

Reading List for IPPM Book - Strang & Vajjhala (2024), UK:Springer

1. Comparative Analysis

Publications:

- A New Risk Assessment Model for Construction Projects by Adopting a Best–Worst Method–Fuzzy Rule-Based System Coupled with a 3D Risk Matrix [140] | [doi.org](#)
- An Innovative Framework of 5D BIM Solutions for Construction Cost Management: A Systematic Review [141] | [doi.org](#)
- Predicting building damage grade by earthquake: a Bayesian Optimization-based comparative study of machine learning algorithms [142] | [doi.org](#)
- Assessing the Implementation of AI Integrated CRM System for B2C Relationship Management: Integrating Contingency Theory and Dynamic Capability View Theory [143] | [doi.org](#)
- Decentralized project management concept for schedule-critical space projects [144] | [doi.org](#)
- Identifying and Evaluating Critical Success Factors for Industrialized Building Systems Implementation: Malaysia Study [145] | [doi.org](#)
- Exploring the Role of Organizational Mindfulness on Cloud Computing and Firm Performance: The Case of Kenyan Organizations [146] | [doi.org](#)
- Big data in relation with business intelligence capabilities and e-commerce during COVID-19 pandemic in accountant’s perspective [147] | [doi.org](#)
- A Fuzzy Multi-objective Mathematical Programming Model for Project Management Decisions Considering Quality and Contractual Reward and Penalty Costs in a Project Network [148] | [doi.org](#)
- Improving nonconformity responsibility decisions: a semi-automated model based on CRISP-DM [149] | [doi.org](#)
- Smart Progress Monitoring Framework for Building Construction Elements Using Videography–MATLAB–BIM Integration [150] | [doi.org](#)
- A Real-Time Productivity Tracking Framework Using Survey-Cloud-BIM Integration [151] | [doi.org](#)
- Building projects with time–cost–quality–environment trade-off optimization using adaptive selection slime mold algorithm [152] | [doi.org](#)
- Design and optimization of prefabricated building system based on BIM technology

[153] | [doi.org](#)

- Bibliometric Survey for Adoption of Building Information Modeling (BIM) in Construction Industry– A Safety Perspective [154] | [doi.org](#)
- Stochastic Energy Management Strategy of Smart Building Microgrid with Electric Vehicles and Wind-Solar Complementary Power Generation System [155] | [doi.org](#)
- 4D Simulation Research in Construction: A Systematic Mapping Study [156] | [doi.org](#)
- Assessing the Effect of Building Information Modeling System (BIM) Capabilities on Lean Construction Performance in Construction Projects Using Hybrid Fuzzy Multi-criteria Decision-Making Methods [157] | [doi.org](#)
- Formal Modeling and Verification of the Functionality of Electronic Urban Railway Control Systems Through a Case Study [158] | [doi.org](#)
- Building and Testing a Fuzzy Linguistic Assessment Framework for Defect Prediction in ASD Environment Using Process-Based Software Metrics [159] | [doi.org](#)
- Conceptual Framework of an Object-Oriented Simulation Approach for Building Construction Processes [160] | [doi.org](#)

2. Project Management

Publications:

- Online technological STEM education project management [27] | [doi.org](#)
- Does agile methodology fit all characteristics of software projects? Review and analysis [28] | [doi.org](#)
- Extending the Project Management Body of Knowledge (PMBOK) for Data Visualization in Software Project Management [29] | [doi.org](#)
- The role of project management in the success of green building projects: Egypt as a case study [30] | [doi.org](#)
- Project Management for Supply Chains 4.0: A conceptual framework proposal based on PMBOK methodology [31] | [doi.org](#)
- Game-Theoretic Modeling of the Project Management Contract [32] | [doi.org](#)
- Comparative analysis of design/build and design/bid/build project delivery systems in Lebanon [33] | [doi.org](#)

3. Project Management, Agile Methodology

Publications:

- New product development process and case studies for deep-tech academic research to commercialization [228] | [doi.org](#)
- Sustainable smart product-service systems: a causal logic framework for impact design

[229] | doi.org

- The digital transformation of management consulting companies: a review [230] | doi.org
- Customer relationship management and its impact on entrepreneurial marketing: a literature review [231] | doi.org
- Four-step approach to idea management sequencing: redefining or reinventing values in a business model [232] | doi.org
- Multi-sided platforms in competitive B2B networks with varying governmental influence – a taxonomy of Port and Cargo Community System business models [233] | doi.org
- Digital transformation as an interaction-driven perspective between business, society, and technology [234] | doi.org
- Exploring the resources, competencies, and capabilities needed for successful machine learning projects in digital marketing [235] | doi.org
- A systematic literature review concerning the different interpretations of the role of sustainability in project management [236] | doi.org
- How do business model tools facilitate business model exploration? Evidence from action research [237] | doi.org
- Business process management (BPM): terminologies and methodologies unified [238] | doi.org
- Business model innovation in corporate entrepreneurship: exploratory insights from corporate accelerators [239] | doi.org
- Shipping digitalization management: conceptualization, typology and antecedents [240] | doi.org
- AI and robotics in the European restaurant sector: Assessing potentials for process innovation in a high-contact service industry [241] | doi.org
- Project Stakeholder Management as the Integration of Stakeholder Salience, Public Participation, and Nonmarket Strategies [242] | doi.org
- Dual focus: service-product orientation to manage the change paradox following servitization strategy [243] | doi.org
- Promoting Entrepreneurship through a Community Learning Model – Case Study: Green Businesses [244] | doi.org
- Classification tools for business models: Status quo, comparison, and agenda [245] | doi.org
- Transforming workplaces into performing workspaces—Holistic evaluation concept for managing workspace change projects [246] | doi.org
- A framework for implementing robotic process automation projects [247] | doi.org
- Software tools for business model innovation: current state and future challenges [248]

| doi.org

- Integrating COBIT with a hybrid group decision-making approach for a business-aligned IT roadmap formulation [249] | doi.org
- A literature review on the impact of digitalisation on management control [250] | doi.org

1. Comparative Analysis

Machine generated summaries

Machine generated keywords: construction, bim, construction industry, building, fuzzy, cost, progress, algorithm, datum, information model, production, safety, project, simulation, optimization

A New Risk Assessment Model for Construction Projects by Adopting a Best–Worst Method–Fuzzy Rule-Based System Coupled with a 3D Risk Matrix [140]

This is a machine-generated summary of:

Abed, Hayder Razzaq; Rashid, Hatim A.: A New Risk Assessment Model for Construction Projects by Adopting a Best–Worst Method–Fuzzy Rule-Based System Coupled with a 3D Risk Matrix [140]

Published in: Iranian Journal of Science and Technology, Transactions of Civil Engineering (2023)

Link to original: <https://doi.org/10.1007/s40996-023-01105-x>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Shiraz University 2023

Copyright comment: Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"This article proposes a novel model that incorporates organizational maturity as a new dimension in the risk evaluation of construction projects."

"The research methodology uses a hybrid best-worst method-fuzzy rule-based system (BWM-FRBS) combined with a 3D risk matrix to evaluate risks based on the probability and mathematical equations generated for the impact and the organizational maturity."

"The outputs of the preceding equations and the probability of occurrence were then used as inputs to the FRBS model to determine the risk score."

"This model used a 3D risk matrix to construct fuzzy rules."

"Iraqi construction projects were used as a case study to confirm the validity of the integrated model."

"The authors concluded that this model is more effective and precise than conventional techniques for evaluating and prioritizing risk and can provide critical information for risk management."

Introduction

"Researchers and practitioners in the construction sector have developed several approaches based on Monte Carlo simulation (MCS), risk matrix (RM), analytical hierarchy process (AHP), sensitivity analysis (SA), fault tree (FT), and event tree (ET) methods (Ahmadi and others 1)."

"Various models have been created to adequately evaluate the risks that projects can pose."

"In Iran, Keramati and others (2) utilized a fuzzy AHP to analyze customer relationship management risks depending on the expert opinions of project managers."

"Ebrat and Ghodsi (3) assessed construction project risks using an adaptive network-based fuzzy inference system (ANFIS) model."

"The findings demonstrate that the ANFIS model provides more accurate risk assessments for building projects."

"This study estimated the relative weights of risk variables using the fuzzy-AHP approach and then proposed a modified F-MAIRCA to evaluate risk events."

Literature Review

"Risk could be uncertainty, possible loss, repercussions, the possibility of an undesirable occurrence, or the influence of ambiguity on goals, depending on the situation."

"The ISO 31000 risk management (ISO 4) principle interpretation has become the predominant standard."

"It defines risk as "the influence of uncertainty on the likelihood of attaining the organization's goals.""

"This standard gives a precise method for determining risk and demonstrates that each risk is the result of combining two risk dimensions: the consequences of the risk and the likelihood of the risk occurring."

"When it comes to risk management in its broadest sense, the scales are virtually always subjective and highly varied from one organization to the other (Waldron 5; Pons 6)."

"Extending the risk measure to include three or more components is a popular strategy."

Research Gaps and Problem Statement

"There is no constant and straightforward approach on incorporating an additional dimension into risk assessment."

"2 reveals that significant efforts have been produced to address the shortcomings of traditional assessment approaches for risk factors."

"Despite the prevalence of risk identification and assessment methods in this field, there is still a need for novel studies to focus on four fundamental principles: Inaccurate determination of the impact level of an event on the projects' objectives."

"Lack of attention to the maturity of the organizations in risk management as an essential dimension in assessing risks."

Research Objective

"Based on the gaps identified in section 3, the study aims to develop a novel model to

assess, rank, and quantify risk factors by incorporating the organizational maturity as a third dimension in the risk evaluation of construction projects."

"The objectives are as follows: (i) integrating three risk dimensions into a single index, where the first dimension is the probability of occurrence and the other two factors are the impact level and the organizational maturity; (ii) generating mathematical equations derived from a survey of relevant literature and expert judgments for the impact level and the organizational maturity by adopting the best-worst method (BWM); and (iii) inputting the probability of occurrence and the output of mathematical equations into the fuzzy rule-based system (FRBS)-3D risk matrix model, where the result will be the risk score."

Best-Worst Method (BWM)

"Because of the difficulty inherent in making comparisons and the limitations of human comprehension, using a pairwise comparison in practice suffers from the inconsistency of its comparison matrices."

"The BWM was developed by Rezaei; it is a vector-based approach in which the weights of parameters are derived differently depending on paired comparisons."

"To conventional comparison techniques, the BWM employs only integer values to describe preferences, decreases the time required for comparisons, and, most crucially, yields more consistent and trustworthy findings."

Fuzzy Rule-Based System (FRBS)

"The knowledge base represents familiarity with an issue that can be solved using fuzzy linguistic principles such as IF-THEN and the effective use of a fuzzy system through an inference engine which can aid in the production of FRBS output with specified input (Ghosha and others 7)."

"The fuzzification method is done to create values of membership for a variable utilizing the membership functions (MF) depending on the fundamental notions of the theory of fuzzy set."

"With the aid of the membership functions, their value for a fuzzy variable may be generated using the fuzzification process."

"Mamdani, Tsukamoto, and Takagi-Sugeno fuzzy algorithms are three rule-based system algorithms that are regularly employed."

"The Tsukamoto approach defines the consequence of each rule using a fuzzy set with a

monotonic membership function."

"Fuzzy inputs lead to a clear result in the Takagi-Sugeno-type approach (linearly combining the information)."

Methodology

"Stage 4: Building a fuzzy-rule based system model The outputs from the previous stage will be combined with the outputs from the risk occurrence probability."

"These outputs will be inputs to the fuzzy rule-based system (FRBS) model designed based on the Mamdani algorithm in MATLAB software package to compute final risks scores."

"A 3D risk matrix will be used to construct the FRBS model rules in the MATLAB environment."

"The integration of these techniques was as follows: After defining the main and sub-dimensions of the proposed model from stages 1 and 2, the technique (BWM), with the help of 12 construction experts, will then be used to find the weights of the sub-dimensions and build mathematical equations for both the impact level and the organizational maturity."

"The outputs of these two equations and the third dimension (which is the probability of the risk occurrence) will be inputs to the FRBS model."

Field Work

"The focus group considers a qualitative data collection method."

"As Patton (8) underlined, focus groups are used to gather high-quality data in the social environment."

"The authors used strict rules to choose the focus group experts to ensure that the meeting results were accurate: 1."

"Based on these criteria, 12 experts were selected for the focus group meeting."

"This group comprises project managers and academics (Ph.D. in civil engineering) who have extensive knowledge of construction projects and more than 15 years of experience working in various public and private organizations."

"A presentation was provided on the initial structure of the proposed risk assessment

model and the primary and sub-dimensions derived from prior studies."

"To validate the proposed model, ten critical risk factors were gathered from sources (Sami Ur Rehman and others 9; Kassem et al 10; Al-Juboori and others 11; Jahan and others 12), in addition to historical data."

Results

"The risk assessment model comprises three primary dimensions: the probability of occurrence, impact level, and organizational maturity."

"After the expert panel has confirmed the risk assessment model in construction projects and the focus group research has been completed, the BWM will determine the weight of each component in the impact level and organizational maturity equations."

"The model consists of three inputs: the probability of occurrence, the impact level, the organizational maturity, and one output (i.e., risk score)."

"The model's architecture was assessed by two experts with a Ph.D. in risk management with more than 10 years of experience."

"They attribute this to the fact that the proposed model accounted for the weighted relevance of variables (sub-dimensions) in the equations for impact level and organizational maturity, which conventional models overlooked."

"These factors have different levels of risk score in the proposed model."

Discussion

"New and essential factors which impact the risk levels of building projects should be investigated."

"This research recommended the development of a new method to risk assessment in building projects."

"The researchers' next plan was to adopt a new hybrid approach to risk assessment using (BWM-FRBS) coupled with the 3D risk matrix."

"The authors validated the proposed model through compared it with two of the most prevalent conventional risk assessment methods, namely the PI approach and the FMEA."

"With the assistance of five decision-makers, these three models were used to evaluate ten

of the most significant risks affecting building projects in Iraq."

"Provides a suitable approach to uncertainties associated with critical risk assessments of project failure where fuzzy logic can effectively deal with these uncertainties."

"The proposed model successfully detects, evaluates, and prioritizes the most significant risks of construction projects and, consequently, delivers precise and useful information on risk management in building projects."

Conclusion

"Because of the significance of risk evaluation and prioritizing in construction projects, the study aims to present a novel approach based on BWM-FRBS for assessing construction project risks."

"The research methodology involves a six-stage procedure: (i) preparing the initial structure of risk assessment which introduces new dimensions; (ii) focus group session; (iii) constructing mathematical equations using the BWM; (iv) building a fuzzy-rule-based system model; (v) using a 3D risk matrix to construct the FRBS model's rules; (vi) validation and sensitivity analysis."

"A new dimension represented in the organizational maturity was added in the risk assessment model."

"New mathematical equations were built for impact level of risk and organizational maturity."

"The organizational maturity mathematical equation involves four components: risk detection, risk control, resilience, and risk communication."

An Innovative Framework of 5D BIM Solutions for Construction Cost Management: A Systematic Review [141]

This is a machine-generated summary of:

Vigneault, Marc-Antoine; Boton, Conrad; Chong, Heap-Yih; Cooper-Cooke, Barry: An Innovative Framework of 5D BIM Solutions for Construction Cost Management: A

Systematic Review [141]

Published in: Archives of Computational Methods in Engineering (2019)

Link to original: <https://doi.org/10.1007/s11831-019-09341-z>

Copyright of the summarized publication:

CIMNE, Barcelona, Spain 2019

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Developments in the fifth dimension (5D) of building information modelling (BIM) has fostered new and potential improvements in terms of efficiency, quality and precision during cost management processes."

"The research aims to develop an innovative framework of 5D BIM solutions for construction cost management."

"Eighteen software or web solutions were found and analysed against five main areas of the cost management practices."

"The research contributes to creating new awareness and knowledge from the available 5D BIM solutions towards the current cost management requirements as well as the future need in the digitalised working environment."

Introduction

"The fifth dimension (5D) of building information modelling (BIM) presents itself as a potential solution to the problem and a tool allowing better and more efficient cost management [13, 14, 15, 16]."

"To address this research question scientifically, the following objectives are designed, namely, (a) critically review current development of 5D BIM uses in relation to

construction cost management, (b) analyze all related software for the 5D BIM solutions and (c) develop an innovative framework of 5D BIM solutions for construction cost management."

"The research would contribute to new insights into the current need of 5D BIM solutions in cost management as well as the future need of a digitalised working environment in the construction industry."

"The first section presents the current construction cost management processes and methods and compares them with documented 5D BIM uses."

Theoretical Foundation

"5D BIM adds to the third and fourth dimensions with the ability to link costing information to the digital model and the project's schedule to allow for better cost management [15]."

"Combined with the quantity take-off capabilities of the 5D BIM solutions, the cost estimating features of most 5D BIM tools allow the creation of cost estimates that represent with more precision the actual costs of a project [13] and overall costs reduction [17]."

"Many 5D BIM capabilities allow for fast and efficient cost control processes, for example, Cash flow forecast Kim and Grobler [18] have demonstrated through their research that automated cash flow analyses where possible with the use of 5D BIM, allowing for faster and more precise cash flow forecasts early in the project's lifecycle."

"The method proposed uses a user-created calculation structure in an existing 5D BIM solution, allowing for an effective and easily upgradable estimate of a project's life-cycle costs."

Research Methodology

"In the third step, the cost management processes were divided into five principal categories after combining and analysing the guides and references from the PMBOK [19], the Royal Institution of Chartered Surveyors [20] and the Australian Cost Management Manual [21], each containing particular requirements that have been confirmed by industry stakeholders and used to review the 5D BIM solutions."

"Cost budgeting In order for the 5D solutions to answer the needs relative to cost budgeting, the reviewed software were checked for subcontractor comparison functions allowing the decision makers to evaluate which offer is the best for a given project."

"Claims and others To improve claims management and pricing processes, the 5D solutions have been reviewed to identify their ability to keep track of changes made to the model and

the impact of these changes on project costs."

"To develop the requirements for the evaluation criteria, the reviewed 5D BIM solutions and the manner in which they met the requirements were firstly observed."

Results

"Besides, all the reviewed non-BIM readable solutions met less than 50% of the cost management requirements for all 3 construction phases, performing slightly better with the post-construction requirements."

"Separately, most of the requirements in the cost budgeting, cost control and claims pricing and management are not met by 50% or more of the reviewed 5D BIM solutions."

"The non-BIM readable solutions answered around 10% of the cost management plan and cost estimating requirements, with no requirements met for cost budgeting, cost control and claims pricing and management requirements."

"The top 3 solutions have been identified for each 5D BIM level according to their ability to meet the most construction cost management requirements developed and the top 3 solutions for an overall use throughout the 3 phases of a project are also presented."

"Both solutions met the requirements in the claims pricing and management category for 5D BIM at pre-construction phase."

Discussions

"This research has developed a new and neutral framework in helping users to make informed decisions regarding the choice of a 5D BIM solution for cost management."

"It has synchronised the appropriate 5D BIM solutions with the intended requirements in cost management for future digitalisation process in the construction industry."

"This research will also help practitioners such as clients, contractors and professionals in making informed decisions regarding the selection of 5D BIM solutions that could potentially greatly improve their cost performance in BIM-enabled projects."

"While the contractor would most likely welcome a 5D BIM model that allows them to monitor and manage a project's costs in fine details, it is unlikely that they would want to reveal the detailed breakdown of their costing information to complete the project to all the project team members who have access to the model and to the client."

"Some research and development will probably have to be done in the legal aspects binding project team members for stakeholders to benefit from the advantages proposed by 5D BIM technologies."

Conclusion

"The research has reviewed and analysed current 5D BIM solutions' capabilities against cost management processes, and subsequently, developed a 5D BIM solution decision-making framework of 5D BIM solutions for cost management."

"The findings help users make informed decisions based on the cost management requirements and also highlight new areas of improvement and development for future 5D BIM solutions."

"Certain limitations need to be considered in the research."

"The research also limited the review of the solutions to freely available information."

Predicting building damage grade by earthquake: a Bayesian Optimization-based comparative study of machine learning algorithms [142]

This is a machine-generated summary of:

Al-Rawashdeh, Mohammad; Al Nawaiseh, Moh'd; Yousef, Isam; Bisharah, Majdi; Alkhadrawi, Sajeda; Al-Bdour, Hamza: Predicting building damage grade by earthquake: a Bayesian Optimization-based comparative study of machine learning algorithms [142]

Published in: Asian Journal of Civil Engineering (2023)

Link to original: <https://doi.org/10.1007/s42107-023-00771-6>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Nature Switzerland AG 2023

Copyright comment: Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other

rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"This study compares Bayesian Optimization-based machine learning systems that anticipate earthquake-damaged buildings and to evaluates building damage classification models."

"The class imbalance makes estimating building damage grades difficult, emphasizing the necessity for careful modeling."

"The optimization technique maximizes the receiver operating characteristic curve (AUROC), which measures the models' ability to discern between damage levels."

"Convergence shows that Bayesian Optimization improves model discrimination."

"The optimized models classified building damage grades with an AUROC of 0.9952."

"The ElasticNet model predicts building damage grade with 92.56% test accuracy and 92.67% train accuracy."

"With 89.39% test accuracy and 99.82% train accuracy, the Random Forest model performs well."

"The Decision Tree model has 89.19% test and 99.94% train accuracy."

"Bayesian Optimization helps models acquire data patterns, improving classification accuracy."

"This study shows that machine learning and optimization can forecast building seismic damage grades."

Introduction

"Zhang and others (22) employed machine learning algorithms to correlate response and damage tendencies to the structural safety status of the building (safe or dangerous to inhabit)."

"Thaler and others (23) established this machine learning-enhanced Monte Carlo simulation model to forecast the structure reaction in earthquake engineering, and neural networks are utilized to strengthen the method's reliability at the tail end of the distribution."

"The primary goal of this study is to assess the ability to exist machine learning methods (Logistic Regression, Decision Tree, K-Nearest Neighbors, Linear Discriminant Analysis, Naive Bayes, Extreme Gradient Boosting, and Random Forest) to assess the responses of structures based on earthquake characteristics and the recorded responses of a structure that has been subjected to an earthquake."

"The following objectives were pursued throughout the investigation: (1) determining the accuracy of different machine learning models in predicting and estimating the amount of damage sustained by buildings, and (2) determining the input factors that have the greatest impact on how accurately the models estimate the amount of damage sustained by structures."

Methodology

"The dataset in question will be utilized for the purpose of training models to prognosticate the degree of building damage, employing the elastic net, Random Forest, and Decision Tree methodologies."

"The selection of Elasticnet, Random Forest, Decision Tree, and Bayesian Optimization was based on their distinctive characteristics and ability to accurately assess the extent of building damage in the context of earthquake data."

"The objective of employing this methodology to evaluate the performance of models is to identify the model that can provide the most accurate forecast of the building damage grade, as determined by the highest test accuracy, the best train accuracy, and the smallest mean squared error."

"To discern the fundamental patterns and associations between the input data and the grade of building damage, the training set is utilized to instruct an elasticnet, a Random Forest, and a Decision Tree model."

Results and discussion

"The Random Forest model demonstrated a successful prediction of the building damage grade without any visual input, achieving an accuracy of 89.39% on the test data."

"The ElasticNet model exhibited a high level of performance in its ability to predict the building damage grade on the test data that had not been previously observed, achieving an accuracy rate of 92.56%."

"The model's high accuracy during training suggests that it has effectively assimilated the data from the training set, thereby successfully capturing the correlations between the input variables and the damage grade of the building."

"The Decision Tree regression model exhibited a high level of accuracy in predicting the building damage grade on the unseen test data, achieving an accuracy rate of 89.19%."

"The model's high accuracy during training suggests that it has effectively assimilated the data from the training set, thereby successfully capturing the correlations between the input variables and the damage grade of the building."

Conclusion

"The article titled "Predicting Building Damage Grade by Earthquake: A Bayesian Optimization-based Comparative Study of Machine Learning Algorithms" provides a comprehensive assessment of the model's efficacy and discusses the implications of the results in the Results and Discussion section."

"This study examines the convergence curve, which illustrates the efficacy of Bayesian Optimization in fine-tuning machine learning models."

"Assessment criteria such as test accuracy, train accuracy, and MSE are employed to assess the efficacy of the Random Forest, ElasticNet, and Decision Tree models."

"Acknowledging the limitations is imperative for comprehending the study's findings and providing guidance for future research aimed at enhancing machine learning models for predicting building damage grades."

"The present study demonstrates the potential of Bayesian Optimization in improving the predictive precision of machine learning models for assessing the extent of building damage."

Assessing the Implementation of AI Integrated CRM System for B2C Relationship Management: Integrating Contingency Theory and Dynamic Capability View Theory [143]

This is a machine-generated summary of:

Chatterjee, Sheshadri; Mikalef, Patrick; Khorana, Sangeeta; Kizgin, Hatice: Assessing the Implementation of AI Integrated CRM System for B2C Relationship Management: Integrating Contingency Theory and Dynamic Capability View Theory [143]

Published in: Information Systems Frontiers (2022)

Link to original: <https://doi.org/10.1007/s10796-022-10261-w>

Copyright of the summarized publication:

The Author(s) 2022

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Failure to plan AI-CRM technology implementation in an organization could lead some to success and others to failure."

"The Dynamic Capability View theory emphasizes the organizational ability to react adequately in a timely manner to any external changes and combines multiple capabilities of the organization, including organizational CRM and AI capabilities."

"Against this background, the purpose of this study is to examine the success and failure of implementation of AI integrated CRM system in an organization from B2C perspective using Contingency theory and Dynamic Capability View theory."

"The study finds that information quality, system fit, and organizational fit significantly and positively impact the implementation of AI-CRM for B2C relationship management."

"There is a moderating impact of technology turbulence on both acceptance and failure of AI-CRM capability in the organization."

Introduction

"In the changed business scenario, there is a necessity for applying AI integrated CRM system to embolden the relationships between organizations and the customers (Alam and others, 24; Wikner, 25)."

"AI integrated CRM system is helpful for automated decision-making and enhances the overall performance of organizations by improving B2C relationship (Peters and others, 26; Cortez & Johnston, 27)."

"AI integrated CRM systems are expected to perform automated routine tasks and support an organization to appropriately customize, prioritize, and segment the collected customers' data to improve the performance of an organization (Gotteland and others, 28) by improving the relationship between the organizations and their potential customers."

"RQ2: Whether there is any moderating impact of technology turbulence for success and failure of implementation of AI integrated CRM system in the organizations?"

"The contingency theory has been extended by investigating how the contingency plan coalesces with several abilities to produce best results by implementing AI integrated CRM system in organization in the B2C context."

Literature Review

"Studies have documented that whether the implementation of a new technology in an organization will be successful or not depends on the characteristics of the organization."

"Studies have suggested that the success or failure to implement a technology in an

organization depends on many factors, such as design characteristics, system characteristics, quality of information, and so on (Sivarajah and others, 29)."

"It has been observed that the users' abilities would affect the quality of information to be procured, system characteristics as well as readiness of the organization towards implementation of a new technology (Powell and others, 30)."

"Studies have been conducted to investigate the potentials of AI implementation in organizations, but none investigated the factors responsible for achieving success or incurring failure to implement a new system like AI integrated CRM system in an organization (Chatterjee and others, 31) especially, in the context of B2C relationship management."

Theoretical Background and Development of Conceptual Model

"From the review of literature, it has been observed that for implementation of AI-CRM system for B2C relationship management, the best way is to depend on common characteristics of the concerned organization and its employees."

"H4: Organization Characteristic (OC) positively impacts Organizational Fit (OF) for implementing AI-CRM system in the organizations for B2C relationship management."

"It has also been highlighted that the various issues including abilities of the employees of organizations, capability of the organizations, resource collection abilities, and other factors help in successful implementation of a new system, like AI-CRM in an organization to improve the B2C relationship (Wu, 32)."

"Technology turbulence is such a concept that it inhibits an organization to enjoy the color of success even after implementation of a new technology like AI-CRM in B2C relationship management."

Research Methodology

"The technique requires the quantification of responses of potential respondents with a standard scale."

"We prepared questions to understand the attitude of the respondents towards AI-CRM implementation in organizations with a view to improving B2C relationship management."

"These questions were prepared in a manner that the potential respondents did not face any difficulties understanding the questions (Mellahi & Harris, 33)."

"We also prepared a response sheet to be provided to the respondents."

"The response sheet contained 5 options for each question, namely Strongly Disagree (SD) marking as 1 to Strongly Agree (SA) marking as 5."

"The questions were tested with 11 managers of some organizations where AI-CRM was implemented and where the organizations function in B2C context."

"These 692 potential respondents were requested to respond in the response sheet within two months (January–February 2019)."

Data Analysis with Results

"Using SmartPLS3 software, we performed bias correlated and accelerated bootstrapping procedure by considering 5000 iterations of subsamples, estimated the path coefficients of the several linkages and the corresponding level of significance by computing probability values (p values) for ensuring stability of the results."

"The results show that DC impacts IQ with path coefficient 0.17 with level of significance $p < 0.05$ (H1)."

"The results also highlight that IQ, SF, and OF simultaneously impact IARM and among these impacts, the impact of SF on IARM is maximum as the concerned path coefficient is the highest among the three linkages and this is 0.32 with level of significance $p < 0.01$ (**) (H6)."

"The effects of the moderator TT on the two linkages IARM→ACA and IARM→ACF are found significant as the impacts of moderator TT on these two linkages bear path coefficients 0.23 and 0.34 with levels of significance $p < 0.05$ (*) and $p < 0.01$ (**) respectively."

Implications of the Study

"Our study investigates how the implementation of AI-CRM in organizations for B2C relationship management can be successful and how in some circumstances the implementation could lead to failure."

"Our study has also used the Contingency theory to develop the model for effectively implementing AI-CRM in B2C relationship management."

"The contingency theory has been successfully used to interpret how AI-CRM can be implemented in the organizations."

"This study helped organizations to understand the several factors associated with the success and failure of implementation of technology like AI-CRM system in the context of B2C relationship management."

"Our study has highlighted that information quality (IQ), system fit (SF), and organizational fit (OF) positively impact the implementation of AI-CRM for B2C relationship management in the organizations (H5, H6, and H7)."

Conclusion

"Our study has developed the model by principally drawing on the Contingency theory."

"In such a scenario, the managers of organizations contemplating to implement AI-CRM for improving the B2C relationship utilizing the contingency approach need to possess appropriate skills and expertise to analyze the various situations (Kast & Rosenzweig, 34)."

"Our study necessitated inclusion of the construct 'information quality' in the framework of Contingency theory because the introduction of new AI-CRM technology and the model has become successful."

"Our study has also developed the model that highlights factors that could estimate both the success and failure to implement AI-CRM system in organizations."

Decentralized project management concept for schedule-critical space projects [144]

This is a machine-generated summary of:

Campos, Jaime; Ferguson, Philip: Decentralized project management concept for schedule-critical space projects [144]

Published in: Aerospace Systems (2021)

Link to original: <https://doi.org/10.1007/s42401-021-00098-7>

Copyright of the summarized publication:

Shanghai Jiao Tong University 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The software industry has recently adopted modern, more flexible project management techniques based on "lean-agile" methods that enable team collaboration and communication through distributed task and schedule management, online document sharing and rolling-wave planning."

"Due to the inherent schedule complexities of hardware development and the firm constraints of design review and launch timelines, flexible project management frameworks have not been widely adopted for space mission management."

"A recent satellite development project was managed using the new modified-agile approach, while collecting project hours and task durations."

"Comparisons were made between this new style of space project management and a recently completed satellite development project using traditional space project management techniques."

"Results show that the new management approach reduced strain on the project team, improved overall productivity, and maintained a more level task loading when compared to the traditional management approach."

Introduction

"This paper presents a hybrid phased-agile approach for space project management and systems engineering that provides a more accommodating structure to project change, while maintaining a schedule that adheres to the strict design review and launch milestones associated with space projects."

"This new management approach results in a more even distribution of tasks and better team communication when compared to traditional space project management."

"To demonstrate the value of this new approach, we compare and contrast empirical project health data (including labor hours and task start/end dates) from two different projects: (1) a recently completed industry satellite development project managed using traditional space project management strategies, and (2) a CubeSat project (Iris) using modern, Agile-inspired management strategies."

"The primary contributions of this research include: A hybrid phased-agile approach to project management that is suitable for space systems engineering."

Background

"Carson [35] notes that this approach allows for the careful and incremental completion of work that enables the project team to ensure the system is designed as a whole."

"EVM is defined as comparing the following three primary economic metrics to monitor the project health: Planned value (PV)—authorized budget assigned to scheduled work Earned value (EV)—the measure of work completed in terms of budget authorized Actual cost (AC)—the cost of the work performed on an activity EVM provides managers and sponsors with a meaningful method for understanding the project progress, but requires the existence of a pre-established detailed plan to compare the three metrics."

"The combination of the traditional phased approach and the EVM method provides space projects with valuable structure."

"Although the traditional phased approach provides valuable structure to modern space projects, the space sector seeks methods to reduce project cost and development time."

"Dwyer [36] investigated methods to apply the Agile Philosophy, a work philosophy that focuses on adapting to change over adhering to a rigid plan, to mechatronic projects consisting of small multi-disciplinary teams."

Research methodology

"The Iris team was trained to identify four sources of delay: Incorrect priorities—not working on a critical path (high priority) task when one is available Multitasking—resources dividing their attention among two tasks, increasing the completion time for both tasks Unavailable resources—if resources or tools are unavailable, the task will be delayed Technical difficulties—technical problems that are present in every project While project management techniques cannot typically mitigate technical difficulties, planning and strong communication can mitigate the first three items."

"To mitigate this, the Iris project required that team members schedule one active task at a

time, to promote focus and productivity."

"This research received the labor hours for phases B through D, and the task start and end dates for phases C and D. The management data can be combined to determine the level of effort needed by the team to complete the necessary work, providing insight into how a traditionally managed project uses the development team."

Results and discussion

"Project 1 provided labor hours for phases B through D, organized by the category of work (such as project management, subsystem design, or procurement)."

"To determine how the traditional project management approach impacted the team for Project 1, this study combined the labor hour data with the task start and end dates to approximate the team's level of effort through each phase."

"While the traditional project management approach provides a useful framework for organizing and planning work, the data shows that high work periods occur that can impact the team."

"To investigate the impact of non-traditional management approaches on a space project, this study collected labor hours, task start and end dates for the completed phase B and ongoing phase C. This project underwent phase B from January 2019 to October 2019, and began Phase C in October 2019."

Conclusion

"The Iris project (Project 2) is a CubeSat development effort that combined the traditional phased management approach with the Agile Philosophy to develop a highly adaptive management style."

"The Iris project implemented elements of the Agile Philosophy and Scrum planning to work efficiently with a team that has changing schedules and availabilities."

"Project management data from Iris demonstrated less management effort and a more balanced task loading when compared to a traditionally managed satellite project."

"The Iris project demonstrated remarkable resilience to the labor restrictions due to the COVID-19 pandemic (although there was no similar labor disruption to compare to in the traditionally managed satellite project)."

Identifying and Evaluating Critical Success Factors for Industrialized Building Systems Implementation: Malaysia Study [145]

This is a machine-generated summary of:

El-Abidi, Khaled M. Amtered; Ofori, George; Zakaria, Sharifah Akmam Syed; Mannan, Md. Abdul; Abas, Noor Faisal: Identifying and Evaluating Critical Success Factors for Industrialized Building Systems Implementation: Malaysia Study [145]

Published in: Arabian Journal for Science and Engineering (2019)

Link to original: <https://doi.org/10.1007/s13369-019-03941-4>

Copyright of the summarized publication:

King Fahd University of Petroleum & Minerals 2019

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The drive toward implementing an industrialized building system (IBS) in Malaysia is in line with Malaysia's Construction Industry Transformation Plan 2016–2020, which seeks to increase more than double the construction industry's productivity."

"Although the introduction of IBS in Malaysia is not new, its acceptance has not been extensive, and IBS implementation is still slow."

"To support the successful implementation of IBS, it is vital to determine the factors that influence the achievement of this aspiration."

"This study aims to identify and evaluate the critical success factors (CSFs) that contribute to the smooth implementation of the IBS dimensions within the context of the Malaysian

construction industry."

"In order to consolidate the set of candidate success factors, these CSFs were identified from the literature review and confirmed through a self-administered survey questionnaire."

"The findings indicate that the CSFs in IBS implementation have different priorities and weights."

Introduction

"The construction industry, as a whole, remains very reluctant to explore IBS use as reflected by its slow uptake [38]."

"The current work's main goal is to identify the critical success factors (CSFs) that influence IBS implementation and to prioritize these factors based on their respective weights."

"The industry can subsequently focus on these CSFs to achieve greater IBS implementation efficiency."

"To prioritize the CSFs according to their individual degrees of importance so that the industry can assess its current practices and adjust its resources to accelerate the uptake of IBS."

"The CSFs will serve as invaluable guidelines for many stakeholders, including both the public and private sectors, with the former acting as a client to the construction sector, as its regulator, and as a provider of funds, in order to accelerate IBS uptake using strategic approaches that lead to a sustainable development in Malaysia."

Research Method

"In these studies, the usual procedures are outlined in five stages: (1) identifying a group of selected success factors (SSFs); (2) conducting a survey to determine the importance of each SSF in accordance with a specific goal; (3) calculating each factor's importance index value based on the survey data; (4) using the importance index value to determine the CSFs from the group of SSFs; and (5) analyzing and interpreting the identified CSFs."

"The self-administered AHP questionnaire was developed via a pilot study, and then the opinions of the same experts who participated in the first survey were collected."

"Analyzing the self-administered survey questionnaire In the second stage, the close-ended questions were analyzed using Microsoft Excel software, quantitative methods were

adopted to analyze these questions in a straightforward way, where a percentage was calculated for every question to determine the power of the answer to the question."

Results

"According to Zakaria and others [39] the government—as a major construction client—plays its role by implementing promotions/advocacies, policies, rules and requirements, and by determining the competitive directions of the construction industry and the IBS decision-making process."

"In order to solve this problem, and in accordance with the initiatives made by the Construction Industry Transformation Program (CITP) (2016–2020), the Malaysian Investment Development Authority (MIDA) has formulated a plan to attract investments of RM 2 billion by 2020 from at least 100 new IBS manufacturers [37]."

"Under the recent government plan CITP (201–2020) [38] more tax exemptions have been introduced such as construction levies for any residential development that achieve 50% of IBS contents (CIDB levy—0.125% of the total cost of the project according to Article 520)."

"The experience of a manufacturer in IBS projects is not only limited to product manufacturing but may also involve the entire process, including project planning, design, management, and implementation."

Discussion

"The CSFs that supports the implementation of IBS were based on five elements: strategy, sources of funding, process, people, and enabler."

"The study found that some CSFs are more essential to the successful implementation of IBS than others."

"Besides that, it is discovered that easy access guarantee, technology enhancement, and research and development are important enablers and support tools that uphold the development of strategy, people and process related to IBS implementation."

"Ranking the factors of IBS implementation was considered the goal, which formed the first level in the hierarchy."

"The second level consisted of the five key elements, whereas the third level consisted of various constructs based on the IBS CSFs to be compared and ranked."

"A hierarchical model for the CSFs affecting IBS implementation was developed based on

the factors identified from the first survey."

Conclusion

"IBS implementation is considered a high-risk strategy because the many stakeholders that participate in this process are very closely linked to one another."

"The factors that determine the success of IBS implementation must be fully investigated."

"The obtained results showed that CSFs could serve as valuable references that help IBS stakeholders develop the effective uptake of industry strategies, which could lead to the creation of a favorable environment for implementing IBS in Malaysia."

"The relative importance of all these factors and their impacts on different IBS implementation dimensions were determined in this study via adopting the AHP method."

Exploring the Role of Organizational Mindfulness on Cloud Computing and Firm Performance: The Case of Kenyan Organizations [146]

This is a machine-generated summary of:

Oredo, John; Dennehy, Denis: Exploring the Role of Organizational Mindfulness on Cloud Computing and Firm Performance: The Case of Kenyan Organizations [146]

Published in: Information Systems Frontiers (2022)

Link to original: <https://doi.org/10.1007/s10796-022-10351-9>

Copyright of the summarized publication:

The Author(s) 2022

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source,

provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The popularity and use of cloud computing has largely been driven by the reported benefits on firm performance."

"Technology providing a paradigm shift in information technology (IT) services, the process through which the adoption of cloud computing effects organizational performance in the context of developing countries is still unclear."

"The aim of this study is to provide a theoretical discussion that advances our understanding about the mediating and moderating roles of organizational mindfulness in the context of cloud computing adoption and organizational performance."

"The findings reveal that organizations need to systematically develop mindfulness capabilities to benefit from the adoption of cloud, and IT innovations in general."

Introduction

"While such studies have provided new insights and understanding of this phenomenon in new contexts, there is a noticeable absence of rigorous research that examine the adoption of cloud computing services in the private sector of developing countries."

"Against this background, this study is motivated to answer the following research question, "What is the mechanism through which cloud computing adoption impacts organizational performance in the context of Kenya?"."

"We adopt the theory of organizational mindfulness (OM) as a theoretical lens to understand and explain the process through which cloud computing adoption can impact organizational performance in the private sector organizations in Kenya, a developing

country."

"This study, therefore, extends the application of organizational mindfulness in IS research by exploring its mediating and moderating roles as a way of explaining how cloud computing adoption impacts organizational performance in the context of Kenya, a developing country."

Related Literature

"Cloud computing services are delivered in terms of three models, namely, (i) cloud service models, (ii) cloud deployment models, and (iii) the cloud consumption model."

"Cloud computing service models are mainly referred to as cloud service layers."

"These layers have been variously referred to as cloud service models (Sriram & Khajeh-Hosseini, 40), cloud business models (Yang & Hsu, 41; Zhang and others, 42), and cloud architectural layer (Stanoevska-Slabeva & Wozniak, 43)."

"Cloud consumption model offers a unique way to consume computation, network, storage, and software resources."

"The characteristics of cloud computing are on-demand self-services (e.g., the consumer can unilaterally provision computing capabilities without the provider's intervention, broad network access (e.g., provides capabilities over the internet for different users and services; 3) resource pooling (e.g., service to be used on a need basis by the consumer; and 4) a measured service (e.g., consumers are billed based on consumption) (Buyya and others, 44)."

Cloud computing in Kenya

"Organizations in the financial, technology, and manufacturing sectors were selected for this study as these sectors remain the top adopters of cloud computing amongst industries (Kirkland, 45)."

"The growing interest in cloud computing by organizations in Kenya and more so the public sector can be attributed to the national ICT policy and regulatory frameworks that were created in 2019."

"The Kenyan government recognizes that the adoption of cloud computing and emerging technologies are expected to transform the Kenyan economy (Ministry of Information, Communications and Technology, 46)."

"The development of a national strategy and regulatory frameworks by the Kenyan government has accelerated the adoption of digital technologies in both the public and private sectors, which has placed Kenya as one of the leading countries in terms of digital integration and the economy (Namunwa, 47)."

Organizational Mindfulness

"At the organizational level, mindfulness is an organization's cognitive processes of revealing and redirecting new events and their erroneous consequences (Weick & Sutcliffe, 48)."

"Organizations adopting IT innovations like cloud computing are faced with a variety of risks and other related uncertainties that can only be handled through High Reliability Organizations (HRO) principles of organizational mindfulness (Enya and others, 49)."

"Preoccupation with failure is an aspect of organizational mindfulness in which an organization is constantly concerned about failures even though they seldom arise (Dernbecher & Beck, 50)."

"Cloud computing services are known to be vulnerable to outages and security breaches and therefore organizations adopting them must continuously monitor any failure or outage."

"The process of adopting and implementing any IT innovation (like cloud computing) is itself prone to failure, and reflective attention to possibilities for failure in this domain also enlarges mindfulness (Swanson & Ramiller, 51)."

Hypothesis Development and Research Model

"We hypothesize: H1: There is a positive relationship between cloud computing adoption (CCA) and firm performance (FP) within the context of organizations in Kenya."

"We hypothesize: H2: There is a positive relationship between cloud computing adoption (CCA) and organizational mindfulness (OM) within the context of organizations in Kenya."

"We hypothesize: H3: There is a positive relationship between organizational mindfulness (OM) and firm performance (FP) within the context of organizations in Kenya."

"We hypothesize: H4: Organizational mindfulness (OM) mediates the relationship between cloud computing adoption (CCA) and firm performance (FP) by organizations in Kenya."

"Mindful organizations, apart from making IT innovation adoption decisions based on their

organizational specifics will also make better decisions throughout the implementation process leading to increased firm performance."

"We hypothesize: H5: Organizational mindfulness (OM) has a positive moderating effect on the positive relationship between cloud computing adoption (CCA) and firm performance (FP)."

Research Methodology

"Whereas the use of PLS- SEM is almost mature in marketing and management research when it comes to testing relationships amongst latent variables (Chang and others, 52), its use is emerging in information systems research (Mican and others, 53)."

"The process was conceptualized in the form of a PLS-SEM model comprised of the relationships amongst cloud computing adoption, organizational mindfulness, and firm performance."

"Model for this study comprised of cloud computing adoption, organizational mindfulness, and firm performance as latent variables."

"The study adapted previously validated scales from the literature on organizational mindfulness, cloud computing adoption and firm performance."

"The measurement model comprised of the indicators and their relationships with relevant latent variables."

"The study modelled the latent variables as reflective indicators since that is the norm in most information systems PLS-SEM based studies (Urbach & Ahlemann, 54)."

"The indicators and their relationships with the latent variables represent the measurement model."

"The sample size of the study was 180 firms, comprising of 60 firms from each sector."

Analysis and Findings

"The PLS-SEM estimates model parameters by drawing on latent variables formed from indicators and applies a series of ordinary least squares regressions to maximize the explained variance of the endogenous latent variables (Ringle and others, 55)."

"PLS-SEM was used to estimate the relationship amongst cloud computing adoption (CCA),

organizational mindfulness (OM) and firm performance."

"It was used to test the moderating effect of organizational mindfulness (OM) on the relationship between cloud computing adoption (CCA) and firm performance (FP)."

"The latent variables of the study; cloud computing adoption, organizational mindfulness and firm performance were modelled as reflective indicators."

"In the second hypothesis, the positive relationship between cloud computing adoption (CCA) and organizational mindfulness (OM) was evaluated."

"The fifth hypothesis was that organizational mindfulness (OM) positively moderates the relationship between cloud computing adoption (CCA) and firm performance (FP)."

Discussion

"While there could be possible factors that explain how cloud computing adoption is related to firm performance, in the present study, the role of organizational mindfulness was explored."

"The study provided an empirical test of the mediating and moderating role of organizational mindfulness on the relationship between cloud computing adoption and firm performance."

"The hypothesis was that cloud computing adoption influences firm performance through organizational mindfulness."

"The fifth hypothesis was on the moderating effect of organizational mindfulness on the positive relationship between cloud computing adoption and firm performance."

"The study found that that organizational mindfulness had a small and insignificant moderating effect (0.014) on the relationship between cloud computing adoption and firm performance."

"The results of the study indicate that managers would benefit by investing in the creation of an organizational mindfulness culture, to enable their organizations to successfully reap benefits from adoption of cloud computing."

Conclusion

"This study examined the mediating and moderating roles of organizational mindfulness in the relationship between cloud computing adoption and firm performance across private

sector organizations in Kenya, a developing country."

"By using organizational mindfulness as a theoretical lens, the study advances understanding of how organizations in developing countries can adopt and benefit from IT innovations."

"The reason being that organizational mindfulness may be embedded as part of an organization's culture and it would be difficult to separate it from the general organizational culture."

"Future research could further examine the processes through which adoption of IT innovations impact organizational performance and the role of organizational mindfulness could be integrated with other process theories."

Big data in relation with business intelligence capabilities and e-commerce during COVID-19 pandemic in accountant's perspective [147]

This is a machine-generated summary of:

Huy, Pham Quang; Phuc, Vu Kien: Big data in relation with business intelligence capabilities and e-commerce during COVID-19 pandemic in accountant's perspective [147]

Published in: Future Business Journal (2023)

Link to original: <https://doi.org/10.1186/s43093-023-00221-4>

Copyright of the summarized publication:

The Author(s) 2023

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is

not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"This research aims at producing a thorough and accurate analysis on how big data as a service and business intelligence capabilities provide a series of opportunities for small and medium enterprises to succeed in E-commerce."

"The statistical data were drawn from samples of accountants within small and medium enterprises, spanning two periods, the period of COVID-19 pandemic and the period of new normal."

Introduction

"BI has emerged as a key technology for enhancing enterprise business performance as well as a driving force behind the development of EC and e-services [56]."

"Prior studies have shown that BD is an essential long-term tool for EC businesses since these businesses need new technology to control and analyze large amounts of information and data [57]."

"Starting from these considerations on the lack of an established academic background on this specific subject pertaining to the potential role of BAAS in driving EC and BI, an analysis on how BAAS can foster the EC and business intelligence capabilities (BIC) in SMEs represented the main motivations in this research and underscored chances for theoretical and practical contributions."

"The current study is a trailblazer in the field of research since it provides vital new information about the extraordinary effects of BAAS on EC in SMEs in developing nations."

Theoretical understanding and foundation

"EC, as a general term, refers to internet technology, based on browser or server applications, through which buyers and sellers engage in a variety of trade activities to

facilitate consumer online shopping, online payment, as well as new business activities involving a number of different business activities and other models [58]."

"Almost all of enterprises currently know little about their customers, BI will enable those enterprises to understand the tactics and technologies used for data analysis, offering historical, current, and forecast views of business information [59]."

"Utilizing BI systems to support strategic organizational operations, such as identifying opportunities, threats, risk assessments, and trends in the business environment, is referred to as having strategic BI capabilities."

"Operational BI capabilities include exchanging information across business units, modeling, and process optimization for service and production [60]."

Research hypotheses corroboration and model formulation

"BD helps the BI to make decision-driven decisions and to identify the unknown facts which indeed contributes to taking a step in the process of making a statement in profits aspects of the organization [61]."

"BD can make a difference for the BI of enterprises, help them make better strategic and tactical decisions as well as create value [62]."

"In accordance with Balachandran and Prasad's [63] suggestion, BI refers to technology, tools, and techniques for gathering, integrating, analyzing, and displaying business information to uphold better and quicker business decisions."

"BI is taken advantage by businesses to extract useful patterns through outlier detection, process mining, and clustering, such as increasing combustion efficiency, in addition to being used as a tool to transform raw data into useful information for better decision making for administrative purposes [64]."

"The higher BIC can enable enterprises to extract valuable market information of all competitors and determine potential business opportunities in EC."

Material and methods

"A small-scale pilot test was carried out using a sample size of 30 respondents in order to verify the reliability of the scales."

"In order to obtain the theoretical and empirical meaning, the measures of EC in this research were developed from the contribution of Susanty and others [65] which was

corroborated from the current literature and testified by small-scale pilot test."

"The high-order and composite construct was used as the measure of BAAS in this study in order to gain the theoretical and empirical meaning."

"The criteria applied to assess first-order constructs were then formulated employing the outcomes of Wang and others [66] and were testified by small-scale pilot test."

"High-order and composite constructs that were supported by recent literature were used as the BIC measures in order to acquire theoretical and empirical meaning."

Result and interpretation analytical observations

"The effect of BAAS (H1: $\beta = 0.202$, t value = 4.703; p value = 0.000) underlined a strictly positive interconnection with EC."

"The current research was performed to produce a holistic picture on how to succeed in EC in both pandemic and the post-pandemic through provide precise and meticulous analysis on the perspectives of accountants in SMEs on BAAS implementation and BIC enhancement in these two periods of time."

"From an overall perspective, the effect size of BAAS and BIC on EC in the COVID-19 pandemic seemed to be less than those in the new normal and the BAAS is even verified to induce insignificant influence on BIC."

"The plausible for the differences in effect size of all the components in the proposed model in the COVID-19 pandemic and new normal as well as the insignificant interconnection between BAAS and BIC can be illuminated at the organizational degree and individual degree."

Implication and avenues for future research

"The findings of Hoang and others [67] on how SMEs used EC to guide national economic recovery after COVID-19 highlighted how several technologies were used, despite the pandemic's short length, to assure organizational survivability and revival in the cutthroat market climate."

"According to the statistical results of the current study, BAAS would be the main factor in driving BIC improvement and EC success."

"In every developing economy, the government plays an important role in facilitating the essential requirements for the development of EC through supplying robust and secure

online payment options, warranting a stable information technology infrastructure, offering sufficient programs, building up awareness of using different means of media and education institutions [68]."

"Despite the fact that this study could be regarded as a trailblazing effort to examine the connections between SMEs and BAAS, BIC, and EC in the context of the COVID-19 crisis over two remarkable periods of time, the interlinks formed in the structural model seemed to be treated in a static manner."

Conclusion

"As EC model has been considered as a model with numerous beneficial features, namely low-cost and boundless model, easier formulation and operationalization, effective marketing opportunities generation, it will allow SMEs to carry on with their operations and continue to profit even during the COVID-19 pandemic."

"In order to formulate a new and in-depth insight on the role of BAAS implementation, to tap higher potential of BI and EC, an analysis on how BAAS can foster the EC and BIC in SMEs represented the main motivations in this research."

"The current research enriches the growing body of literature on the potential of BAAS and BIC in EC within SMEs in developing country in both the period of COVID-19 pandemic and the period of new normal through provide precise and meticulous analysis on the perspectives of accountants in SMEs on BAAS application, BIC enhancement and the effectiveness of EC, in these two periods of time."

A Fuzzy Multi-objective Mathematical Programming Model for Project Management Decisions Considering Quality and Contractual Reward and Penalty Costs in a Project Network [148]

This is a machine-generated summary of:

Hashemi, S. M.; Mousavi, S. M.; Patoghi, A.: A Fuzzy Multi-objective Mathematical Programming Model for Project Management Decisions Considering Quality and Contractual Reward and Penalty Costs in a Project Network [148]

Published in: Arabian Journal for Science and Engineering (2020)

Link to original: <https://doi.org/10.1007/s13369-020-04800-3>

Copyright of the summarized publication:

King Fahd University of Petroleum & Minerals 2020

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Project managers always aim to simultaneously handle conflicting goals in the organization."

"A new mathematical model is proposed that simultaneously minimizes total cost and completion time and maximizes the quality in the project management decision problem."

"A linearization technique is presented with attention to variable change and piecewise linearization, in which nonlinear function is converted to the linear programming model."

"The other aim of this paper is to introduce a modified version of fully fuzzy multi-objective linear programming for the problem."

"For analyzing a fully fuzzy time–cost–quality project management model, a practical example of the literature is provided."

"By examining the results of the model with conflicting objectives, two scenarios are presented to explore the interactions of conflicting objectives on the project, and the results are reported."

Introduction

"Project managers are trying to minimize the schedule of project activities at the appropriate time and sequence, depending on the project cost or completion time."

"Project decision makers will save indirect costs and increase direct costs to accelerate the

project to shorten the project time."

"Compression of the time of activities is one of the ways to reduce the project time with the least possible cost and the least increase in resources [69]."

"Reducing the project time is associated with accelerating the critical activities leading to more use of resources, which itself means an increase in costs."

"The analysis of compression of the project is dependent on shortening the length of the project time by accelerating the number of activities by adding the costs [70]."

Literature Reviews

"Göçken [70] has presented an efficient piecewise linear method to transform the nonlinear cost function into a mixed-integer linear programming model."

"Jebaseeli and Dhayabaran [71] solved the TCQT problem by fuzzy integer linear programming and estimated the time and cost parameters with a triangular fuzzy number."

"A fully fuzzy linear programming method has been introduced to solve a model with fuzzy objective functions, constraints, parameters, and variables."

"In the method proposed by Buckley and Feuring [72], fully fuzzy programming problem was turned into a fuzzy multi-objective linear programming problem with maximization of objective functions."

"A flexible fuzzy programming problem has been expanded in this method with the use of finding all non-dominant sets in multi-objective linear programming."

"At the outset, the fully fuzzy multi-objective problem was converted to an interval linear programming problem using the nearest interval approximation (NIA) method."

Project Management Decisions in Fuzzy Conditions

"The function is transformed into a continuous piecewise linear approximation equation using a variable change and also by applying the linear piecewise method to be presented in the model."

"Information about the project, including the normal time and maximum compressed time along with the cost in the normal and crash modes, and information on the quality, the weight of activities, and weight of the objectives are expressed by the use of the linguistic

variables with trapezoidal fuzzy."

"The objective functions of the cost and time and quality are considered to be linear."

"The objective function (2) refers to minimizing the total project time."

Computational Results

"The quality of the project is reduced when the project time goes beyond the normal time to the compressed time, and the total cost of the project is always a quadratic function."

"Of this scenario, the proposed model is solved with one objective function so that the cost objective function is solved firstly, and then, the time objective function is minimized, and the maximum value of the quality objective function is regarded."

"In the second part of this scenario, the objective functions are investigated pairwise (simultaneous minimization of the cost and time objective functions, simultaneous minimization of time and maximization of the quality, and, finally, minimizing the time and maximizing the quality), and the simultaneous effect of all three objective functions is considered in the final scenario."

Conclusion

"Since the project managers are faced with several conflicting objectives simultaneously in their management decisions, the proposed mathematical model addresses the simultaneous investigation of quality, time, and cost, so they are receiving minimum cost and time and maximum quality."

"Due to the uniqueness of the projects and the ambiguity in the information and data, a developed fuzzy approach is provided in terms of parameters, decision variables, constraints, and objective functions that are fuzzy."

"Three important items are concurrently regarded: simultaneous consideration of minimizing and maximizing objective functions; simultaneous attention to continuous and discrete variables and implementation in a mixed-integer programming problem; and problem solving in the case of facing crisp right-hand side (RHS) parameters in the constraints, especially in the case of big M. Finally, a practical example is given to examine the proposed model with the provided methodology."

Improving nonconformity responsibility decisions: a semi-automated model based on CRISP-DM [149]

This is a machine-generated summary of:

Ziv, Batel; Parmet, Yisrael: Improving nonconformity responsibility decisions: a semi-automated model based on CRISP-DM [149]

Published in: International Journal of System Assurance Engineering and Management (2021)

Link to original: <https://doi.org/10.1007/s13198-021-01318-1>

Copyright of the summarized publication:

The Society for Reliability Engineering, Quality and Operations Management (SREQOM), India and The Division of Operation and Maintenance, Lulea University of Technology, Sweden 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The literature often excludes the NC responsibility decision, which is a difficult, costly and time-consuming task assignment, but also an integral part of the NC management process."

"We propose a semi-automated model we call SANC, which improves the accuracy of NC responsibility decisions and significantly cuts their costs."

"We base our methodology on CRISP-DM and extend it to fit the semi-automated NC responsibility decision."

Introduction

"In the next few paragraphs, we show a standardized NC management process that

includes CA, together with a significant decision which is hardly discussed in the literature: Who is responsible for an NC?"

"The NC responsibility decision can be referred to as a task-assignment problem."

"Task assignment is a combinatorial problem that aims to optimize pairs of 'agents' (NC responsibilities) and 'tasks' (NC events), while considering operational costs and agent's abilities (Ramezani and Ezzatpanah 73)."

"It seems that task assignment has not been fully enjoying the data revolution we are currently undergoing (Einav and Levin 74), and NC responsibility decisions, a special case of task assignment, is no different."

"Our objectives are: (1) To retain or exceed the NC responsibility decision accuracy and remove, as much as possible, the human from the loop to achieve cost and time cutbacks, while (2) Using available resources such as existing data and reasonable computational power, thus ensuring low investment costs."

Method

"SANC extends CRISP-DM (Wirth and Hipp 75), a widespread data-mining standard, to fit a general need for semi-automated machine learning processes, and the NC responsibility decision in particular."

"The context in which the NC responsibility decision occurs must be learned."

"When the chosen algorithm prediction is "unreliable", we need to bring the human back into the loop to improve the chances of classifying correctly."

"The certainty of a decision is represented by any function of the posterior distribution yielded by the ML algorithm."

"The posterior distribution is the conditional distribution of NC responsibility, given the information from the NC event."

"If the certainty of an automated decision is above the threshold, it means it is reliable enough to be followed through."

"This parameter can differ between organizations and it represents company-specific compromises between needs for money, time, and the precision of the NC responsibility decision."

Case study and results

"The potential responsibility departments (production line, engineering, supplier and logistics) want the NC to be correctly routed and to provide a good starting point for a deep investigation; the quality team wants an effective, robust and measurable process; and the company's management wants cost reduction in the form of less NC over time."

"If the PNCL cannot decide on responsibility, the decision is transferred to the Material Review Board (MRB), a committee composed of six experienced and senior representatives of production, engineering, logistics, suppliers and quality (stage four)."

"Supplier: origin country, whether it is new or experienced, etc These four elements underpinned a conceptual database that describes the NC responsibility decision."

"(*) shows that the probability of classifying the NC as a supplier's responsibility when it was an engineering problem is 0.0957."

Discussion and conclusion

"We showed that, contrary to its portrayal in the literature, the NC responsibility decision is a complex and wasteful task-assignment process, both in terms of money and time."

"To improve the NC responsibility decision, we developed a model we call SANC (semi-automated NC) that utilizes existing data and other resources to save costs and improve accuracy."

"SANC allowed us to achieve both our objectives for our case study and we indeed retained the accuracy of current state NC responsibility decision, while reducing more than 80% of labor."

"We found the "business understanding" step to be surprisingly valuable due to the incorporation, rather than exclusion, of the human in the semi-automated NC responsibility decision."

"We feel that incorporating both human and machine into the NC responsibility decision might calm the fear associated with committing to a full-on automated process."

Limitations and future work

"Imagine a semi-automated state courthouse called SASC, where the following sentencing method is as followed: the criminal profile of the accused citizen is run through an ML

classifier that decides whether they are guilty or not guilty."

"If the classifier is certain in its decision, then its classification is followed through."

"The NC responsibility decision fits this analogy, with the MRB as the judge and departments as accused citizens."

"Automated classification may be blessed in the eyes of management, but the assignees might persist in not being held accountable for the decision made."

"We have proved that the NC responsibility decision can be semi-automated, but the question of whether the assignees will follow the automated decisions still needs further research."

Smart Progress Monitoring Framework for Building Construction Elements Using Videography–MATLAB–BIM Integration [150]

This is a machine-generated summary of:

Arif, Farrukh; Khan, Waleed Ahmed: Smart Progress Monitoring Framework for Building Construction Elements Using Videography–MATLAB–BIM Integration [150]

Published in: International Journal of Civil Engineering (2021)

Link to original: <https://doi.org/10.1007/s40999-021-00601-3>

Copyright of the summarized publication:

Iran University of Science and Technology 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The integration of the IP camera and the developed software allowed for automatic as-built quantity extraction for the concreting in columns, concreting in beams, and block masonry, which were the bulk construction activities."

"As-planned quantities were imported to the MATLAB interface to compare with as-built quantities, hence providing progress comparative assessment."

"After analysis, the result was 91.5%, which was the percentage completion of the as-built quantity in comparison to the as-planned quantity."

"For beam B1, the as-planned quantity was 13.7 cft, while the as-built quantity was 13.67 cft, which showed 99.8% completion of the activity for beam B1."

"This study aims to provide different mathematical models for the image processing of the as-built quantities of the construction activities."

"This study provides a framework for smart progress monitoring, which can be easily used on the construction sites by the contractors, while also providing paths for future work in developing cost-effective methods for progress monitoring."

Introduction

"Construction progress monitoring has been recognized as one of the key elements that leads to the success of a construction project."

"Manual and periodic approaches of progress monitoring do not offer the stakeholders a mutual understanding of project performance in real-time."

"By performing real-time construction progress monitoring, corrective measures and actions can be taken in a timely manner, thus enabling better project control."

"To update the project's as-built schedule of the project current progress is required by collecting data from the construction site [76]."

"To perform the progress tracking actual progress is compared with as-planned progress and automated progress monitoring results assigning the duration of each activity precisely [77] and it will result in more accurate project management."

"The developed framework was implemented on a real-time construction project that is in

progress."

Literature Review

"Existing methods of progress monitoring are costly, time-consuming, low quality, and less effective."

"The most suitable way of project control using progress monitoring is to automate the methods [78]."

"Various studies have been conducted regarding automated construction progress monitoring in the past few years."

"Yang and others [79] provided a detailed review of the literature on computer vision-based methods for construction progress monitoring both at the project level (visual monitoring of civil infrastructure) and the operation level, which included visual monitoring of the construction equipment and workers."

"They argued that despite recent technological advancements, there is a limited application of automated progress monitoring techniques in the construction industry worldwide."

"Salehi and Yitmen [80] also concluded that image-based data collection techniques for automated progress monitoring at a construction site are an inexpensive operation, flexible, easy to share, and integrate with other technologies."

Research Scope and Objectives

"There were two main objectives of this study: (1) The first objective was to develop an interactive progress monitoring system which effectively monitors the real-time progress of vertical members (columns), horizontal members (beams), and block masonry. (2) The second objective was to implement the developed methodology in a real-time construction project."

"The scope of this study covers three building construction elements only, including columns, beams, and masonry."

"A single camera was used for the case project implementation."

Research Methodology

"These included: (1) real-time data extraction, (2) Video interface programming, (3) image processing programming interface for progress monitoring (4) modeling, and (5) Progress

reporting."

"After reviewing through the literature, an interface program was developed in MATLAB for accessing the real-time video of the construction site in which the subject elements of the study were detected phase-wise on the basis of color detection mechanism for activity identification."

"The pixel count (in the image) of the element under study was used with the developed calibration regression model (in the case study project) to obtain the progress data, which was used for comparison to state the progress."

"After implementation of the aforementioned steps, as-planned quantities were obtained from a Building Information Model of the case study project and were compared with the real-time quantities (as-built) obtained from the progress monitoring mechanism to state the ongoing progress."

Stage 1: Smart Progress Monitoring Framework Development

"Only by identifying the phase, the current as-built quantity of an element under study can be correctly labelled to correctly measure progress and for this, RGB values for different activities are coded in the video interface program."

"This part of the framework consisted of two steps: (1) Image processing interface and (2) extraction of as-built quantities."

"In the image processing interface, the captured snapshot was processed, and the progress of the subject element was extracted."

"The developed MATLAB interface was programmed to import the quantities for the relevant element identified through the image processing interface, specifically for the marked region of interest (ROI), and stores in the array(s)."

"The quantity sheet of the as-built state can be generated during the execution of the processing interface, while the schedule of the quantity extracted from the as-planned BIM are available in the arrays."

Stage 2: Framework Implementation

"The second objective was to implement the framework through the case study and extract the real-time as-built quantities to compare it with the as-planned quantities to report progress."

"The image processing to convert 2D pictures to on-site geometric values depended upon the relationship between pixels, depth in image, height and length of the real object."

"The equation for horizontal member (beam) is expressed as: where Z is the pixel/length, x is the distance from camera to object."

"The equation for area members can be obtained by multiplying the equations for the vertical length and the horizontal length. where T is the pixel area/area, x is the distance from camera to object."

"For the purpose of extracting an as-planned schedule of quantities for the building elements under consideration, the case study project was modeled as-planned using Revit."

Discussion

"The results obtained from the case study give good visual as well as quantitative understanding of the progress of the construction activity of specific elements which are under observation."

"The percentage of completion for the activities after comparing it with the as-planned quantity gives exact values of the progress of the project."

"It is more suitable compared to the manual method of progress monitoring which gives hypothetical values based on manual visualization by the field staff."

"A selective number of elements of the structure were selected, which are in the range of one IP camera to implement this method for the entire project more than one camera will be used to cover more elements."

"Visualization and automatic progress measurement results in better project control."

Conclusion and Recommendations

"This method gave better understanding of the progress of the construction activities, and it was more user-friendly to operate, along with less setup cost."

"Since, the image and visualization-based input was being used in the current study, therefore it eliminated the erroneous progress measurement."

"The limitation of this study was that a single camera was used and only three elements were studied."

"More elements could be studied using a multiple camera system."

"This study gives a low-cost and user-friendly framework for tracking the progress of the construction project."

"This framework utilized resources already available and a strong integrated methodology to provide real-time videographic access to the site, as well as measures of as-built versus as-planned progress (provided by BIM)."

A Real-Time Productivity Tracking Framework Using Survey-Cloud-BIM Integration [151]

This is a machine-generated summary of:

Arif, Farrukh; Khan, Waleed Ahmed: A Real-Time Productivity Tracking Framework Using Survey-Cloud-BIM Integration [151]

Published in: Arabian Journal for Science and Engineering (2020)

Link to original: <https://doi.org/10.1007/s13369-020-04844-5>

Copyright of the summarized publication:

King Fahd University of Petroleum & Minerals 2020

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"This study presents low cost and easily adaptable real-time construction activities' productivity tracking framework for the small to medium size construction companies using Survey-Cloud-BIM integration."

"The framework focuses on gathering progress data through construction face survey using a typical total station, integrating the data through cloud, and thereafter processes it through Dynamo programming to generate data-driven as-built model of an under-construction project on a BIM platform."

"The data-driven (progressive) BIM models can then be used to calculate real-time productivity and compare it with the calibrated productivity that can help project managers to take control decisions timely and efficiently."

"The framework was implemented on a case study project to track the real-time productivity and progress of three bulk construction activities; concreting in columns, concreting in slab and placement of block masonry on the construction sites."

Introduction

"The conventional way of construction activities' productivity tracking on different construction sites is through visualization by the field staff who collects the information by simple visiting the site and visualizes the certain percentage of the activity completion with his experience and perception."

"Comprehensive structured training to adopt this framework can lead to successful utilization of available resources resulting in integrated and automated progress monitoring on construction sites."

"This will make it easier to have a detailed understanding of the productivity of the construction activities, and based on this information, future's decision regarding the project control can be made."

"Different repetitive and non-repetitive cycle time studies can be performed on different construction sites to gather the data for the productivity of different construction activities [81]."

"This method considers different factors like number of labors and their productive time, rating factor of the construction activity, etc Therefore, cycle time studies provide better mathematical ground for the comparison of productivity."

Literature Review

"There are various ways to define productivity of construction activity."

"Productivity rates are low due to the lacking of planning and control over the construction

activities [82]."

"Lee et al [83] used BIM for progress measurement and productivity measurement through 3D visualization of the work on the construction site."

"With no specific comparative analysis on construction plan, resources and cost data, faulty assumptions and inaccurate measurement on the progress could be made and the mistakes such as over-paying to the contractor and oversee of the planned delay might take place."

"The most suitable way of project control using progress monitoring is to automate the methods [78]."

"Different integration of manual and automatic data collection be made towards progress monitoring and control."

"None of the technologies advocated integrated utilization of traditional surveying (and instruments) to BIM and Cloud for automated progress visualization and measurement."

Research Objective, Scope and Methodology

"The main objective of this research was 'Development of a real-time productivity tracking framework for bulk construction activities through Survey-Cloud-BIM integration.'"

"Scope of the study focuses towards productivity of construction activities including concreting in columns, concreting in slab and placement of block masonry."

"The cycle time studies for yardstick development were conducted on three building construction projects in Karachi."

"Using Survey-Cloud-BIM integration, a real-time progress and productivity tracking framework was developed."

"Following the literature review and framework development, productivity cycle time studies were conducted for bulk construction activities including concreting in columns, concreting in slab and placement of block masonry."

"The productivity of bulk construction activities was tracked and the data was collected from real-time building construction projects being executed in Karachi."

Real-Time Productivity Tracking Framework

"The focus of the building face survey was to gather as-built data (i.e., height for column,

length and width for slab, and length and height for block masonry), and geo-referenced Easting–Northing were not significant requirements in this study."

"For each of the three bulk construction activities in scope, a separate script of programming using dynamo was developed to generate real-time as-built model in the same work space."

"Yardsticks were developed for the bulk construction activities discussed above for tracking the real-time productivity by conducting single and multiple cycle time studies on different construction sites of Karachi."

"The curves were used to track the real-time productivity of the activity by considering the curve as the baseline for the case study project."

"The as-built quantities extracted using the same option for the as-built Revit model generated through building face survey and Dynamo scripting."

Case Study

"The spreadsheet data extracted through the as-built construction survey was then uploaded to cloud drive to transfer data in real-time from field to office system."

"Every time there is a progress update from survey, the script is run with latest building face spreadsheet available in the cloud to generate the latest real-time as-built model."

"The quantities from as-planned model and generated as-built model were extracted for columns, slabs and block masonry."

"The extracted quantities from as-built model were then used to calculate as-built productivity for the corresponding progress update."

"As for case study project, based on tracking the productivity for columns was found to be well above (faster) than the budgeted productivity, but slower than calibrated productivity for both progress updates."

"In case of concreting for slab, the actual productivity was found to be slower than both budgeted and calibrated productivity, for both progress updates."

Feedback on Framework

"Non-structured interviews were conducted with the focus group to seek their views on the

proposed framework as conducted by the same principle author in another study [84]."

"The main feedback with the focus group was on the framework and its implementation in the industry."

"The focus group agreed to the fact the implementation of this framework on a construction project will result in better cost control and thus informed decision making by the project management team."

"Focus group agreed that framework implementation will give more accurate information of the productivity of construction activities."

"The focus group highlighted several advantages of the framework developed through this research."

"The focus group also proposed that framework should be tested on more projects in future."

Conclusions and Recommendations

"The study also contributes by developing productivity yardsticks for tracking the productivities of the above discussed construction activities."

"Implementation of the framework on a case study project was done to show its workability, and the results of the case study for the productivity tracking of considered construction activities have been discussed above."

"The productivity yardsticks developed in the study should be used for construction sites of Karachi as cycle time data was gathered on different construction sites of Karachi and it may differ for other cities of Pakistan due to different productivity rates."

"The part of the framework which needs productivity yardstick development can also be automated in future, provided extensive productivity or cycle time data is readily available for different type of construction activities."

Study Contributions

"The framework and its implementation as presented in the study are unique in the sense that (1) it provides integration to the building face survey data that was not used before, (2) utilizes a very ordinary total station for the collection of data that makes framework cost-effective as well as adaptable for construction companies in Pakistan, and (3) framework helps in generating real-time data-driven as-built model in BIM workspace. (4)

Development of productivity yardsticks curves for tracking productivity of aforementioned bulk construction activities."

"All of these important points make the paper significantly contributing towards body of knowledge in project control using innovative mechanism."

Building projects with time–cost–quality–environment trade-off optimization using adaptive selection slime mold algorithm [152]

This is a machine-generated summary of:

Son, Pham Vu Hong; Khoi, Luu Ngoc Quynh: Building projects with time–cost–quality–environment trade-off optimization using adaptive selection slime mold algorithm [152]

Published in: Asian Journal of Civil Engineering (2023)

Link to original: <https://doi.org/10.1007/s42107-023-00572-x>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Nature Switzerland AG 2023

Copyright comment: Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The adaptive selection slime mold algorithm (ASSMA) is proposed for repetitive projects

due to multiple concurrent instances."

"It is made by merging the tournament selection (TS) method and the slime mold algorithm (SMA) model."

"The new model's capabilities are demonstrated using a case study of a rural water pipeline project, and the outcomes of the ASSMA are contrasted with those of the data envelopment analysis (DEA) approach utilized by the previous researcher."

"The ASSMA technique is an effective optimization matching method that can help project managers select the best strategy for a given activity."

Introduction

"The success of a project is consistently determined by the three factors of time, cost, and quality."

"The fourth consideration in this article's concurrent four-factor optimization of a construction project is the environmental impact."

"Because the majority of conflicting factors cannot be coordinated concurrently to complete a project, it is imperative to optimize time, cost, quality, and environmental effect."

"These methods have been widely employed by researchers to address the three optimization issues of time, cost, and quality (El-Razek and others, 85) and time, cost and safety (Afshar & Zolfaghar Dolabi, 86)."

"The successful implementation of time, cost, quality, and safety optimization raises performance to unprecedented heights (Sharma & Trivedi, 87), creating a variety of distinctive results."

"This study applies the concurrent four-factor optimization of time, cost, quality, and environmental impact in an infrastructure project (ASSMA)."

"The ASSMA capabilities are fully utilized in this study to facilitate the analysis of time, cost, quality, and environmental impact."

Literature review

"Yu and others (88) endorsed the SMA on quantum rotation gates, Houssein and others (89) presented hybrid SMA with a differential evolution algorithm to solve the

comprehensive optimization problem."

"The SMA has not been combined with many different methods or widely applied to construction management, especially for crucial objective optimization."

"Afshar and others (90) analyzed a new multicolony ant algorithm which was used to solve the time–cost multiobjective optimization problem."

"Ngoc-Tri Ngo and others (91) presented the meta-model optimization algorithm combined with computer models to solve the energy use of buildings."

"Vu-Hong-Son and others (92) presented a new hybrid artificial intelligent model to optimize the material supply chain save cost for construction contractors."

"Son and Khoi (93) optimized the time–cost–quality trade-off problem by using the new model of slime mold algorithm for construction projects."

"Son and others (94) presented the optimization algorithm of the dragonfly particle swarm for the cost optimization of construction material."

Methodology

"The standard TS selects a sample of k people at random from the current populations, and then it selects the competitor with the best fitness."

"The TS process is composed of two steps of sampling and selection."

" X_A and X_B are two random slime mold positions, and the ability to solve is not explicitly mentioned in exploration and exploitation."

"This process aids in the trade-off between exploration and exploitation: The algorithm's position with velocity serves as a compass for the slime mold's trajectory V_c ."

Case study

"The essay concluded by suggesting that the qualities given below are sufficient for assessing how effectively the proposed ASSMA performs (Abhilasha and Kumar 2019): number of solutions (NS): the number of Pareto optimum front solutions, spacing: the variance of the separation of Pareto front solutions, mean ideal distances (MID): the Pareto front solution's rate of convergence from the ideal point, spread of nondominant solution (SNS): the variety of solutions provided by the Pareto front, quality metric (QM): a variable that aids in evaluating the effectiveness of the Pareto optimum solutions found, diversity:

extending Pareto-optimal solutions, hypervolume (HV): the region of the objective space that solutions occupy, epsilon (E): a metric indicating how unsatisfactory a solution set is in comparison to the most well-known Pareto front, computational time (CT): the amount of time it takes to create a Pareto-optimal front."

"The mathematical model used for the DEA is applied to the basis of effectiveness assessment of two different models, determining the ranking of good and poor performance, from which it is possible to ascertain which activities are predominant and lead to good optimization in finding results, which is one of the intriguing methods for future development."

Conclusion

"Project managers in the field of project management must make plans to ensure that the project is completed successfully while reducing time, cost, and environmental effect and maintaining a high level of quality."

"The basis for proving that the project manager needs a lot of experience and knows how to deal with changes arising in the project is that it can be very difficult to achieve the trade-off of factors, and sometimes project managers have to increase the time and pay extra costs for problems that result in an increase or decrease in quality and environmental impact."

"The results show that the project implementation approach was successfully used, producing the best results with the least amount of time, money, and environmental impact."

"Finding the solution with the least amount of time, money, and environmental impact while keeping the highest degree of quality is the major goal of a construction project."

Design and optimization of prefabricated building system based on BIM technology [153]

This is a machine-generated summary of:

Xiao, Yanwu; Bhola, Jyoti: Design and optimization of prefabricated building system based on BIM technology [153]

Published in: International Journal of System Assurance Engineering and Management

(2021)

Link to original: <https://doi.org/10.1007/s13198-021-01288-4>

Copyright of the summarized publication:

The Society for Reliability Engineering, Quality and Operations Management (SREQOM), India and The Division of Operation and Maintenance, Lulea University of Technology, Sweden 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The popularization and maturity of BIM technology provide a new method and platform for the realization of collaborative design of prefabricated buildings."

"BIM applications in prefabricated buildings are mostly stays in the stage of construction and production."

"In order to promote the application of BIM in prefabricated building design, this paper compares BIM collaborative design with traditional design methods."

"The results show that the effectiveness of the building collaborative design method based on BIM is verified through an example."

Introduction

"The popularization and maturity of BIM technology provide a new method and platform for the realization of collaborative design of prefabricated buildings."

"The prefabricated buildings are revolutionized by constructing the prefabricated building by applying the BIM technology and for deeper design, the 3D visualizations is transformed by the 2D designs."

"The BIM technology is utilized by the designers for inventory models buildings for

prefabricated buildings effective promotion for factory-scale mass production achievement."

"The development of prefabricated building construction is therefore promoted by the BIM technology."

"Based on the requirements of BIM technology IDM, a conceptual model of PCP collaborative design is established to determine the accuracy of BIM model in different design stages in order to promote the application of BIM in prefabricated building design."

Literature review

"Authors in this paper introduced the Manufacture and Assembly (DFMA) design and combine it with Building Information Modeling (BIM) design for the concept and process of DFMA-oriented parametric design development (Yuan and others 96)."

"Authors in this paper detailed and maintained the prefabricated component system functional characteristics and potential application value is also enhanced which is necessary for the design realization under the support of BIM technology to meet the sustainable development requirement of the prefabricated component system (Wang 97)."

"Due to the BIM technology, emerging prefabricated buildings along with structural design become very effective and accurate."

"Based on BIM Technology, the prefabricated building material management can reduce the occupancy rate of the warehouse as compare to the conventional method and the materials quality control is also better."

BIM collaborative design

"It is a collaborative mode in which all professionals carry out parallel design based on 3D model in the same environment and complete the design work of the same project through information sharing, communication and collaboration."

"Component collaboration refers to the accuracy of 3D model design and the information needed for model delivery."

"The PCP model based on BIM systematically describes the relationship among the key links of assembly building component design, Professional collaboration, component production and so on."

"The design of prefabricated components should be related to the Professional, and the

model information should be continuously supplemented and improved by using the network platform according to the requirements of different Professional division of labor."

"This sequence is the traditional design process, but the three-dimensional model with rich information and the efficient network collaboration platform can realize the timely sharing of information."

1. Results and discussion

"The utilization rates of funds are improved by the high inventory turnover times and material accumulation is reduced."

"Based on BIM Technology, the assembly building material turnover time is reduced to 3 and the conventional method turnover times reduced to 2."

"Based on BIM Technology, the prefabricated building materials management method inventory turnover time is high which raise the transportation cost."

"The prefabricated building material management method transportation in terms of transportation times based on BIM Technology is more as compared to that of conventional method so in terms of transportation cost, conventional method is better."

"Based on BIM Technology, the prefabricated building material management method construction process and the material turnover speed is fast so the warehouse occupancy rate is also low."

"There is production of the surplus materials in the construction process; the cost is more with the surplus material."

Conclusions

"Prefabricated construction with standardized design, component production industrialization, construction installation professional characteristics, based on the BIM model as design object."

"Based on the requirements of BIM technology IDM, a conceptual model of PCP collaborative design is established to determine the accuracy of BIM model in different design stages in order to promote the application of BIM in prefabricated building design."

"The prefabricated building material management method transportation in terms of transportation times based on BIM Technology is more as compared to that of conventional method so in terms of transportation cost, conventional method is better."

"The prefabricated building material management method warehouse occupancy rate based on BIM Technology is 75% and 40%."

Bibliometric Survey for Adoption of Building Information Modeling (BIM) in Construction Industry– A Safety Perspective [154]

This is a machine-generated summary of:

Hire, Shalaka; Sandbhor, Sayali; Ruikar, Kirti: Bibliometric Survey for Adoption of Building Information Modeling (BIM) in Construction Industry– A Safety Perspective [154]

Published in: Archives of Computational Methods in Engineering (2021)

Link to original: <https://doi.org/10.1007/s11831-021-09584-9>

Copyright of the summarized publication:

The Author(s) 2021

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"BIM is a model-based smart nD platform that offers tools for architecture, engineering, and construction professionals to plan, design, and manage construction activities more efficiently."

"Despite its growing use globally, BIM has not been adopted sufficiently in the Indian construction industry."

"This paper presents a bibliometric analysis of the adoption of BIM in the global construction and the Indian construction industry."

"It also reviews the adoption of BIM for safety in the global and Indian construction industry."

"The bibliometric analysis is carried out in two phases, at first it reviews the adoption of BIM globally, and limits the findings to cover BIM adoption in the Indian construction industry."

"It reviews the adoption of BIM for safety in global construction and limits the findings to cover BIM adoption for safety in India."

"The research highlights the need for BIM in India particularly for safety on construction sites."

Introduction

"Building Information Modeling (BIM) has the potential to help organizations to manage their work efficiently."

"Autodesk emphasizes the 'Intelligent' 3D model-based process dimension that gives Architecture, Engineering, and Construction (AEC) professionals' insight and tools to plan, design, develop and manage buildings and infrastructure more efficiently."

"According to Eastman and others (2011), building models are characterized by: Building components are represented with 1) digital representations (objects) carrying computable graphics and data attributes identifying them to software applications, and 2) parametric rules allowing intelligent manipulation; Components that include data describing how they operate as required for analysis and work processes."

"Is 4D BIM, consisting of a time model that adds an extra information aspect to a project

information model in the form of timing data."

"Integrating BIM with 5D CAD simulation models allows for more efficient, cost-effective, and sustainable building development."

Need of Study

"In construction site management, one of the most critical objectives is the safety of the site personnel."

"Occupational Safety and Health Administration (OSHA) estimated that every year one in ten construction site employees get injured."

"Causes of accidents are identified in many kinds of research such as lack of PPE [98], poor safety training [99] and [100], negligence by contractors in safety management."

"The integration of BIM and safety can reduce the risks of accidents on-site [101]."

"Researches such as the integration of BIM and various technologies such as GIS, sensor technologies, unmanned aerial vehicles (UAVs) [102], safety planning of temporary structure [103], are observed for construction safety purposes."

"There is scope to adopt BIM for timely completion, increased productivity, and safety management."

"Although the focus of this study is on "BIM for safety" in the Indian construction industry, at first, the bibliographic search includes a broader global perspective so global initiatives in BIM for safety are identified and understood."

Methodology

"In phase I, global results observed in part A are limited to state India in part B. Phase II of the survey is also divided into two parts, Part A and Part B. Part A of phase II represent the adoption of BIM for safety in global construction and part B of phase II represents the adoption of BIM for safety in the Indian construction industry."

"For both phases, I and II, search for global results are observed in part A and those results are limited to India in part B. Selected keywords for phase I consist of "BIM", "Building information modeling", and "Construction"."

"For phase II, Selected keywords are "Building information modeling", "BIM", "Construction" and "Safety", further in part B (II), obtained results are limited towards

"India".

"Part B of phase II represents the BIM adoption particularly for safety in the Indian construction sector."

Phase I: Bibliometric Survey of BIM Adoption on Construction Sites

"Of the total publications in the area of BIM, 19.10% documents are from the USA, 16.41% from China, and 10.74% from the UK with the year of publication beginning from 1991, proving the level of research in the area of BIM in these countries."

"Areas such as BIM-enabled accident prevention, construction safety, BIM integrating with Global Positioning System (GPS) are researched by Teizer marking his last publication in this area in the year 2019."

"A total of 160 authors are involved in Indian research publications regarding BIM adoption."

"Sawhney with his first publication in the year 2011 (in this domain), explored the areas such as lean and green project outcomes using BIM, parametric modeling for outside construction, interpretive structural modeling analysis, factors influencing BIM adoption in India, marking last publication in 2020."

"The third keyword is 'BIM' with 20 documents, followed by the 'construction industry' with a total 19 times of occurrences."

Phase II: Bibliometric Survey for Adoption of BIM for Safety on Construction Sites

"Phase II of bibliometric survey is carried for BIM adoption in construction, especially for 'safety'."

"Phase II is also divided into two parts part A and part B, part A of phase II represents the global adoption of BIM for safety and part B of phase II represents the adoption of BIM for safety in 'Indian' construction."

"Keywords selected for part A (II) are 'BIM', 'building information modeling', 'construction and safety'."

"Part B of phase II regarding BIM adoption for safety in Indian construction revealed a total nine documents."

"Studying the statistics of global BIM adoption for safety helps to understand the countries

with most publications in the BIM topic area, indicative of BIM research."

"Considering India, first BIM research publication is observed in the year 2010 and BIM adoption for safety in year 2011."

"Following section discusses the analysis of documents observed for BIM adoption in safety in India."

Summary of Phase I and Phase II

"It includes total number of documents that appeared phase-wise and part-wise, top three countries with maximum number of documents published, and top three authors with number of publications in the bracket."

"Part B in each phase indicates India's position relative to the top 3 listed countries and lists the authors with the most published work in that phase of the study."

Findings and Discussion

"The early stage of this research has thus, primarily focused on identifying the global trends of BIM adoption in the construction sector and then narrowing the focus on its adoption for safety purposes."

"In phase II, part A explored global BIM adoption for safety and part B explored BIM adoption for safety in India."

"The survey was carried out in phase II for assessing the level of the adoption of BIM for safety on construction sites."

"The body of knowledge in BIM for safety in India has at its best been scant, there is a huge opportunity for researching into the adoption of BIM for safety in Indian construction industry."

"BIM adoption in India is still in its infancy, it has not been used in Indian construction for safety purposes."

and Wind-Solar Complementary Power Generation System [155]

This is a machine-generated summary of:

Bhagat, Kalsoom; Dai, Chaohua; Ye, Shengyong; Bhayo, M. Zubair; Kalwar, Basheer Ahmed; Mari, Mohsin Ali: Stochastic Energy Management Strategy of Smart Building Microgrid with Electric Vehicles and Wind-Solar Complementary Power Generation System [155]

Published in: Journal of Electrical Engineering & Technology (2022)

Link to original: <https://doi.org/10.1007/s42835-022-01193-1>

Copyright of the summarized publication:

The Author(s) under exclusive licence to The Korean Institute of Electrical Engineers 2022

Copyright comment: Springer Nature or its licensor holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"This paper presents a power flow management strategy for a Smart Building Micro Grid (SBMG) integrated with Electric Vehicles Batteries (EVBs), solar and wind generation in a grid-connected architecture."

"Proposed optimal power flow management topology uses Stochastic Model Predictive Control (SMPC) architecture to cater the uncertainties caused by stochastic behaviour of Variable Renewable Energy Sources (VRES) and load demand."

"Degradation of EVBs has been also incorporated to keep the power flow economical for both Electric Vehicles (EVs) owners and micro-grid management authority."

"A mathematical model is simulated on MATLAB to determine levelized cost of electricity

(LCOE) for the proposed SBMG architecture and grid without VRES architecture."

"With the proposed SMPC optimization architecture a significant decrease of 33% in battery degradation has been observed."

"Negative Cash flow is also decreased in terms of replacement cost of batteries by incorporating battery degradation in optimization architecture."

Introduction

"Smart energy buildings have a highly efficient energy performance and own their individual renewable energy systems while also being connected to the local energy distribution grids."

"Smart buildings are supposed to have two-way interactions with the energy distribution grids as well."

"Renewable energy may assist such large buildings in raising their energy self-sufficiency while also minimizing the environmental emissions at a low cost."

"Proposed coordinated energy management strategy is applied to a number of smart buildings with varying energy consumption patterns that create a cluster and exchange energy, allowing for the most efficient use of energy provided by indigenous renewable sources."

"The Energy Storage System (ESS) such as EV batteries can use to coordinate the usage of VRES in micro grid and overall demand on the grid must be kept within feasible constraints that prevent smart grid network from failure."

Literature Review

"Just comprising PV energy, an economic evaluation and feasibility study of hybrid micro grid Net Zero Energy Buildings is done for two-story building of Pakistan [104]."

"Optimization control and energy management in micro grid systems are evolving into a multi-objective "management/ optimization" function that must address technical as well as economic issues concurrently."

"Building micro grid energy management solutions present in literature are for small buildings and uncertainties of all energy sources (irradiance, wind speed, vehicles travelling plans) are not encountered during optimization process, because of processing time and complexity issue."

"There is no existence of such smart model that can consider renewable sources (wind and solar) for micro grid to power any big and tall building."

"Contributions of this research work are as follows: Introduction of electrical energy system integrated with wind, solar, and EVBs into the bahria icon tower as a SBMG."

Case Study Bahria Icon Tower

"Large parking areas have great EVs capacity that can facilitate complex and sell extra electrical energy to utility grid as a potential energy provider."

"By selling energy to the utility grid, employing stored power to satisfy critical load demands in times of low output from VRES, or when buying power from the utility grid is expensive during peak hours, a portion of the profit earned via V2G from resident's vehicles can be reflected on each resident's monthly discounted bill."

"To previous models while addressing energy management in micro grid, such as [105], the proposed SBMG's model formulation is intricate due to joint consideration of residential and EVs charging demands."

"Unlike traditional energy storage and V2G operations, an EVB cannot be charged fully at once thus, making it impossible to provide fully charged EVs to EV owners via instant power import from VRES or utility grid."

Energy Management Model of SBMG

"The EVCBs are installed at parks of the building to charge EVs during off-peak hours in low electricity rates, and the utility grid purchases available energy of EVs during peak hours in high electricity rates."

"The following state-space model can be used to integrate N battery models: The predicted charging load profile of EVBs, presented by the large-scale penetration of EVs, may result in load changes, which can provide a significant quantity of information to utilize and assist in unloading the grid effects [106]."

"To keep the demands below the acceptable limits, operating times of the non-critical loads are shifted to the off-peak hours by control room."

"This signal is taken into account in each time slot when power demand of controllable non-critical loads is evaluated by energy management system."

"Battery degradation is calculated through capacity loss due to charging and discharging

during bi-directional power flow explained above."

Results and Feasibility Analysis

"As the real-time data for batteries charging/discharging is derived from the stochastic model of EVBs."

"Using DR framework optimizer shifts the load demand from the utility grid into different time slots using in system EVBs."

"The instantaneous accumulative charging and discharging EVBs power are acting as load and source for the SBMG respectively."

"To cater the stochastic load demand and keep the EVBs prepared for the next trip accumulative power in the batteries varies on different steps of time."

"Before its optimization, the demand for battery charging remained almost linear because those EVBs are taking power from the system that causes overloading of the network."

"Comparison between the Proposed SBMG architecture and a base system with only utility grid to feed the electric load demand of building and EVBs have been extracted from both software."

Conclusion

"Implemented controller decreases the network demand stress on the utility grid by regulating the connected flexible loads and charging/discharging of EVBs."

"Comparative analysis with the greedy algorithm shows superiority of the proposed optimization architecture against sudden variation in power demand by exploiting in system EVBs."

"EVBs degradation due to V2G and G2V operation is reduced by 33% using the proposed optimization architecture."

"Integration of EVBs to the micro-grid network helped eliminate the grid expansion cost which is a huge economic benefit."

4D Simulation Research in Construction: A Systematic Mapping Study [156]

This is a machine-generated summary of:

Boton, Conrad; Rivest, Louis; Kubicki, Sylvain; Ghnaya, Oussama: 4D Simulation Research in Construction: A Systematic Mapping Study [156]

Published in: Archives of Computational Methods in Engineering (2022)

Link to original: <https://doi.org/10.1007/s11831-022-09873-x>

Copyright of the summarized publication:

The Author(s) under exclusive licence to International Center for Numerical Methods in Engineering (CIMNE) 2022

Copyright comment: Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"It uses the community structure method and modularity optimization techniques to propose a mapping of the research efforts dedicated to 4D simulation in construction."

"A total of 674 normalized keywords from 386 publications are analyzed, providing a new perspective of the keywords' co-occurrences, clusters and communities."

"The analysis of the keywords identifies the relationships between some big players (i.e., "Building information modeling", "4D CAD", "Virtual design and construction", "Scheduling", "Simulation", "Critical path method" and "Software engineering"); each of these keywords leading a specific community, with a total of seven communities identified and analyzed."

"Regarding the analysis of the authors' communities, the total number of authors is 721, with a total of 1127 links, showing that while multiple authors have been working on 4D-related subjects, only a few communities of authors account for most of the activity."

Introduction

"4D simulation is today considered as an example of BIM [107], linking a three-dimensional (3D) model to the activity schedule to visualize and simulate the construction process over time."

"While the potential benefits of 4D simulation are perceived as high by practitioners, its implementation rates in actual projects remains low [107, 108], despite considerable research effort having been dedicated to the subject."

"Given that 4D research has co-existed as a research field separated from the BIM research domain for a significant period of time, it is still unclear today when and how the two fields have merged, since there is virtually no systematic review dedicated to exploring the 4D-related scientific literature."

"The research presented in this article aims at proposing a systematic literature review (SLR) of the referenced research on 4D simulation in the construction industry."

Related Works

"Based on a real case study, Hartmann and Fischer [109] proposed an analysis of 4D simulation as a constructability support medium and concluded that 4D models can transfer various types of useful information (sequencing, scheduling, design) among practitioners to support the decision-making process, even for clients that are not necessarily from the construction industry."

"The core features are related to activities' planning, linking 3D elements to activities, conducting 4D simulation, interacting with the 3D model and the fourth dimension, etc The usability features relate to the ease of learning and use, the user friendliness of the interface, the existing learning resources, etc Collaboration and interoperability are related to the interoperability with other systems and include the import formats for both 3D models and project schedules, the output formats for the simulation, the bidirectional link maintained (or not) with the source files, the collaboration capabilities offered by the software (e.g. multidisciplinary models' coordination) and the communication tools, etc Over the last decade, scientific research in 4D simulation has been closely linked to the development of the collaborative BIM approach."

Research Methodology

"We present the main steps of the research approach: the data collection, the quality assessment, the keywords' normalization and the data analysis."

"At the end of the normalization stage, the 1245 unique keywords were normalized into 652 keywords, which were then used in the data analysis step."

"The data analysis consisted of four complementary analyses: an analysis of the keywords, an analysis of the keywords' co-occurrences, an analysis of the authors' communities, and an analysis of the evolution of the terminology."

"The analysis of the keywords' co-occurrences is made by presenting the data in the form of interpretable graphs so that it is possible to conduct meaningful analysis."

"The first Excel spreadsheet contains the nodes, i.e., all the normalized keywords, including their counts and their unique IDs."

"For the analysis of the evolution of the terminology, the list of the normalized keywords was generated per year of publication, from 1997 to 2019."

Main Results

"One can see that the top-ranked keywords are "Building information modeling", "4D CAD", "Virtual design and construction", "Visualization", "4D model or modeling" and "Construction management"."

"In this community, the keyword "Building information modeling" is linked to a variety of keywords, the most important of which are "4D model or modeling", "4D BIM", "Four dimensional", "Construction", "Progress management", "Construction planning" and "Information technology"."

"All, this community shows that researchers who use the keyword "Building information modeling" in 4D scientific literature often refer to the concepts of 4D BIM and 4D model(ing) in the context of construction planning and progress management."

"In this community, the keyword "4D CAD" is strongly linked to "Visualization" and "Construction management", suggesting that the keyword "4D CAD" is more associated with visualization-related use of 4D simulation in the context of construction management."

Discussion

"This work presents some interesting contributions to the understanding of 4D simulation

research in construction."

"While some of the findings are similar to those presented by that earlier work, this research provides a new perspective on the subject, in particular in the use of modularity optimization techniques to highlight the main subjects of interest."

"The article also provides a good perspective on the community of researchers working on 4D simulation in construction."

"It shows that the number of researchers who have published at least one article on 4D simulation is significant (721 authors), and, despite the interconnection between a few high-impact researchers (Dawood, Kang, Fischer, Golpavard, etc), the community remains very fragmented with small teams quite disconnected from each other."

"As well that the "Scheduling" community strongly relates to the knowledge engineering research domain, with the presence of keywords like "Ontology", "Knowledge management" and "Semantic system"."

Conclusion

"This paper mapped the research efforts dedicated to 4D simulation in architecture, engineering, and construction by examining the indexed scientific publications."

"This study analyzed the authors' keywords of 674 normalized keywords from 386 publications."

"The identified clusters highlight the main research subjects addressed by researchers in the field, in terms of 4D usages, planning methods, and optimization techniques."

"Future works could apply this type of study to other industrial sectors such as aerospace and automotive engineering, to thereby obtain relevant information on the evolution of 4D applications compared to the construction industry."

Assessing the Effect of Building Information Modeling System (BIM) Capabilities on Lean Construction Performance in Construction Projects Using Hybrid Fuzzy Multi-criteria Decision-Making Methods [157]

This is a machine-generated summary of:

Moballeggi, Elham; Pourrostan, Towhid; Abbasianjahromi, Hamidreza; Makvandi, Payam: Assessing the Effect of Building Information Modeling System (BIM) Capabilities on Lean Construction Performance in Construction Projects Using Hybrid Fuzzy Multi-criteria Decision-Making Methods [157]

Published in: Iranian Journal of Science and Technology, Transactions of Civil Engineering (2022)

Link to original: <https://doi.org/10.1007/s40996-022-00971-1>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Shiraz University 2022

Copyright comment: Springer Nature or its licensor holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Integrated and synergistic integration of the two phenomena of lean construction (LC) and BIM can reduce errors and losses."

"The main purpose of the present study is to determine effective parameters of the synergy of LC technique and BIM system and identifying and evaluating the most important application and infrastructure required to apply an integrated model of application of these techniques in construction projects in the country."

"The results showed that among the identified BIM capabilities, the ability to integrate the database with a weight of 0.201 ranks first, and the standardization function in LC with a similarity index of 0.547 is also the optimal solution."

"The results showed that based on the similarity index (CCi) illustration of the process of how to form a plan status plan at any time, "The closest solution to the function of teamwork culture, the ability to" assess compliance with the initial objectives of the plan "The closest solution to the function of continuous improvement/construction based on quality and capability" Fast construction and Time and cost optimization "The closest solution to the function of continuous improvement/construction based on quality and capability" Energy consumption "The closest solution to the function of waste and the ability to" Build and control computer scheduling and project budgeting "The closest solution to the function of waste be."

Introduction

"The building information modeling (BIM) system is highly efficient in solving problems such as many changes in different stages of construction and lack of integration in project parts, and time and cost management and rework."

"Building information modeling can be defined according to the BIM handbook as follows: "A concept for describing instrumentations, processes, and technologies facilitated by computer science to display a view of building information, performance, planning, construction and finally operation (Eastman and others 110; Afrazi and others 111; Afrazi and Yazdani 112; Jahandari and others 113; Fan and others 114)."

"The impacts of adopting value stream mapping (VSM), just in time (JIT), continuous flow, and total productive maintenance (TPM) approaches throughout the manufacture and erection processes of pre-fabricated steel frames (PSFs) of construction projects were explored by Heravi and others (115)."

"In order to evaluate and identify the most essential applications, capabilities, and infrastructure needed to use the integrated model, this paper attempts for the first time to verify the effective parameters of the synergy between lean construction technique (LC) and building information modeling system (BIM)."

Theoretical Foundations

"Lean thinking is an attitude to increase productivity and continuous value creation and minimize costs and losses in project-based projects and organizations (Baradaran and others 116)."

"Lean construction is an attitude and style of construction that has brought many changes to the construction industry; in fact, using the concepts and principles of lean thinking to design the production system in the construction industry with the aim of increasing productivity, minimizing material waste, time and energy spent to produce the maximum

possible value, reducing construction time and controlling project cost construction."

"Looking at the lean construction process, this attitude, the process of planning, engineering, design, construction, production, and delivery of materials (projects) in better compliance with the objectives of project management in transferring maximum value to project owners (Abdelhamid and others 117; Afshar and others 118; Naghipour and others 119)."

BIM and Lean Interaction

"Integrated and synergistic integration of two phenomena of lean construction (LC) and building information modeling (BIM) by reducing errors and losses can have a significant impact on increasing productivity in different phases of the project (Oskouie and others 120)."

"Based on their studies on the detailed analysis of the interactions between BIM and Lean, these researchers have concluded that there is a kind of alignment between the two techniques that, if properly understood, can improve construction processes."

"To examining case studies of the simultaneous use of the concept of Lean and BIM in real construction projects, the existence of synergistic contexts and positive results of combining these two concepts has been pointed out (Nasrollahi 121; Gerber and others 122; Liu and others 123; Hamdi and Leite 124)."

"In their research, Clemente and Cachadinha examined and evaluated the synergy of BIM and Lean techniques in public construction projects."

"In their research, the use of BIM and Lean for the requirements of modeling in the design of sanitary construction projects is examined."

Research Method

"To be, the research method is a quantitative survey that after identifying the capabilities of the BIM technique and LC functions based on a hierarchical combination of fuzzy multi-criteria decision-making method and TOPSIS data are analyzed."

"The questionnaires in this section are based on pairwise comparisons for analysis with fuzzy hierarchical multi-criteria decision-making methods."

"After determining the weight of the identified capabilities in relation to BIM by the FAHP method, they are prioritized, and the preferred capabilities in the main functions of LC are determined by the FTOPSIS method."

"After extracting pairwise comparisons, the analysis of fuzzy multi-criteria decision-making methods with coding in MATLAB software was used to provide prioritization models based on FAHP and FTOPSIS methods."

"Of this method, language variables are used by decision-makers to determine the weight of criteria (n existing criteria $C = \{C_1, C_2, \dots, C_n\}$) and ranking of options (m possible option $A = \{A_1, A_2, \dots, A_m\}$) determined."

Application of the Proposed Framework

"The overall goal of the decision-making process, entitled "Investigating the Impact of BIM Capabilities on LC Main Functions in Construction Projects," is at the first level of the hierarchy."

"Using this mechanism and based on the comparison of the final weight results for BIM capabilities, a total of the following eight capabilities were selected: Illustration of the process of how the design status plan is formed at any given time (P1-3), Construction and computer control of project scheduling and budgeting (P2-4), Estimation of costs and process execution time automatically (P3-2), Assessment of compliance with the initial objectives of the project (P3-7) Coordination in design and construction (P4-1), Information retention and integrated model design (P5-1), Fast construction and time and cost optimization (P6-1) Energy consumption (P7-1)."

"The experts were asked to evaluate the importance and intensity of the effect of BIM capabilities of the main LC functions on BIM capabilities in comparison with each other, using the linguistic variables corresponding to the FTopsis method."

Conclusion

"The results of the study of the effect of BIM capabilities on LC operation and their user synchronization with the FTOPSIS method in the studied infrastructure projects and according to the ranking based on the similarity index (CC_i), it was determined that the Status of the project at any time "The closest solution to the function of teamwork culture, the ability to" assess compliance with the initial objectives of the plan "The closest solution to the function of continuous improvement/construction based on quality and the ability to" Build fast and optimize time and cost "The solution to the function of continuous improvement/construction based on the quality and capability of "energy consumption" is the closest solution to the function of waste and the capability of "computer construction and control of project scheduling and budgeting" is the closest solution to the function of waste."

Formal Modeling and Verification of the Functionality of Electronic Urban Railway Control Systems Through a Case Study [158]

This is a machine-generated summary of:

Lukács, Gábor; Bartha, Tamás: Formal Modeling and Verification of the Functionality of Electronic Urban Railway Control Systems Through a Case Study [158]

Published in: Urban Rail Transit (2022)

Link to original: <https://doi.org/10.1007/s40864-022-00177-8>

Copyright of the summarized publication:

The Author(s) 2022

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"This paper presents a formal model-based methodology to support railway engineers in the design of safe electronic urban railway control systems."

"The purpose of our research is to overcome the deficiencies of existing traditional design methodologies, namely the incompleteness and the potential presence of contradictions in the system specification resulting from non-formal development techniques."

"The proposed solution provides a specification/verification environment that facilitates the construction of correct, complete, consistent, and verifiable functional specifications during the development, while hiding all the formal method-related details from the railway engineers writing the specifications."

"Using this formal model-based methodology, a high-quality functional specification can be achieved, which is guaranteed to be more exhaustive and will contain fewer errors than traditional development."

Introduction

"Domain engineers are reluctant to use formal methods during the system design/development activities, because even though these are claimed to help avoid specification errors, their application often requires significant additional expertise because they are abstract, computer science-based methods."

"The research described in this article aims to present a case study demonstrating the practical utilization of a new methodology that supports railway engineers in the construction and verification of formal specifications."

"This set of requirements exhibits all sorts of problems: the lack of correctness, completeness, consistency, verifiability, etc. During the first phases of the life cycle [125], developers aim to analyze this set of requirements in order to significantly reduce these problems, and then create systems requirement specifications from it."

"MBSE is a formalized application of modeling to support the life-cycle activities during the development [126], which intends to bring together the model-centric approaches of various engineering disciplines (e.g., electrical, software)."

Related Work

"The framework is integrated with the third-party Yakindu Statechart Tools modeling tool and the Uppaal model checker to provide formal verification of the constructed models."

"The paper by Yul and others [127] presents an application of formal model checking-based safety verification of a railway interlocking system."

"The novelty lies in the following: (1) it enables the selection and integration of the

appropriate high-level semi-formal and low-level formal description forms and tools into a toolchain that fits the railway field; (2) it illustrates the transformation from the semi-formal to formal models (this transformation can be partly automated, but the transformation rules are not in the scope of in this paper); and (3) the proposed approach was created specifically for the railway engineering domain (also taking systems engineering best practices into account), where these techniques are not yet widely applied."

Methodology

"Hereinafter, it will be referred to as FMBRSE (Formal Model-Based Railway Safety Engineering) methodology."

"The result of applying the methodology in a development task is a formally verified, validated functional model of the given railway safety system."

"A formal model of a component—when the input function does exist—is made up of three elements: the automata representing the functionality, the input (value generator) function, and the necessary elements modeling the environment (e.g., modeling of the function call sequences, modeling of the timing of actions)."

"The practical implementation of model checking within FMBRSE is based on an existing, widely known framework: Uppaal [128]."

"The built-in model checking engine evaluates the requirements given as temporal logic expressions over the state space, and reports whether or not they are fulfilled."

Case Study

"In the non_antagonism state, the Topn timer does not run, and the AFault output of this function is false (i.e., there is no antagonism between presence inputs of DP)."

"For the DP, this means that the value of the To timer was less than the PTomin parameter for the duration while both presence inputs were in the free state (with PFault true)."

"For the DP this means that the value of the To timer was more than the PTomax parameter for the duration while both presence inputs were in the free state (with PFault true)."

"If DP detects tram presence, it uses the states awaiting_free_without_fault/non_overflowed_CInt8Max and awaiting_free_without_fault/overflowed_CInt8Max."

"If the DP has correctly detected the occupancy according to the configuration (PTomaxE can be also true or false), the tram presence will remain in the state non_overflowed_PTomax."

Results

"For the model checking to be performed, it is not enough to only transform the state machines defined in Yakindu."

"The above two additions are needed in the declarations section of the Uppaal model compared with Yakindu."

"The transformation of each Yakindu state machine to its equivalent Uppaal process template can be easily traced based on their names."

"Sections, we first introduce the automata directly transformed from the state machines and then the additional automata."

"The variables, parameters, and constants have identical names in both the Yakindu and Uppaal models, so the transformation can be easily traced."

"In the "run" state the component performs the described functionality."

"When this automaton switches from the "start" to the "run" state, a new cycle begins (CYCLE!)."

"When the component has finished running, the automaton returns from the "run" to the "start" state."

Discussion

"The users are often informally helping to clarify the issues related to the set of requirements during the development, even more so with the application of the proposed methodology."

"These can basically be divided into three groups: model validation (e.g., row 1), state availability (e.g., rows from 2 to 8), and functional requirements described by railway engineers (e.g., rows 9 and 10)."

"That the requirements given by domain engineers in most cases cannot be directly converted into a CTL formula."

"We rewrote the requirements into an intermediate domain-specific (restricted) language (currently under development)."

"The requirements given in the intermediate language were converted into CTL formulas."

"We found that the requirements related to availability are configuration-dependent, while functional requirements are configuration-independent."

"That railway engineers experienced difficulties in evaluating the results of requirement violations."

Conclusion

"We presented a formal model-based methodology that facilitates the construction of correct, complete, consistent, and verifiable functional specifications during the development of electronic urban railway control system."

"The process we propose provides a specification-verification environment for railway engineers."

"Using formal models and model checking, a high-quality functional specification can be achieved, written by railway engineers at the system development level."

"Its novel elements include (1) the selection and integration of the appropriate high-level semi-formal and low-level formal description forms and tools into a toolchain that fits the railway field, (2) the transformation from the semi-formal to formal models as illustrated by the case study, and (3) taking the specifics of the railway engineering domain and the best-practice systems engineering into account during the creation of the proposed methodology."

Building and Testing a Fuzzy Linguistic Assessment Framework for Defect Prediction in ASD Environment Using Process-Based Software Metrics [159]

This is a machine-generated summary of:

Sharma, Pooja; Sangal, Amrit Lal: Building and Testing a Fuzzy Linguistic Assessment Framework for Defect Prediction in ASD Environment Using Process-Based Software

Metrics [159]

Published in: Arabian Journal for Science and Engineering (2020)

Link to original: <https://doi.org/10.1007/s13369-020-04701-5>

Copyright of the summarized publication:

King Fahd University of Petroleum & Minerals 2020

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The objective of the present work is to build and test a framework which makes use of process-based software metrics to determine the defects in software projects in an agile software development environment."

"A methodological framework based on fuzzy linguistic modelling has been proposed to predict the defect density using various process metrics derived from literature studies to measure the attributes stated in the agile manifesto."

"The proposed model shows better accuracy (for projects with size ≥ 50 KLOC) as observed from statistical results, i.e. RMSE (18.69), NRMSE (0.0110), MMRE (0.0539) and BMMRE (0.0585)."

"Results obtained from the linguistic model emphasise the value of concepts related to customer involvement and interactions, the collaboration between stakeholders, responding to change, i.e. flexibility, team experience, skills, communication and coordination, as per agile manifesto."

Introduction

"The effectiveness of process metrics in the agile environment needs to be evaluated as little investigations have been undertaken in the literature to examine the process metrics which help to measure the attributes stated in the agile manifesto (individuals and interactions, working software, customer collaboration and responding to change requests)

[129]."

"The early prediction studies carried out using these metrics may prove helpful to agile teams for quality assurance, but still, a detailed study regarding the advantages of utilising these process metrics in fault prediction is required [130, 131]."

"There is a need to develop a model that shall take into account various requirement, design and testing metrics that can help agile teams to predict the defects."

"Linguistic assessment of process-based software metrics in an agile environment."

"Build and test the fuzzy inference system to measure the effectiveness of various metrics in predicting defects in software projects."

Related Research

"Sambinelli and others [132] in their work emphasised increased customer orientation in the ASD process and identification of the use of customer orientation metrics in an agile environment."

"This work can be extended by including the process metrics or developing advanced models for defect prediction, which makes use of both product and process metrics."

"The measure of these metrics will help to meet the challenges laid by the attributes stated in the agile manifesto, i.e. individuals and interactions, working software, customer collaboration and responding to change requests."

"They shall take into account the key challenges being faced by agile teams and make use of metrics measurement to manage the software development work efficiently."

"These metrics encompass the attributes in the agile manifesto in various software development life cycle phases, i.e. requirement, design and implementation, testing."

Fuzzy Theory Background and Definitions

"The theory can translate linguistic information into a fuzzy set."

"Over the last three decades, the fuzzy theory has been used in numerous applications ranging in various engineering disciplines, i.e. manufacturing, transportation, image processing, control systems, computer vision and expert systems (Guo and Wong [133])."

"Fuzzification is a process of determining the extent to which input data belong to each of

the fuzzy sets with the help of the MFs."

"It is done to make a crisp quantity fuzzy, or in other words, it is the method that relates the numeric values of the crisp inputs to the values of the linguistic terms."

"It is necessary to consider the domain expert in the phenomenon to be modelled so that the membership functions can be constructed for the linguistic information related to the problem inputs and outputs."

Design of Proposed Model

"4.1 Selection of metrics 4.2 Fuzzifying the metrics using MFs 4.3 Formation of If-then rules 4.4 Design of fuzzy inference system and obtaining defuzzified output The following paragraphs briefly discuss each phase During the ASD process, a great deal of data is being produced during software development activities ranging from requirement specifications to test developments."

"Under the requirement phase, a total of six metrics are considered as input metrics, i.e. (i) experience of specification and documentation staff, (ii) review, inspection and walk-through, (iii) requirements stability, (iv) customer involvement, (v) vendor management and (vi) project planning."

"In the design and implementation phase, nine metrics are considered as input metrics, i.e. (i) functional complexity, (ii) scale of new functionality implemented, (iii) programmer capability, (iv) development staff motivation, (v) internal communication, (vi) development staff training quality, (vii) developer's experience, (viii) defined processes followed and (ix) scale of distributed communication."

Industrial Case Studies

"In design and development phase, the defect density value of project 20 is 0.0282 which is obtained as an output of fuzzy inference model with nine inputs (i) complexity of new functionality, (ii) scale of new functionality, (iii) programmer capability, (iv) development staff motivation, (v) internal communication, (vi) development staff training quality, (vii) development staff experience, (viii) defined processes followed and (ix) scale of distributed communication assessed linguistically as very high, high, very low, very low, low, high, high, high and high, respectively."

"For the testing phase, the defect density value for project 20 is assessed, which comes out to be 0.0187."

"The total number of defects with project size up to 10 KLOC, between 10 and 50 KLOC and

above 50 KLOC is calculated."

Threats to Validity

"The authors used the case study approach to examine the proposed fuzzy linguistic approach for defect prediction."

"To improve the prediction accuracy of developed fuzzy inference system, the parameters of various fuzzy sets of the rules representing the combination of antecedents and consequents are trained using back-propagation algorithm."

"In the case study research, the objective is to make a possible analytical generalisation [134], wherein the study outcomes are compared with the studies in the literature with similar settings and as a result findings are found appropriate."

"This threat has been minimised by developing a framework based upon fuzzy linguistic approach for defect prediction in ASD environment using process-based software metrics."

"To improve the prediction accuracy of developed fuzzy inference system, the parameters of various fuzzy sets of the rules representing the combination of antecedents and consequents are trained."

Conclusions

"Authors found soft computing-based fuzzy set theory as a means to capture and process the descriptive information related to process metrics."

"The study proposes a framework based on a fuzzy linguistic approach to predict the defect density using various process metrics."

"The proposed model makes use of twenty-one software process metrics related to customer involvement and interactions, the collaboration between stakeholders, responding to change, i.e. flexibility, team experience, and skills (capability), communication and coordination, etc , encompassing various phases in the software development life cycle."

"Further, to explain and validate the proposed model, data set related to twenty-nine projects from PROMISE software engineering repository has been used."

"The model provides valuable insights to project managers regarding the applicability of the process-based software metrics in ASD environment."

"Findings of the study may be extended to develop advanced framework or models for fault prediction by considering both process and product metrics."

Conceptual Framework of an Object-Oriented Simulation Approach for Building Construction Processes [160]

This is a machine-generated summary of:

Alsudairi, Abdulsalam Ali: Conceptual Framework of an Object-Oriented Simulation Approach for Building Construction Processes [160]

Published in: Arabian Journal for Science and Engineering (2020)

Link to original: <https://doi.org/10.1007/s13369-020-04513-7>

Copyright of the summarized publication:

King Fahd University of Petroleum & Minerals 2020

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Proximity of a simulation model with the real situations in the construction process is an ongoing challenge."

"This concern has been remarkably addressed in the recent developments in object-oriented simulation (OOS) approach."

"The literature lacks in a generic OOS approach that could be easily tailored for a wide range of construction processes, while ensuring accuracy and reliability; accordingly, the

present study has developed a conceptual OOS framework."

"As the initial step, a thorough review of the literature was made to critically analyze the existing simulation models."

"The present modeling approach consists of four major components: (1) object identification, (2) object interchangeability, (3) object parameters, and (4) object progression."

"By implementing this approach to real construction processes, it has been established that this method enhances model accuracy and leads to better understanding of the construction processes, thereby reducing dependency on assumptions and abstractions that are inevitable in simulation models."

Introduction

"Many studies emphasized the increased use of simulation owing to its flexibility in modeling complex systems and accuracy in mimicking reality [135, 136]."

"To be specific, the object-oriented simulation (OOS) has incorporated more potentialities than before, which has reduced the amount of model abstraction and assumption."

"With the recent advancement in modeling and simulation, these steps need to be revisited to enhance credibility and accuracy, and to ease verification and validation."

"An OOS framework was developed in the present study, by detailing the first two steps of Law and McComas [137] in the OOS perspective, with the objective of realizing a rather generic, accurate, and realistic simulation model."

"The significance and scope of such a simulation approach was established in the light of a critical review of the existing models and approaches for construction simulation."

Review of Literature

"As the initial step towards developing the proposed OOS approach, a thorough review has been made on the existing construction simulation models, in order to study their potentialities and limitations that could be addressed in the proposed method."

"A lot of studies have been reported on developing models and frameworks for managing various processes and aspects of building construction, and tackling diverse issues in the industry."

"Du and others [138] proposed object-oriented discrete event simulation (DES) model for effective change order management in construction projects."

"The proposed PI-based DES model was developed by using the OOS platform, AnyLogic, which was then applied to investigate the change order management process in a Midwestern land-grant university."

"BIM and OOS have been widely used for tackling various issues in the construction industry, while some works were on developing customized models (THRP, entropy weight method & GA, and SCOs) for construction management."

Development of the New OOS Framework

"These two steps mainly address the following: Careful determination of model objectives
Identification of any performance problems
Specification of model parameters and inputs
Specification of what issues to be addressed in the model
Specification of performance measures
Outline the configuration of the system to be studied
The reason behind concentrating on these two steps is that the models are usually expressed in terms of goals, performance criteria and constraints [139], and most of these expressions are determined in these two steps."

"A critical review of these models has exposed the author to a wider spectrum of construction processes, thereby gaining a comprehensive understanding on the nature and requirements of these processes."

"Eight experts were selected based on certain criteria such as good record of published works in the field of simulation and modeling, and high educational background (PhD or Master)."

"The experts were briefed about the background and main objectives of the study, before starting the interview."

Implementation of the OOS Model to Construction Processes

"One may realize that identifying a process object is the starting point for any simulation model."

"Objects with the following characteristics are of interest to a modeler: Flowing: objects that move through part/whole of a process carrying specific information: e.g., maintenance work order."

"It is very clear from this example that object-oriented modeling conforms to the nature

and logic of construction processes."

"To illustrate this, the present model was applied to a concreting process, where the generic object is a cubic meter of concrete, and its classes vary according to the structural elements such as column, footing, or slab."

"Another benefit of focusing on objects is that it helps the modeler in mapping their process."

"In a steel erection process the model objective could be to evaluate steel crew productivity."

Benefits of the New Approach

"Retaining model accuracy simplifies model verification and validation that are essential in any simulation modeling; i.e., both terms require detailed information about a system/process."

"One of the major characteristics of construction objects is that they change their status as they move through their processes."

"The proposed method considers the question of interchangeability and progression of construction objects, where the modeler performs data collection by asking specific questions: What is the generic object of the studied system/process?"

"Maintaining model articulation means more metrics about construction objects such as cost associated with them (direct or indirect), waiting times and bottlenecks."

"Focusing on objects and their interrelationship as featured in the present method enables the modeler in constructing a quasi-generic simulation model."

"In this quasi-generic model, the modeler only needs to identify quantities of objects and their combinations, which vary from one project to another."

Conclusion

"This study has proposed an OOS framework for simulating construction processes."

"It is based on certain concepts of object-oriented simulation, taking into consideration all types of construction processes."

"According to construction objects, the proposed method directs the modeler to certain

path that helps in formulating the simulation model along with the necessary data for modeling."

"This method offers several benefits; for instance, creating construction simulation models with respect to the concepts of objects, classes and inheritance leads to better understanding of a system/process and hence better model articulation."

Bibliography

- [1] Ahmadi M, Behzadian K, Ardeshir A, Kapelan Z (2016) Comprehensive risk management using fuzzy FMEA and MCDA techniques in highway construction projects. *J Civil Eng Manag* 23(2):300–310
- [2] Keramati A, NazariShirkouhi S, Moshki H, Afshari-Mofrad M, Maleki-Berneti E (2013a) A novel methodology for evaluating the risk of CRM projects in fuzzy environment. *Neural Comput Appl* 23(1):29–53
- [3] Ebrat M, Ghodsi R (2014) Construction project risk assessment by using adaptive-network-based fuzzy inference system: an empirical study. *KSCE J Civil Eng* 18(5):1213–1227. <https://doi.org/10.1007/s12205-014-0139-5>
- [4] International Organization for Standardization (ISO) (2009). *Risk management: principles and guidelines ISO; 31000*: Montreal, QC, Canada
- [5] Waldron K (2016) Risk analysis and ordinal risk rating scales-a closer look. *J Valid Technol*, 22(5)
- [6] Pons DJ (2019) Alignment of the safety assessment method with New Zealand legislative responsibilities. *Safety* 5(3):59
- [7] Ghosh S, Thang DV, Satapathy SC, Mohanty SN (2020) Fuzzy rule based cluster analysis to segment consumers' preferences to eco and non-eco-friendly products. *Int J Knowledge Based Intell Eng Syst* 24(4):343–351
- [8] Patton MQ (2002) *Qualitative evaluation and research methods*, 3rd edn. Sage, Thousand Oaks, CA
- [9] Sami Ur Rehman M, Thaheem MJ, Nasir AR, Khan KIA (2020) Project schedule risk

management through building information modelling. *Int J Const Manag* 22(8):1489–1499

[10] Kassem MA, Khoiry MA, Hamzah N (2020) Theoretical review on critical risk factors in oil and gas construction projects in Yemen. *Eng Constr Architect Manag* 28:934–968

[11] Al-Juboori OA, Rashid HA, Mahjoob AMR (2021) Investigating the critical success factors for water supply projects: case of Iraq. *Civil Environ Eng* 17(2):438–449.
<https://doi.org/10.2478/cee-2021-0046>

[12] Jahan S, Khan KIA, Thaheem MJ, Ullah F, Alqurashi M, Alsulami BT (2022) Modeling profitability-influencing risk factors for construction projects: a system dynamics approach. *Buildings* 12(6):701

[13] Azhar S (2011) Building information modeling (BIM): trends, benefits, risks, and challenges for the AEC industry. *Leadersh Manag Eng* 11(3):241–252

[14] Mitchell D (2012) 5D BIM: creating cost certainty and better buildings. In: RICS cobra conference, pp 1–10

[15] Smith P (2014) BIM and the 5D project cost manager. *Proc Soc Behav Sci* 119:475–484

[16] Smith P (2016) Project cost management with 5D BIM. *Proc Soc Behav Sci* 226(226):193–200

[17] Bryde D, Broquetas M, Volm JM (2013) The project benefits of building information modelling (BIM). *Int J Proj Manage* 31(7):971–980

[18] Kim H, Grobler F (2013) Preparing a construction cash flow analysis using building information modeling (BIM) technology. *KICEM J Constr Eng Proj Manag* 704:1–9

[19] Project Management Institute (2017) A guide to the project management body of knowledge. Project Management Institute Inc., Newtown

[20] Smith D, Lovegrove S, Muse A, Pan DDZ, Sawhney A, Watkins P, Whisson G, Seah Kwee Yong T (2015) BIM for cost managers: requirements from the BIM model. RICS guidance note

[21] Australian Institute of Quantity Surveyors (2000) Australian cost management manual, vol 1. Australian Institute of Quantity Surveyors, Deakin West

[22] Zhang, Y., Burton, H., Sun, H., & Shokrabadi, M. (2018). A machine learning framework for assessing post-earthquake structural safety. *Structural Safety*, 72, 1–16.

<https://doi.org/10.1016/j.strusafe.2017.12.001>

[23] Thaler, D., Stoffel, M., Markert, B., & Bamer, F. (2021). Machine-learning-enhanced tail end prediction of structural response statistics in earthquake engineering. *Earthquake Engineering & Structural Dynamics*, 50(8), 2098–2114. <https://doi.org/10.1002/eqe.3432>

[24] Alam, M. M. D., Karim, R. A., & Habiba, W. (2021). The relationship between CRM and customer loyalty: The moderating role of customer trust. *International Journal of Bank Marketing*, 39(7), 1248–1272.

[25] Wikner, S. (2018). The next generation CRM tools: Bridging the gaps between sales needs and CRM tools architecture. In P. Andersson, B. Axelsson, & C. Rosenqvist (Eds.), *Organizing Marketing and Sales* (pp. 195–205). Emerald Publishing Limited, Bingley. <https://doi.org/10.1108/978-1-78754-968-520181012>

[26] Peters, L. D., Vanharanta, M., Pressey, A. D., & Johnston, W. J. (2012). Taking time to understand theory. *Industrial Marketing Management*, 41(5), 730–738.

[27] Cortez, R. M., & Johnston, W. J. (2020). The coronavirus crisis in B2B settings: Crisis uniqueness and managerial implications based on social exchange theory. *Industrial Marketing Management*, 88, 125–135.

[28] Gotteland, D., Shock, J., & Sarin, S. (2020). Strategic orientations, marketing proactivity and firm market performance. In Press. *Industrial Marketing Management*, <https://doi.org/10.1016/j.indmarman.2020.03.012> .

[29] Sivarajah, U., Irani, Z., Gupta, S., & Mahroof, K. (2019). Role of big data and social media analytics for business to business sustainability: A participatory web context. *Industrial Marketing Management*, 86, 163–179.

[30] Powell, A., Noble, C. H., Noble, S. M., & Han, S. (2018). Man vs machine: Relational and performance outcomes of technology utilization in small business CRM support capabilities. *European Journal of Marketing*, 52(3/4), 725–757.

[31] Chatterjee, S., Nguyen, B., Ghosh, S. K., Bhattacharjee, K. K., & Chaudhuri, S. (2020). Adoption of artificial intelligence integrated CRM system: An empirical study of Indian organizations. *The Bottom Line*, 33(4), 359–375.

[32] Wu, L.-W. (2011). Beyond satisfaction: The relative importance of locational convenience, interpersonal relationships, and commitment across service types. *Journal of Service Theory and Practice*, 21(3), 240–263.

[33] Mellahi, K., & Harris, L. C. (2016). Response rates in business and management

research: An overview of current practice and suggestions for future directions. *British Journal of Management*, 27(2), 426–437.

[34] Kast, F. E., & Rosenzweig, J. E. (1979). *Organization and management: A systems and contingency approach*. McGraw-Hill.

[35] Carson RS (2013) Can systems engineering be agile? Development lifecycles for systems, hardware, and software. *INCOSE Int. Symp.* 23(1):16–28.
<https://doi.org/10.1002/j.2334-5837.2013.tb03001.x>

[36] Dwyer S (2017) Agile design project methodology for small teams developing mechatronic systems. Thesis, University of Alberta. <https://doi.org/10.7939/R38C9RG6T>, <https://era.library.ualberta.ca/items/38bc534a-eaaa-4e0f-ad7f-2b2c32ba4a7a> . Accessed 27 Sep 2018

[37] Malaysian Investment Development Authority (MIDA): Industrialized building system (IBS) in Malaysia: an update, MIDA Newsletter Publication for Global Investors, Malaysia, 3. <http://www.mida.gov.my/home/3094/news/mida-targets-100-additional-ibs-manufacturing-companiesby-2020/> (2015). Accessed 23 Nov 2016

[38] Construction Industry Development Board Malaysia (CIDB): *Construction Industry Master Plan 2 (CIMP 2 2016–2020)* (2015)

[39] Zakaria, S.A.S.; Gajendran, T.; Skitmore, M.; Brewer, G.: Key factors influencing the decision to adopt industrialised building systems technology in the Malaysian construction industry: an inter-project perspective. *Archit. Eng. Des. Manag.* 14(1–2), 27–45 (2018)

[40] Sriram, I., & Khajeh-Hosseini, A. (2010). *Research Agenda in Cloud Technologies* (ArXiv E-Print No. 1001.3259). Retrieved from. <http://arxiv.org/abs/1001.3259> . Accessed 1 July 2022

[41] Yang, S., & Hsu, C. (2011). The Organizing Vision for Cloud Computing in Taiwan. *Journal of Electronic Commerce Research*, 12(4), 257–271.

[42] Zhang, Q., Cheng, L., & Boutaba, R. (2010). Cloud computing: State-of-the-art and research challenges. *Journal of Internet Services and Applications*, 1(1), 7–18.
<https://doi.org/10.1007/s13174-010-0007-6>

[43] Stanoevska-Slabeva, K., & Wozniak, T. (2010). Cloud Basics – An Introduction to Cloud Computing. In K. Stanoevska-Slabeva, T. Wozniak, & S. Ristol (Eds.), *Grid and Cloud Computing* (pp. 47–61). Berlin: Springer. Retrieved from http://link.springer.com/chapter/10.1007/978-3-642-05193-7_4 .

[44] Voorsluys, W., Broberg, A., & Buyya, R. (2011). Introduction to Cloud Computing. In R. Buyya, J. Broberg, & A. Goscinski (Eds.), *Cloud computing: Principles and paradigms*. Wiley.

[45] Kirkland, G. (2019, November 4). Cloud Computing: A look across industries. Akuaroworld. <https://www.akuaroworld.com/cloud-computing-across-industries/>

[46] Ministry of Information, Communications and Technology. (2019b). National Information, Communication and Technology (ICT) Policy. <https://www.researchdatashare.org/content/2019-kenya-national-ict-policy>

[47] Namunwa, K. (2022). Why These Countries Are AI Leaders in Africa. Retrieved July 23, 2022, from CIO Africa website: <https://cioafrica.co/ai-growth-in-africa-why-these-countries-are-leading-the-pack/>.

[48] Weick, K. E., & Sutcliffe, K. M. (2001). *Managing the unexpected: Assuring high performance in an age of complexity*. Jossey-Bass.

[49] Enya, A., Dempsey, S., & Pillay, M. (2019). High Reliability Organisation (HRO) Principles of Collective Mindfulness: An Opportunity to Improve Construction Safety Management. In P. M. F. M. Arezes (Ed.), *Advances in Safety Management and Human Factors* (pp. 3–13). Springer International Publishing. https://doi.org/10.1007/978-3-319-94589-7_1

[50] Dernbecher, S., & Beck, R. (2017). The concept of mindfulness in information systems research: A multi-dimensional analysis. *European Journal of Information Systems*, 26(2), 121–142. <https://doi.org/10.1057/s41303-016-0032-z>

[51] Swanson, E. B., & Ramiller, N. C. (2004). Innovating mindfully with information technology. *MIS Quarterly*, 28(4), 553–583.

[52] Chang, S. E., Shen, W.-C., & Liu, A. Y. (2016). Why mobile users trust smartphone social networking services? A PLS-SEM approach. *Journal of Business Research*, 69(11), 4890–4895. <https://doi.org/10.1016/j.jbusres.2016.04.048>

[53] Mican, D., Sitar-Tăut, D.-A., & Moisescu, O.-I. (2020). Perceived usefulness: A silver bullet to assure user data availability for online recommendation systems. *Decision Support Systems*, 113420,. <https://doi.org/10.1016/j.dss.2020.113420>

[54] Urbach, N., & Ahlemann, F. (2010). Structural equation modeling in information systems research using partial least squares. *Journal of Information Technology Theory and Application (JITTA)*, 11(2). <http://aisel.aisnet.org/jitta/vol11/iss2/2>.

[55] Ringle, C. M., Rigdon, E., & Sarstedt, M. (2018). On Comparing Results from CB-SEM and PLS-SEM: Five Perspectives and Five Recommendations (SSRN Scholarly Paper No. ID 3128192). Rochester, NY: Social Science Research Network. Retrieved from Social Science Research Network website: <https://papers.ssrn.com/abstract=3128192>.

[56] Turban E, Volonino L (2011) Information technology for management: improving strategic and operational performance, 8th edn. Wiley, Danvers

[57] Sazu MH (2022) Does big data drive innovation in E-commerce: A global perspective? SEISENSE Bus Rev 2(1):55–66. <https://doi.org/10.33215/sbr.v2i1.797>

[58] Yue H (2022) Research on E-commerce data standard system in the era of digital economy from the perspective of organizational psychology. Front Psychol 13:1–10. <https://doi.org/10.3389/fpsyg.2022.900698>

[59] Ferreira T, Pedrosa I, Bernardino J (2019) Integration of business intelligence with e-commerce. In: 2019 14th Iberian conference on information systems and technologies (CISTI), pp 1–7. <https://doi.org/10.23919/cisti.2019.8760992>

[60] Fink L, Yogev N, Even A (2017) Business intelligence and organizational learning: an empirical investigation of value creation processes. Inf Manag 54(1):38–56. <https://doi.org/10.1016/j.im.2016.03.009>

[61] Sivarajah U, Kamal MM, Irani Z, Weerakkody V (2017) Critical analysis of Big Data challenges and analytical methods. J Bus Res 70:263–286. <https://doi.org/10.1016/j.jbusres.2016.08.001>

[62] Verhoef PC, Kooge E, Walk N (2016) Creating value with big data analytics: making smarter marketing decisions. Routledge, London

[63] Balachandran BM, Prasad S (2017) Challenges and benefits of deploying big data analytics in the cloud for business intelligence. Procedia Comput Sci 112:1112–1122. <https://doi.org/10.1016/j.procs.2017.08.138>

[64] Duan L, Xu LD (2012) Business intelligence for enterprise systems: a survey. IEEE Trans Ind Inf 8(3):679–687. <https://doi.org/10.1109/tii.2012.2188804>

[65] Susanty A, Handoko A, Puspitasari N (2020) Push-pull-mooring framework for e-commerce adoption in small and medium enterprises. J Enterp Inf Manag 33(2):381–406

[66] Wang X, Yang LT, Liu H, Deen MJ (2017) A Big Data-as-a-service framework: state-of-the-art and perspectives. IEEE Trans Big Data.

<https://doi.org/10.1109/tbdata.2017.2757942>

[67] Hoang TDL, Nguyen HK, Nguyen HT (2021) Towards an economic recovery after the COVID-19 pandemic: Empirical study on electronic commerce adoption of small and medium enterprises in Vietnam. *Manag Mark* 16(1):47–68.

<https://doi.org/10.2478/mmcks-2021-0004>

[68] Kabango CM, Asa AR (2015) Factors influencing e-commerce development: implications for the developing countries. *Int J Innov Econ Dev* 1(1):64–72.

<https://doi.org/10.18775/ijied.1849-7551-7020.2015.11.2006>

[69] Feylizadeh, M.R.; Mahmoudi, A.; Bagherpour, M.; Li, D.F.: Project crashing using a fuzzy multi-objective model considering time, cost, quality and risk under fast tracking technique: a case study. *J. Intell. Fuzzy Syst.* (2019). <https://doi.org/10.3233/JIFS-18171>

[70] Göçken, T.: Solution of fuzzy multi-objective project crashing problem. *Neural Comput. Appl.* 23(7–8), 2167–2175 (2013)

[71] Jebaseeli, M.E.; Dhayabaran, D.P.: Integer programming model for fuzzy time cost and quality trade off problem. *Int. J. Eng. Sci. Innov. Technol. (IJESIT)* 4(3), 97–106 (2015)

[72] Buckley, J.J.; Feuring, T.: Evolutionary algorithm solution to fuzzy problems: fuzzy linear programming. *Fuzzy Sets Syst.* 109(1), 35–53 (2000)

[73] Ramezani R, Ezzatpanah A (2015) Modeling and solving multi-objective mixed-model assembly line balancing and worker assignment problem. *Comput Ind Eng* 87:74–80.

<https://doi.org/10.1016/j.cie.2015.04.017>

[74] Einav L, Levin J (2014) The Data Revolution and Economic Analysis. *Innov Policy Econ* 14:1–24

[75] Wirth R, Hipp J (2000) CRISP-DM: towards a standard process model for data mining. In: *Proceedings of the fourth international conference on the practical application of knowledge discovery and data mining*, no 24959, pp 29–39

[76] Abdelsayed M, Navon R (1999) An information sharing, internet-based, system for project control. *Civ Eng Environ Syst* 16(3):211–233

[77] Turkan Y, Bosche F, Haas C, Haas R (2012) Automated progress tracking using 4D schedule and 3D sensing technologies. *Autom Constr* 22:414–421

[78] Navon R, Sacks R (2007) Assessing research issues in automated project performance

control (APPC). *Autom Constr* 16(4):474–484

[79] Yang J, Park M, Vela PA, Golparvar-Fard M (2015) Construction performance-monitoring via still images, time-lapse photos, and video streams: Now, tomorrow, and the future. *Adv Eng Inform* 29:211–224

[80] Salehi AS, Yitmen I (2018) Modeling and analysis of the impact of BIM-based field data capturing technologies on automated construction progress monitoring. *Int J Civ Eng* 16:1669–1685

[81] Ostwald, P.F.: *Construction Cost Analysis and Estimating*. Prentice Hall, Upper Saddle River (2001)

[82] Eastman, et al.: *BIM Handbook: “A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers, and Contractors”*. Wiley, Hoboken (2008)

[83] Lee J et al (2017) BIM-assisted labor productivity measurement method for structural formwork. *Autom Constr* 84:121–132

[84] Arif, F.: *A decision support framework for infrastructure maintenance investment decision-making*. FIU Electronic Theses and Dissertations (2013)

[85] El Razek, R. H. A., Diab, A. M., Hafez, S. M., & Aziz, R. F. (2010). Time-cost-quality trade-off software by using simplified genetic algorithm for typical repetitive construction projects. *World Acad Sci Eng Technol*, 37, 312–320.

[86] Afshar, A., & Zolfaghar Dolabi, H. R. (2014). Multi-objective optimization of time-cost-safety using genetic algorithm. *Int. J. Optim. Civil Eng.*, 4(4), 433–450.

[87] Sharma, K., & Trivedi, M. K. (2020). Latin hypercube sampling-based NSGA-III optimization model for multimode resource constrained time-cost-quality-safety trade-off in construction projects. *Int J Constr Manage.*

<https://doi.org/10.1080/15623599.2020.1843769>

[88] Yu, C., Heidari, A. A., Xue, X., Zhang, L., Chen, H., & Chen, W. (2021). Boosting quantum rotation gate embedded slime mould algorithm. *Expert Systems with Applications*, 181, 115082.

[89] Houssein, E. H., Mahdy, M. A., Blondin, M. J., Shebl, D., & Mohamed, W. M. (2021). Hybrid slime mould algorithm with adaptive guided differential evolution algorithm for combinatorial and global optimization problems. *Expert Systems with Applications*, 174, 114689.

[90] Afshar, A., Kasaeian Ziaraty, A., Kaveh, A., & Sharifi, F. (2009). Nondominated archiving multicolony ant algorithm in time–cost trade-off optimization. *Journal of Civil Engineering and Management*, 135, 668–674.

[91] Ngo, N.-T., Truong, T. T. H., Truong, N.-S., Pham, A.-D., Huynh, N.-T., Pham, T. M., & Pham, V. H. S. (2022). Proposing a hybrid metaheuristic optimization algorithm and machine learning model for energy use forecast in non-residential buildings. *Science and Reports*, 12, 1–8.

[92] P Vu-Hong-Son, P Ton-Dat, N Huynh-Chi-Duy (2022) Optimization of project scheduling under constrained resources using the dependency structure matrix and whale algorithm, 37, 1–16.

[93] Son, P. V. H., & Khoi, L. N. Q. (2022). Utilizing artificial intelligence to solving time–cost–quality trade-off problem. *Science and Reports*, 12, 20112.

<https://doi.org/10.1038/s41598-022-24668-7>

[94] Son, P. V. H., Duy, N. H. C., & Dat, P. T. (2021). Optimization of construction material cost through logistics planning model of dragonfly algorithm -particle swarm optimization. *KSCE J Civil Eng*, 25, 2350–2359.

[95] Lau SY, Chen T, Zhang J, Xue X, Khoo YS (2019) A new approach for the project process: prefabricated building technology integrated with photovoltaics based on the bim system. *IOP Conf Ser Earth Environ Sci* 294:012050

[96] Yuan, Z.; Sun, C.; Wang, Y.: Design for manufacture and assembly-oriented parametric design of prefabricated buildings. *Autom. Constr.* 88, 13–22 (2018)

[97] Wang G (2019) Design and optimization of prefabricated component system based on BIM technology. *J Phys Conf Ser* 1345(6):062054

[98] Ahmed S (2019) Causes of accident at construction sites in Bangladesh. *Org Technol Manag Constr Int J* 11(1):1933–1951

[99] Kanchana S, Sivaprakash P, Joseph S (2015) Studies on labour safety in construction sites. *Sci World J* 2015:1–6

[100] Bhole MAS (2016) Safety problems and injuries on construction site: a review. *Int. J. Eng. Tech* 2(4):24–35

[101] Hossain MM, Ahmed S (2019) Developing an automated safety checking system using BIM: a case study in the Bangladeshi construction industry. *Int J Constr Manag*.

<https://doi.org/10.1080/15623599.2019.1686833>

[102] Alizadehsalehi S, Yitmen I, Celik T, Arditi D (2018) The effectiveness of an integrated BIM/UAV model in managing safety on construction sites. *Int J Occup Saf Ergon* 26(1):829–844

[103] Kim K, Cho Y, Kim K (2018) BIM-driven automated decision support system for safety planning of temporary structures. *J Constr Eng Manag* 144(8):1–11

[104] Ali HM, Arif S, Theppaya T (2021) Techno economic evaluation and feasibility analysis of a hybrid net zero energy building in Pakistan: a case study of hospital. *Front Energy Res* 9:127

[105] Huang Y, Mao S, Nelms RM (2014) Adaptive electricity scheduling in microgrids. *IEEE Trans Smart Grid* 5(1):270–281

[106] Gong Q, Midlam-Mohler S, Marano V, Rizzoni G (2011) Study of pev charging on residential distribution transformer life. *IEEE Trans Smart Grid* 3(1):404–412

[107] Kreider R, Messner J, Dubler C (2010) Determining the frequency and impact of applying BIM for different purposes on building projects. In: *Proceedings of the 6th international conference on innovation in architecture, engineering and construction (AEC)*, 2010, pp 1–10

[108] Kubicki S, Boton C (2014) IT barometer survey in Luxembourg: first results to understand IT innovation in construction sector. In: *Computing in civil and building engineering*. American Society of Civil Engineers, Orlando, pp 179–186.
<https://doi.org/10.1061/9780784413616.023>

[109] Hartmann T, Fischer M (2007) Supporting the constructability review with 3D/4D models. *Build Res Inf* 35:70–80. <https://doi.org/10.1080/09613210600942218>

[110] Bortolotti T, Romano P, Martínez-Jurado PJ, Moyano-Fuentes J (2016) Towards a theory for lean implementation in supply networks. *Int J Prod Econ* 175:182–196.
<https://doi.org/10.1016/j.ijpe.2016.02.020>

[111] Afrazi M, Yazdani M (2021) Determination of the effect of soil particle size distribution on the shear behavior of sand. *J Adv Eng Comput* 5:125.
<https://doi.org/10.25073/jaec.202152.331>

[112] Afrazi M, Lin Q, Fakhimi A (2022) Physical and numerical evaluation of mode II fracture of quasi-brittle materials. *Int J Civ Eng*.

<https://doi.org/10.1007/s40999-022-00718-z>

[113] Nguyen P, Akhavian R (2019) Synergistic effect of integrated project delivery, lean construction, and building information modeling on project performance measures: a quantitative and qualitative analysis. *Adv Civ Eng* 2019:1–9.

<https://doi.org/10.1155/2019/1267048>

[114] Zhang Z, Yang F, Zhang H, Zhang T, Wang H, Xu Y, Ma Q (2021) Influence of CeO₂ addition on forming quality and microstructure of TiC -reinforced CrTi₄-based laser cladding composite coating. *Mater Character.*

<https://doi.org/10.1016/j.matchar.2020.110732>

[115] Deng H (1999) Multicriteria analysis with fuzzy pairwise comparison. *Int J Approx Reason* 21:215–231. [https://doi.org/10.1016/S0888-613X\(99\)00025-0](https://doi.org/10.1016/S0888-613X(99)00025-0)

[116] Aksamija A, Guttman M, Rangarajan H, Meador T (2011) Parametric control of BIM elements for sustainable design in revit: linking design and analytical software applications through customization. *J Res* 3:32–45

[117] Abdelhamid TS, El-Gafy M, Salem O (2008) Lean construction: fundamentals and principles. *Am Prof Constr J* 4:8–19

[118] Salem O, Solomon J, Genaidy A, Minkarah I (2006) Lean construction: from theory to implementation. *J Manag Eng* 22:168–175.

[https://doi.org/10.1061/\(ASCE\)0742-597X\(2006\)22:4\(168\)](https://doi.org/10.1061/(ASCE)0742-597X(2006)22:4(168))

[119] Sedghi Y, Zandi Y, Shariati M, Ahmadi E, Azar VM, Toghroli A, Wakil K (2018) Application of ANFIS technique on performance of C and L shaped angle shear connectors. *Smart Struct Syst* 22(3):335–340

[120] Jahandari S, Tao Z, Saberian M et al (2021) Geotechnical properties of lime-geogrid improved clayey subgrade under various moisture conditions. *Road Mater Pavement Des.*

<https://doi.org/10.1080/14680629.2021.1950816>

[121] Tavassoli A, Mortahab MM (2008) A study of the application of lean construction method in Iran and proposing a workshop performance considering this method. In: 4th international conference on project management, Tehran, Ariana Research Group

[122] Carvajal-Arango D, Bahamón-Jaramillo S, Aristizábal-Monsalve P et al (2019) Relationships between lean and sustainable construction: positive impacts of lean practices over sustainability during construction phase. *J Clean Prod* 234:1322–1337.

<https://doi.org/10.1016/j.jclepro.2019.05.216>

- [123] Hamidian M, Mahdi S, Hamid S (2011) Assessment of high strength and light weight aggregate concrete properties using ultrasonic pulse velocity technique. *Int J Physic Sci* 6(22):5261–5266
- [124] Davoodnabi SM, Mirhosseini SM, Shariati M (2021) Analyzing shear strength of steel-concrete composite beam with angle connectors at elevated temperature using finite element method. *Steel Compos Struct* 40(6):853–868
- [125] CENELEC EN 50126:2017 Railway applications – The Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS) – Part 1: Generic RAMS Process (English version).
- [126] Papke BL et al (2020) Implementing MBSE – an enterprise approach to an enterprise problem. *INCOSE Int Symp* 30(1):1550–1567.
<https://doi.org/10.1002/j.2334-5837.2020.00803.x>
- [127] Nazaruddin YY, Tamba TA, Pradityo K, Aristyo B, Widyotriatmo A (2019) Safety verification of a train interlocking timed automaton model, *IFAC-PapersOnLine*, 52(15): 331-335, ISSN 2405-8963, <https://doi.org/10.1016/j.ifacol.2019.11.696>
- [128] Behrmann G, David A, Larsen KG (2004) A tutorial on UPPAAL. In: Bernardo M, Corradini F (eds) *Formal methods for the design of real-time systems. SFM-RT 2004. Lecture notes in computer science*, vol 3185. Springer, Berlin, Heidelberg.
https://doi.org/10.1007/978-3-540-30080-9_7
- [129] Beck, K.; Beedle, M.; van Bennekum, A.; Cockburn A., Cunningham, W.; Fowler, M.; Grenning, J.; Highsmith, J.; Hunt, A.; Jeffries, R.; Kern, J.; Marick, B.; Martin, R. C.; Mellor, S.; Schwaber, K.; Sutherland, J.; Thomas, D.: *Manifesto for Agile Software Development*, (2007)
- [130] Ozakıncı, R.; Tarhan, A.: Early software defect prediction: a systematic map and review. *J. Syst. Softw.* 144, 216–239 (2018). <https://doi.org/10.1016/j.jss.2018.06.025>
- [131] Li, M.; Smidts, C.: A ranking of software engineering measures based on expert opinion. *IEEE Trans. Softw. Eng.* 29(9), 811–824 (2003)
- [132] Sambinelli, F.; Borges, M.A.F.: Strategies to Increase Customer Value in Agile Software Development. *CSR Und Hochschul Manag.* (2019).
https://doi.org/10.1007/978-3-030-14310-7_5
- [133] Guo, Z.X.; Wong, W.K.: Fundamentals of artificial intelligence techniques for apparel management applications. *Optim. Decision Mak. Apparel Supply Chain Using Artif. Intell. (AI)* (2013). <https://doi.org/10.1533/9780857097842.13>

- [134] Yin, R.K.: Case study research. Design and methods, 3rd edn. London, Sage (2003)
- [135] Augenbroe, G.: Trends in building simulation. *Build. Environ.* 37(8–9), 891–902 (2002)
- [136] Yilmaz, L.; Taylor, S.J.E.; Fujimoto, R.; Darema, F.: Panel: the future of research in modeling and simulation. In: *The 2014 Winter Simulation Conference, Savannah, Georgia, December 07–10, 2014*, pp. 2797–2811 (2014)
- [137] Law, A.M.; McComas, M.G.: Secrets of successful simulation studies. *Ind. Eng.* 22(5), 47–53 (1990)
- [138] Du, J.; El-gafy, M.; Zhao, D.: Optimization of change order management process with object-oriented discrete event simulation: case study. *J. Constr. Eng. Manag.* 142(4), 1–15 (2016)
- [139] Shirts, R.: Ten secrets of successful simulations. *Training* 29(10), 79–83 (1992)
- [140] Abed, Hayder Razzaq; Rashid, Hatim A. A New Risk Assessment Model for Construction Projects by Adopting a Best–Worst Method–Fuzzy Rule-Based System Coupled with a 3D Risk Matrix. *Iranian Journal of Science and Technology, Transactions of Civil Engineering* (2023). doi: 10.1007/s40996-023-01105-x
- [141] Vigneault, Marc-Antoine; Botton, Conrad; Chong, Heap-Yih; Cooper-Cooke, Barry An Innovative Framework of 5D BIM Solutions for Construction Cost Management: A Systematic Review. *Archives of Computational Methods in Engineering* (2019). doi: 10.1007/s11831-019-09341-z
- [142] Al-Rawashdeh, Mohammad; Al Nawaiseh, Moh'd; Yousef, Isam; Bisharah, Majdi; Alkhadrawi, Sajeda; Al-Bdour, Hamza Predicting building damage grade by earthquake: a Bayesian Optimization-based comparative study of machine learning algorithms. *Asian Journal of Civil Engineering* (2023). doi: 10.1007/s42107-023-00771-6
- [143] Chatterjee, Sheshadri; Mikalef, Patrick; Khorana, Sangeeta; Kizgin, Hatice Assessing the Implementation of AI Integrated CRM System for B2C Relationship Management: Integrating Contingency Theory and Dynamic Capability View Theory. *Information Systems Frontiers* (2022). doi: 10.1007/s10796-022-10261-w
- [144] Campos, Jaime; Ferguson, Philip Decentralized project management concept for schedule-critical space projects. *Aerospace Systems* (2021). doi: 10.1007/s42401-021-00098-7

[145] El-Abidi, Khaled M. Amtered; Ofori, George; Zakaria, Sharifah Akmam Syed; Mannan, Md. Abdul; Abas, Noor Faisal Identifying and Evaluating Critical Success Factors for Industrialized Building Systems Implementation: Malaysia Study. *Arabian Journal for Science and Engineering* (2019). doi: 10.1007/s13369-019-03941-4

[146] Oredo, John; Dennehy, Denis Exploring the Role of Organizational Mindfulness on Cloud Computing and Firm Performance: The Case of Kenyan Organizations. *Information Systems Frontiers* (2022). doi: 10.1007/s10796-022-10351-9

[147] Huy, Pham Quang; Phuc, Vu Kien Big data in relation with business intelligence capabilities and e-commerce during COVID-19 pandemic in accountant's perspective. *Future Business Journal* (2023). doi: 10.1186/s43093-023-00221-4

[148] Hashemi, S. M.; Mousavi, S. M.; Patoghi, A. A Fuzzy Multi-objective Mathematical Programming Model for Project Management Decisions Considering Quality and Contractual Reward and Penalty Costs in a Project Network. *Arabian Journal for Science and Engineering* (2020). doi: 10.1007/s13369-020-04800-3

[149] Ziv, Batel; Parmet, Yisrael Improving nonconformity responsibility decisions: a semi-automated model based on CRISP-DM. *International Journal of System Assurance Engineering and Management* (2021). doi: 10.1007/s13198-021-01318-1

[150] Arif, Farrukh; Khan, Waleed Ahmed Smart Progress Monitoring Framework for Building Construction Elements Using Videography–MATLAB–BIM Integration. *International Journal of Civil Engineering* (2021). doi: 10.1007/s40999-021-00601-3

[151] Arif, Farrukh; Khan, Waleed Ahmed A Real-Time Productivity Tracking Framework Using Survey-Cloud-BIM Integration. *Arabian Journal for Science and Engineering* (2020). doi: 10.1007/s13369-020-04844-5

[152] Son, Pham Vu Hong; Khoi, Luu Ngoc Quynh Building projects with time–cost–quality–environment trade-off optimization using adaptive selection slime mold algorithm. *Asian Journal of Civil Engineering* (2023). doi: 10.1007/s42107-023-00572-x

[153] Xiao, Yanwu; Bhola, Jyoti Design and optimization of prefabricated building system based on BIM technology. *International Journal of System Assurance Engineering and Management* (2021). doi: 10.1007/s13198-021-01288-4

[154] Hire, Shalaka; Sandbhor, Sayali; Ruikar, Kirti Bibliometric Survey for Adoption of Building Information Modeling (BIM) in Construction Industry– A Safety Perspective. *Archives of Computational Methods in Engineering* (2021). doi: 10.1007/s11831-021-09584-9

[155] Bhagat, Kalsoom; Dai, Chaohua; Ye, Shengyong; Bhayo, M. Zubair; Kalwar, Basheer Ahmed; Mari, Mohsin Ali Stochastic Energy Management Strategy of Smart Building Microgrid with Electric Vehicles and Wind-Solar Complementary Power Generation System. *Journal of Electrical Engineering & Technology* (2022). doi: 10.1007/s42835-022-01193-1

[156] Boton, Conrad; Rivest, Louis; Kubicki, Sylvain; Ghnaya, Oussama 4D Simulation Research in Construction: A Systematic Mapping Study. *Archives of Computational Methods in Engineering* (2022). doi: 10.1007/s11831-022-09873-x

[157] Moballeghi, Elham; Pourrostan, Towhid; Abbasianjahromi, Hamidreza; Makvandi, Payam Assessing the Effect of Building Information Modeling System (BIM) Capabilities on Lean Construction Performance in Construction Projects Using Hybrid Fuzzy Multi-criteria Decision-Making Methods. *Iranian Journal of Science and Technology, Transactions of Civil Engineering* (2022). doi: 10.1007/s40996-022-00971-1

[158] Lukács, Gábor; Bartha, Tamás Formal Modeling and Verification of the Functionality of Electronic Urban Railway Control Systems Through a Case Study. *Urban Rail Transit* (2022). doi: 10.1007/s40864-022-00177-8

[159] Sharma, Pooja; Sangal, Amrit Lal Building and Testing a Fuzzy Linguistic Assessment Framework for Defect Prediction in ASD Environment Using Process-Based Software Metrics. *Arabian Journal for Science and Engineering* (2020). doi: 10.1007/s13369-020-04701-5

[160] Alsudairi, Abdulsalam Ali Conceptual Framework of an Object-Oriented Simulation Approach for Building Construction Processes. *Arabian Journal for Science and Engineering* (2020). doi: 10.1007/s13369-020-04513-7

2. Project Management

Machine generated summaries

Machine generated keywords: project management, project, software project, contractor, principal, contract, software, amount, construction, supply chain, delivery, education, rate, stem, chain

Online technological STEM education project management [27]

This is a machine-generated summary of:

Shen, Fangyang; Roccasalvo, Janine; Zhang, Jun; Tian, Yun; Yi, Yang: Online technological STEM education project management [27]

Published in: Education and Information Technologies (2023)

Link to original: <https://doi.org/10.1007/s10639-022-11521-7>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2023

Copyright comment: Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"With a strong demand for online education and project management in deeper scope and larger scale to better fit COVID-19 pandemic situation, exploring new knowledge of online education to make it more effective became vital with the new challenges of STEM education."

"To resolve the above problem, this paper focuses on various aspects of online STEM education project management where the Enhanced Noyce Explorers, Scholars, Teachers (E-NEST) three-tiered structure was implemented during the COVID-19 period."

"Built upon the theories of engagement, capacity and continuity (ECC) and team-based learning (TBL), this remote learning model and infrastructure had a positive impact on STEM education and project management."

"This indicated that the E-NEST model greatly supported student success and faculty in online learning and project management meetings."

"The E-NEST STEM education project was compared to two other project management models along with the previous NEST curriculum."

"The comparisons attest that the E-NEST project developed excellent and innovative online platforms for student learning with project management and ECC and TBL applications."

"This research can be used to constructively develop more online STEM education learning models and platforms and integrate new practice and technology globally."

Introduction

"How will we constructively develop project management and STEM education learning in educational computer systems throughout the duration of the pandemic period?"

"We present an online STEM education project management strategy using the Enhanced Noyce Explorers, Scholars, Teachers (E-NEST) three-tiered structure (Shen and others, 3) during the pandemic period."

"The results from all of the above qualitative data demonstrated that the STEM education remote learning and project management model was beneficial in teaching and learning for students and faculty."

"The project evaluation and survey data indicated that the E-NEST three-tiered structure supported student and faculty success by using modified project management and distance learning approaches in STEM education."

"This study investigates the students' observations of the impact of the three-tiered infrastructure of project management and E-NEST programs using the enhanced theories of team-based learning and engagement, capacity and continuity in online learning."

Methods

"Noyce explorers and scholars participated in 2021 summer workshops with team-based learning (TBL) activities where the following research tools were utilized by the program evaluator: remote focus group interviews, one-to-one student interviews and anonymous surveys to collectively assess E-NEST remote learning."

"The external evaluation was guided by five broad questions, each of which cuts across both the three tiers (Explorer, Scholar and Teacher) and foundations of project delivery (capacity, engagement and continuity and team-based learning): (1) To what extent, and with what quality, does the project team implement the strategies and develop outputs proposed for the project? (2) To what extent are diverse STEM students recruited to the teacher education program? (3) How effectively are those students prepared to be STEM teachers, considering student teaching, degree completion and teacher certification? (4) To what extent are students retained through educator preparation and induction processes?"

(5) To what extent do program graduates demonstrate effectiveness in terms of both teaching practices and impact on K-12 student learning?"

Results and Discussion

"The project evaluation and data validates that the remote three-tiered infrastructure of project management and E-NEST program using the enhanced theories of team-based learning and engagement, capacity and continuity have effectively supported students and their academic achievement."

"The E-NEST project management team successfully adapted to remote learning content wholly online."

"Students successfully motivated students in STEM education using culturally responsive teaching and modified engagement, capacity and continuity and team-based learning applications of theories remotely."

"The overall findings from project evaluation and online survey and focus group interview data significantly demonstrated that Noyce explorers and scholars highly approved of the E-NEST remote learning platforms and project management."

"The data confirms that project faculty developed effective online platforms for student learning."

"The E-NEST's project management allowed students to constructively learn in remote environments with best practices of classroom and time management consistent with PMBOK and PCM guidelines (Crisan, Muresan & Ilies, 2)."

Conclusions

"The E-NEST project applied teaching and project management strategies remotely based on the modifications of the theories of team-based learning (Ruder, Maier & Simkins, 4) and engagement, capacity and continuity (Artis & Washington, 5)."

"The E-NEST STEM education project management model was also compared to (Delisle, Jugdev & Thomas, 1) and (Crisan, Muresan & Ilies, 2) along with the NEST curriculum (Shen and others, 3)."

"The implications of this study's findings from qualitative data illustrate that a successful remote learning and project management model was developed to teach STEM education."

"This new E-NEST remote learning infrastructure can be useful as a role model for many

other online educational platforms and contribute to research in STEM education in higher education institutions internationally."

Does agile methodology fit all characteristics of software projects? Review and analysis [28]

This is a machine-generated summary of:

Itzik, David; Roy, Gelbard: Does agile methodology fit all characteristics of software projects? Review and analysis [28]

Published in: Empirical Software Engineering (2023)

Link to original: <https://doi.org/10.1007/s10664-023-10334-7>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2023

Copyright comment: Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The agile paradigm for software projects has significantly impacted software development worldwide."

"Several aspects of the agile paradigm and its compatibility with various software project

characteristics remain empirically under-researched."

"We employ a systematic literature review (SLR) to assess the compatibility of agile methodology with the characteristics of software development projects."

"We have then explored the position-sentiment regarding each cell of the decision-making framework as it is expressed in a wide set of academic articles, to help researchers and practitioners evaluate the compatibility of the agile methodology with the software project they are dealing with."

Introduction

"This paper addresses the following research questions: What software project characteristics are compatible with the agile methodology?"

"For what software project characteristics does little or no evidence exist regarding the compatibility with the agile methodology?"

"Some studies have attempted to identify contextual factors that could indicate whether it would be better to use agile or traditional plan-driven software development methodologies."

"The present study seeks to pinpoint and gain insights into the compatibility of the agile methodology with different characteristics of software projects."

"Such visualization enables researchers, practitioners, and project managers to see the "big picture" (Gehlenborg and Wong 6) by identifying software project characteristics that make a project compatible or incompatible with the agile methodology."

"Using the proposed decision-making framework would assist researchers in identifying existing literature gaps regarding the agile methodology application in the software project management domain."

Literature Review

"They proceeded to insert success factors extracted from their study into the model dimensions to assess the effect of a project and its environmental factors on the agile methodology."

"In light of the above situation, the primary purpose of this study is to sketch a comprehensive picture of the agile methodology compatibility with software project characteristics, i.e., knowledge areas derived from the Project Management Body of

Knowledge (PMBOK) (PMI 7), in different phases of the software development life cycle (SDLC)."

"We identify which software project characteristics have been sufficiently investigated by the research community for their compatibility with agile methodology and whether or not there is a consensus (positive or negative) about their compatibility with the agile methodology."

"We investigate the software project characteristics for whose compatibility with the agile methodology there is little or no evidence."

The Decision-Making Framework

"The agile development methodology design aims to facilitate the evolution of software requirements at any stage along the project (Borque and Fairley 8), we decided to include the Definition of Requirements stage in the x-axis (knowledge areas) and not in the y-axis (SDLC)."

"Since this occurs over all the stages according to the agile approach, it appears in the knowledge area axis and not in the SDLC axis. (3) For Project Schedule Management we use the term "Schedule." (4) For Project Cost Management we use the term "Budget." (5) Project Quality Management becomes "Quality." (6) Project Resource Management becomes "Productivity" since resource management is examined from an efficiency and productivity perspective. (7) Project Communication Management was split into two subareas: "Communication" and "Decision making". (8) For Project Risk Management we use "Risk." (9) Project Procurement Management and (10) Project Stakeholder Management are not relevant to the agile development context of this study, and our matrix does not include them."

Research Methodology

"The purpose of this study was to examine evidence from software development projects using the agile methodology to assess the compatibility of this methodology with the various characteristics of a software project."

"To construct the search string, we grouped the set of keywords with the Boolean OR operator, and combined the different OR clauses with the Boolean AND operator as follows: (agile OR scrum OR XP OR extreme programming) AND (software OR project OR team) AND (quality assurance OR testing OR architecture OR design OR development OR maintenance) We adjusted the search string to the syntax of each electronic database search engines used and applied it to the studies' titles, abstracts, and keywords."

Results

"Around 54% of them adopted the use-case research method (single and multiple), 27% – the survey method, 14% – a systematic literature review (SLR) or systematic mapping study (SMS), 2% leaned on an experiment, and 2% used a different evaluation research method than the mentioned categories."

"They make up approximately 45% of the published primary studies."

"The other listed journals published each 5% or less of the primary studies."

"The data item "agile method" is extracted only from primary studies investigating a use case."

"Since a use case may simultaneously employ several agile methods, the total number of agile-method use instances in the reviewed use-case studies (108 examples) is higher than the total use-case studies (68 studies)."

"The remaining agile methods were only 22% of the use cases reviewed."

Discussion

"Several studies report that the agile methodology negatively affects productivity in large-scale complex projects [S34, S45, S93, S101]."

"Although the decision-making framework data reveals scant research evidence of the agile methodology performance in maintenance and its effect on project characteristics, recent studies indicate that using the agile methodology negatively affects maintenance activities."

"Despite evidence of highly positive effects on requirements during the development phase and on quality and communication during both the development and QA phases, the agile methodology does not appear to be compatible with large-scale, complex projects, projects with distributed settings, or whose team members are not sufficiently skilled."

"They could, for example, utilize a plan-driven methodology for the architecture and design phase, an agile methodology for the development phase, and a revised agile methodology for QA, thus making better decisions by selecting or adjusting their development approach to each project."

Conclusions

"The decision-making framework proposed in this study comprehensively overviews the agile methodology."

"A second limitation is the risk of personal bias in several processes performed manually, such as evaluating the sentiments in each primary study and assigning them to the appropriate cells in the decision-making framework."

"The decision-making framework systematically offers a comprehensive picture of the agile methodology's effectiveness in various aspects of software projects throughout their life cycle."

"Each cell of the decision-making framework shows whether the researchers are in solid consensus (positive or negative) or an ongoing debate about a project's compatibility with the agile methodology."

"Future research should also investigate agile scaling frameworks such as SAFe (Leffingwell 9) DAD (Ambler and Lines 10) LeSS (Larman and Vodde 11), and hybrid frameworks designed to support large-scale and complex projects with distributed settings."

"Future research could investigate the effectiveness and risks associated with adopting the agile methodology for large-scale projects, especially case studies of different organizational settings."

Extending the Project Management Body of Knowledge (PMBOK) for Data Visualization in Software Project Management [29]

This is a machine-generated summary of:

Couto, Julia Colleoni; Kroll, Josiane; Ruiz, Duncan Dubugras; Prikladnicki, Rafael: Extending the Project Management Body of Knowledge (PMBOK) for Data Visualization in Software Project Management [29]

Published in: SN Computer Science (2022)

Link to original: <https://doi.org/10.1007/s42979-022-01168-z>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Nature Singapore Pte Ltd 2022

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Most of the tools adopted for software project management are based on textual reports."

"The implementation of data visualization using techniques and tools for project management can help identify and prevent project issues such as unexpected budget increases, unrealistic deadlines, lack of clear goals, and success criteria."

"The results from the evaluation show that our proposal adds support to visual project management and helps to identify the status and progress of the project quickly and prevent future issues related to communication."

"Our proposal was also found to be helpful for less experienced software project managers."

Introduction

"There are several known challenges for DV in software project management (SPM) such as different processes adopted for SPM, diversity of software development teams and DV techniques, and management of data sources and code repositories."

"In the project management field, the use of DV techniques and tools allows the mapping of large amounts of data to visual patterns that aid human information processing [12] and help in reducing cognitive bias."

"Visual project management can bring many benefits to Software Project Management (SPM), enabling managers to view and understand large amounts of data quickly and efficiently."

"Data visualization can help managers obtain insights from project issues, as well as

discover a new point of view of the data."

"In Couto and others [13] we proposed an extension for the PMBOK Guide consisting of the addition of two new processes named 10.4 Plan Data Visualization and 10.5 Implement Data Visualization."

Software Project Management

"This study focuses on the Communications KA because data visualizations are inserted in its context for visualizing project information."

"PMBOK Project Communications Management is currently composed of three processes."

"10.2 Manage Communications - a process that certifies that project information will be collected, created, distributed, stored, retrieved, managed, monitored, and arranged in a timely and appropriate manner."

"10.3 Monitoring Communications - a process that ensures the project and stakeholders meets its information needs."

"The PMBOK guide points out that because each project is unique, processes need to be adapted according to some factors such as physical location, stakeholders, language, communication technologies used, and how knowledge is managed in the project."

"Project documents can present data visualization techniques, and PMBOK lists 33 documents as the most commonly used project management communication models."

"Our study further investigates project management and the usage of data visualization."

Visualization Techniques and Tools for Software Project Management

"We conducted a Systematic Mapping Study (SMS) to identify which visual management techniques and tools are generally used for project management and which ones are applied in project management in the Software Engineering field."

"We asked the participants to select the provided techniques or tools they would use for each processes group."

"The majority of tools and techniques (50%) reported in studies were developed to support DV for Engineering, Architecture, or Construction projects, followed by Software Engineering (SE) projects (42%)."

"Regarding the PMBOK, we found that practitioners use the following DV techniques and tools in all project process groups: kanban, bar chart or columns, line chart, and dashboard."

"The maximum score that a technique or tool could have in each question would be 26 points, i.e., when all the participants and all sessions informed that they would use the technique or tool in a specific group of processes."

Development of an Extension for the PMBOK Guide

"Of this process, the communication management plan and project documents must be updated to include DV techniques and tools."

"EEF that may influence the Plan Data Visualization process include: Published material, including papers about applicable DV techniques; Academic studies; Benchmarking results; Global, regional, or local trends, practices, or habits; Organizational governance structure; Organizational, stakeholder, and client structure and culture; Geographic distribution of facilities and resources; Specific project document standards; Guidelines and criteria for defining the set of visualization techniques and tools to be used; Established channels, tools, and communication systems; Project management information systems."

"The following topics related to the project should be considered to plan the project DV: Knowledge of SPM; Knowledge of tools and visualization techniques that can be used to support the communication of information; Data interpretation and contextualization; Organization communication technologies; Organization policies and procedures on legal requirements for corporate communications; Communications with the public, community, media, and in a global environment - between virtual groups; Project and communications management systems."

Evaluation of the Extension Proposal

"To validate our proposal, we conducted a user study to evaluate the proposed extension in terms of alignment with the PMBOK Guide and its applicability in SPM."

"We design our user study to evaluate the applicability and alignment of the proposed PMBOK extension for DV in SPM."

"The majority of the participants gave high scores to the proposal's applicability to SPM and its alignment to the PMBOK Guide."

"We also observe that some participants disagree with the proposal's applicability and alignment within the PMBOK Guide."

"Participant 8 highlighted how important our proposal is for the software industry: "it [our proposal] is important and 'super' [very] valid to have technical options in BoKs [PMBOK Guides], as they serve as a reference for using [applying it in SPM]. [...]"."

Conclusions and Future Work

"Prior to this study, extensive research was conducted in the project management area to understand how software project management can benefit from using data visualization to increase the projects' success."

"We evaluate our PMBOK extension proposal for data visualization in software project management that was built in our prior research."

"We conducted a user study to evaluate our proposal regarding its applicability in software project management and its alignment with the PMBOK Guide."

"Our results are also promising, and they show that our proposal is applicable for software project management and is aligned with the PMBOK Guide."

"The experts found that adding two new processes to the current PMBOK structure is relevant, and we believe that this result is important to show that our proposal can be incorporated to support project management activities in the software industry."

The role of project management in the success of green building projects: Egypt as a case study [30]

This is a machine-generated summary of:

Abdelkhalik, Heba Farouk; Azmy, Hisham Hussein: The role of project management in the success of green building projects: Egypt as a case study [30]

Published in: Journal of Engineering and Applied Science (2022)

Link to original: <https://doi.org/10.1186/s44147-022-00112-5>

Copyright of the summarized publication:

The Author(s) 2022

License: OpenAccess CC BY + CC0 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Sustainability and project management are two trends that have taken global interest in the last decades due to their significant role in various fields of life."

"Some of these obstacles have been addressed in recent studies with suggested solutions, but the role of project management in overcoming or even mitigating the risk of these obstacles was almost absent in most of these studies."

"This paper attempts to observe the most important obstacles facing the application of sustainability in the construction field and taking the green construction situation in Egypt as a case study."

"This paper aims to investigate the role of project management in green building projects' success, through project management best practices' applications to overcome the main reasons that obstruct the green building projects movement."

"The results showed that there is a lack of management methods that address sustainable construction projects."

"Some defined obstructions could be overcome by project management's best practices and methods."

Introduction

"Green building applications at the project level were considered."

"The lack of green buildings in developing countries and the gap between the percentage of the registered projects and the certified projects from green building rating systems in countries like Egypt indicates that there are some obstacles facing this kind of project in all project phases."

"This paper aims to investigate the obstacles that face green building applications in developing countries due to the size of the challenges that face these projects there and takes Egypt as a case study."

"The study observed challenges facing project managers or green building administrators in this project through a questionnaire and online interviews with them."

"The study attempted to find solutions through project management best practices to overcome the main reasons that impede the green building movement in developing countries like Egypt."

Literature review

"A few studies realized the role of project management in sustainability and green building's success; however, the existing studies are still insufficient [14]."

"It is noticed that most previous studies care about studying sustainable management and environmental management, but few of them address project management and its great role in sustainable and green architecture."

"Green buildings must be viewed as a comprehensive solution that integrates sustainable principles throughout the project life cycle, from project planning to design, construction, and operation, rather than simply as a collection of green materials, technologies, and other environmentally friendly innovations [15]."

"There is the methodology of (Project Integrating Sustainable Methods (PRISM)) which was introduced in 2013 by the international organization of green project management (GPM)."

"Another important aspect in addressing the integration between project management and sustainability or green buildings is the contribution of the project managers to the success

of sustainable projects."

Methods

"Following the SLR, an online questionnaire and interviews with project managers and sustainability consultants were conducted to determine how green project buildings are managed in Egypt, a more specific ranking for the most affective challenges that obstruct green buildings in Egypt from the challenges identified previously in previous studies, and finally to determine how the green building situation in Egypt could be improved."

"The questionnaire consists of 18 questions with two types of questions, open questions, and multiple-choice questions aiming to benefit from the experience of project managers and to define obstacles they faced in managing green building projects in Egypt, the main aims need to be elicited from the questionnaire as follows: 1."

"The main obstacles that project managers face when managing green buildings in Egypt."

Results and discussion

"From the systematic literature review, the research reached an important hypothesis, which is that green building situation in Egypt could be improved and go faster in steady steps by developing and improving the project management methods used in implementing the green building projects."

"To experiment research hypothesis, it is needed to know how green building projects are managed in Egypt and study the management methods used in these projects."

"This section of the study aims to investigate how green-building projects are managed in Egypt."

"Discover if the way of managing these buildings affects project success in achieving the sustainability goals and whether it is among the factors leading to the obstruction of the construction of green buildings in Egypt."

"An online questionnaire and interviews were conducted with Egyptian project managers and green building administrators (with experience of 3 to 20 years in green buildings) who worked in green buildings in Egypt, whether registered or certified buildings, under LEED or GPRS."

Conclusions

"The roles of project managers and green building consultants are unclear."

"As, the concept of a green project manager is missing, the person who has the project management knowledge, including management methodologies, methods, tools, and techniques, and has leadership skills to lead the entire project team and organize all project processes in an integrative manner holistically in the context of sustainability."

"There should be a distinction between the roles and responsibilities of project managers and green building consultants."

"Research on green building project management should be encouraged, especially at the local level, due to its important role in the success of the project, overcoming the obstacles that may face this type of construction, and the ability to organize the process and coordinate between several of its elements."

Project Management for Supply Chains 4.0: A conceptual framework proposal based on PMBOK methodology [31]

This is a machine-generated summary of:

Frederico, Guilherme F.: Project Management for Supply Chains 4.0: A conceptual framework proposal based on PMBOK methodology [31]

Published in: Operations Management Research (2021)

Link to original: <https://doi.org/10.1007/s12063-021-00204-0>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"This paper aims to present a conceptual framework for Project Management on supply chains in the context of the Fourth Industrial Revolution (Supply Chains 4.0), taking into consideration the gap that exists regarding this subject in the literature."

"Considering this significant gap, a conceptual framework has been proposed by combining some constructs of Supply Chain 4.0 with the ten knowledge areas of the PMBOK - Project Management Body of Knowledge framework."

"This conceptual framework is herein named Supply Chain Project Management 4.0 – SCPM 4.0."

"Although this conceptual framework is not based on empirical research, it brings a relevant contribution to both researchers and practitioners, since it is a unique approach concerning Project Management for supply chains in the Industry 4.0 age."

"This paper is novel, considering that it addresses a significant knowledge gap linked to Project Management for supply chains in the context of Industry 4.0."

"Notwithstanding, this article helps researchers on the deployments of future researches regarding Project Management in the Industry and Supply Chain 4.0 areas."

Introduction

"This is relevant, considering the following arguments: 1) It fills a relevant gap in the literature related to the subject of Project Management in supply chains, especially in the Industry 4.0 context 2) The PMBOK is the most recognized and comprehensive methodology for Project Management in the world, and even it may have limitations to be further explored, this work stands out as an initial point for this knowledge gap 3) This work significantly contributes to the academic audience by showing insights for future empirical and literature review researches as well as for the practitioners involved in Supply Chain 4.0' programs who need specific methods and guidance to effectively implement such initiatives, as part of the managerial issues."

Literature review and gap analysis

"Project Management subject in the context of Industry and Supply Chain 4.0 is scarcely presented in the literature."

"In a search conducted through the Web of Science and Google Scholar databases, the following keywords criteria were used to look for relevant research by checking for their

presence in the title or abstract: (Project Management*) AND (Industry 4.0*) AND (Supply Chain*) OR (Project*) AND (Industry 4.0*) AND (Supply Chain*)."

"Two (2) articles were present on the search because the word project was used in terms of the research project which were related to Industry 4.0 or Supply Chain 4.0."

"The same occurs for the word "Supply Chain 4.0", which evidences that Project Management has not been approached as the main subject of these researches and even less on the Supply Chain 4.0 context."

"This demonstrates a gap linked to Project Management methodologies for the Industry and Supply Chain 4.0 context."

Conceptual framework for Project Management in Supply Chains 4.0

"According to the proposal of this paper, the PMBOK's knowledge areas might collaborate to create a better scaffolding on the construct of Managerial & Capabilities Supporters, as an effective methodology for conduct Supply Chain 4.0's projects and programs on the seek for a successful implementation of the Technology Levers."

"Considering the Supply Chain 4.0 framework proposed by Frederico and others (16), Project Management methodology may also collaborate for a higher maturity of Supply Chain 4.0 programs, succeeding in the implementation of Technology Levers and then improving Supply Chain Processes."

"The PMBOK contains ten main areas of knowledge, being considered as one of the relevant methodologies to well manage projects and programs."

"Project Management for Supply Chains 4.0 is developed according to the PMBOK's knowledge areas."

Conclusions

"Although these articles considered Project Management in the Industry and Supply Chain 4.0 context in some way, they are not related to the Project Management methodologies."

"With regard to the answer for RQ2, the sample of articles showed that the literature approaches the project in the Industry and Supply Chain 4.0 context in four perspectives: 1) as an object of study, 2) as a method or tool to support project management, 3) as a solution development for specific projects and 4) as a research project."

"What are the main required skills for effective management of projects and programs

related to Industry and Supply Chain 4.0?"

"How to develop effective communication across the areas and stakeholders involved in the management of Industry and Supply Chain 4.0's projects and programs?"

"How to effectively engage and manage the stakeholders involved in Industry and Supply Chain 4.0's projects and programs?"

Game-Theoretic Modeling of the Project Management Contract [32]

This is a machine-generated summary of:

Zenkevich, N. A.; Sokolov, Y.; Fattakhova, M. V.: Game-Theoretic Modeling of the Project Management Contract [32]

Published in: Automation and Remote Control (2020)

Link to original: <https://doi.org/10.1134/s0005117920110107>

Copyright of the summarized publication:

Pleiades Publishing, Inc. 2020

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The Principal signs the contract for task execution in which he determines the amount and regime of payments to each of the contractors; in the second stage, the contractors choose their own work rates."

"The characteristics of the optimal contract for each payment regime are numerically

simulated."

"In accordance with the comparative analysis of the simulation results, the project manager (Principal) benefits from choosing the contract with different payments for the contractors and the payment regime upon completion of tasks."

Introduction

"This technique has been developed for the randomly distributed execution times of individual operations and the entire project; see [17, 18, 19]."

"The project management problem with contractual relations becomes much more complicated if the completion time is a random variable."

"The theory of an optimal project management contract has not been elaborated so far."

"In the cited work, the authors investigated a two-stage game-theoretic model of project management with the same contractors and exponentially distributed task execution times, for which they succeeded to estimate the optimal amount of payments under the contract with the payment regimes upon completion of tasks or upon implementation of the entire project [20]."

"In accordance with the comparative analysis of the simulation results, the project manager benefits from choosing the contract with different payments for the contractors and the payment regime upon completion of tasks."

Model of Project Management Contract with Identical Payments

"The Principal concludes a contract with each contractor for the execution of the assigned task, in which he determines the amount and regime of payment."

"Under the second payment regime (upon implementation of the entire project), each contractor will receive his payment only after all the project tasks have been completed."

"Assume that the task execution time X_i is an exponentially distributed random variable with a parameter $r_i > 0$, which is the work rate of contractor i , chosen by him at the start of the project (the time instant $t = 0$)."

"Under the payment regime upon completion of tasks, each contractor i will benefit from joining the project's team if The Principal's expected payoff function is given by where $Q > 0$ denotes the project's income obtained by the Principal from the customer for implementing the entire project."

"Under this payment regime, the contractor is paid when all project tasks have been completed."

Contract Model with Different Payments

"Consider a contract model with the payment regime upon completion of tasks for the case $n = 2$, in which the order of task completion is stipulated in the contract and affects the amount of payment."

"The Principal offers two contractors a contract for the execution of project tasks, stipulating that all payments will be made upon completion of tasks, but the amount of payments depends on the order of task completion."

"In the case of different payments to the Principal depending on the order of task completion, it makes sense for the remaining contractor to change his work rate."

"In this stage, the payoff function of contractor i depends on the task completion time of both contractors."

Numerical Simulation of Optimal Contracts

"Compare the payment regimes upon completion of tasks and upon implementation of the entire project."

"Consider an example of the optimal behavior of participants under the regime D with complete information about the status of tasks, in order to perform numerical simulation and to analyze the sensitivity of the amount of optimal payments to the model parameters."

"Under the regime D (payment upon implementation of the entire project) with complete information about the status of tasks, the contractors are assumed to become aware of the completion of each contractor's task."

"Consider some examples of the project management contract with identical and different payments upon completion of tasks."

"Note that for the same values of the model parameters, the Principal's payoff is greater for the project management contract with different payments; see the results of numerical simulation above."

Comparative analysis of design/build and design/bid/build project delivery systems in Lebanon [33]

This is a machine-generated summary of:

About Chakra, Hadi; Ashi, Amina: Comparative analysis of design/build and design/bid/build project delivery systems in Lebanon [33]

Published in: Journal of Industrial Engineering International (2019)

Link to original: <https://doi.org/10.1007/s40092-019-00323-1>

Copyright of the summarized publication:

The Author(s) 2019

License: OpenAccess CC BY 4.0

This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"This study has two aims: firstly, to assess and compare the performance of design/bid/build and design/build projects in Lebanon; secondly, to compare the results with the performance of equivalent systems in the Far East and the USA, in order to identify the similarities between Lebanon and these countries."

"Seven performance indicators were identified in terms of cost, time, quality, communication, risk and safety to evaluate the performance of 102 residential buildings and tower projects completed in Lebanon."

"The results presented in this study show some agreements between different performance indicators when applied to principal project delivery systems in the selected countries."

Introduction

"Project delivery systems define the roles and responsibilities of the parties involved in a project and also form an execution framework in terms of the sequencing of design, procurement and construction (Liu and others 21)."

"There are various project delivery systems, such as design/bid/build, design/build, construction management agency and construction management at risk."

"The DB project delivery system is the one where the client makes contract with a single entity to perform both design and construction under a single DB contract."

"In DB, designers work under contractors as one team, and therefore, there is an absence of adversarial relationship between contractors and consultants which is found commonly in DBB projects (Ratnasabapathy and Rameezdeen 22; Konchar and Sanvido 23; Ling 24)."

"This study was carried out to assess and compare the performance of building projects procured through DBB and DB delivery systems in Lebanon, and find out which system performs better concerning each performance indicator."

Literature review

"Several studies have conducted quantitative analysis to compare the performance of DBB and DB project delivery systems in different countries."

"The results indicate that in Sri Lanka, DB projects show best performance in terms of cost and time, while quality is better achieved in DBB projects (Ratnasabapathy and Rameezdeen 22)."

"Ling and Kerh studied the performance of projects that used the DBB and DB delivery systems in Singapore (Ling and Kerh 25)."

"Their outcomes show clearly that DB projects performed significantly better than DBB projects in the area delivery speed."

"In the USA, Konchar and Sanvido conducted an empirical study that examined explanatory and interacting variables to predict the performance of DB, DBB and construction management at risk projects (Konchar, and Sanvido 23)."

"That research found that projects using DB delivery could achieve significantly improved cost and schedule advantages, and produce equal and sometimes more desirable quality performance than DBB projects."

Research methodology

"The questionnaire used in the survey conducted by Chakra and others included 24 questions (Chakra and others 26)."

"Not all those questions are needed in this study."

"The list of questions was filtered in order to limit it to questions that include indicators, which are equivalent to the performance indicators of the four studies mentioned in the literature review."

"That there are common indicators that measure the performance of construction projects."

Data collection

"Further analysis was required to define which projects were procured through DB or DBB project delivery system."

"That among the 102 projects, 60 projects were procured through DBB project delivery system and 42 DB projects."

"The mean of every performance indicator was calculated from the respondents' perceptions and then used to compare their functioning in DBB and DB project delivery systems in Lebanon."

Data analysis

"These results were used to compare the performance of DBB and DB delivery systems in the five considered countries in terms of time, cost, quality, communication, risk and safety."

"The results of the time indicator (I1) show that in Sri Lanka, Singapore, USA and China, DB projects have lower schedule growth; on the other hand, in Lebanon, DBB projects have lower schedule growth."

"Many contractors on DB projects in Lebanon rent their construction equipment during the

high season."

"In DBB, the owner may request more changes throughout the project; however in DB, the contractor aims to avoid or minimize design changes during construction in order to avoid reworks and additional costs."

"Data from both Lebanon and Sri Lanka support the observation that DB projects perform better in communication."

"Lebanese DB projects show better performance than DBB projects."

"In DB projects, the contractors have the responsibility for both construction and design."

Results and discussion

"This study was carried out to assess and compare the performance of building projects in Lebanon procured through DBB and DB delivery systems, and to compare the performance of both systems with Sri Lanka, Singapore, China and the US projects procured through a similar route."

"The outcomes of this study clearly show that the Lebanese DBB projects perform better in terms of time, regular inspection of work activities and safety."

"DB projects have better performance in terms of cost, proper storage of materials and equipment, communication and risk."

Conclusions

"It is recommended that in Lebanon, for projects to be completed and delivered at a specific time, the owner should select the DBB project delivery system."

"When owners need to construct projects that may face a lot of risks, it is recommended to select the DB delivery system since most of the risks in this system are borne by the contractor."

"This gives a chance for Lebanese investors to invest in such countries using the same delivery system they are familiar with as they achieve the same results, since these countries use equivalent methods and specifications for their projects."

"Contractors from these countries can have the opportunity to procure projects in Lebanon following the same delivery systems they use in their countries and with the same

outcome."

Bibliography

- [1] Delisle, C., Jugdev, K., & Thomas, J. (2001). Rethinking Project management – old Truths and New Insights. Schulich School of Engineering Research & Publications, 7(1), 36–43. <https://doi.org/10.11575/PRISM/30197> .
- [2] Crisan, E., Muresan, I., & Ilies, L. (2010). Best Practices in Project Management. Review of International Comparative Management, 11(1), 43–51. https://www.academia.edu/20497918/Best_Practices_in_Project_Management .
- [3] Shen, F., Roccasalvo, J., Tian, Y., & Zhang, J. (2020). Creating Culturally Responsive Noyce Explorers, Scholars and Teachers. 17th International Conference on Information Technology: New Generations <https://doi.org/10.1007/978-3-030-43020-7>
- [4] Ruder, P., Maier, M., & Simkins, S. (2021). Getting started with Team-Based learning (TBL): an introduction. The Journal of Economic Education. <https://doi.org/10.1080/00220485.2021.1925187> .
- [5] Artis, S., & Washington, G. (2021). See It, Do It, Learn It: Integrating Experiential Learning into High School Engineering Outreach Programs. American Society for Engineering Education <https://www.jee.org/36119>
- [6] Gehlenborg N, Wong B (2012) Points of view: heat maps. Nat Methods 9:213
- [7] PMI (2017) A guide to the Project Management body of knowledge (PMBOK guide), 6th edn. Project Management Institute
- [8] Borque P, Fairley R (2014) Guide to the software engineering body of knowledge version 3.0. IEEE Computer Society Staff
- [9] Leffingwell D (2016) SAFe 4.0 reference guide: scaled agile framework for lean software and systems engineering. Addison-Wesley Professional, Indianapolis
- [10] Ambler SW, Lines M (2012) Disciplined agile delivery: a practitioner's guide to agile software delivery in the enterprise. IBM press

- [11] Larman C, Vodde B (2016) Large-scale scrum: more with LeSS. Addison-Wesley Professional
- [12] McDermott T. Data, information, knowledge, and leadership in complex project management. In: 2019 IEEE Technology Engineering Management Conference (TEMSCON); 2019. pp 1–8, <https://doi.org/10.1109/TEMSCON.2019.8813672> .
- [13] Couto JMC, Kroll J, Ruiz DD, et al. A pmbok extension proposal for data visualization in software project management. In: Proceedings of the 23rd International Conference on Enterprise Information Systems, ICEIS 2021, Online Streaming, April 26-28, 2021, Volume 2. SCITEPRESS; 2021. pp 54–65, <https://doi.org/10.5220/0010454600540065> .
- [14] Marcelino-Sádaba, S., González-Jaen, L.F., Pérez-Ezcurdia, A. (2015) Using project management as a way to sustainability. From a comprehensive review to a framework definition, Journal of cleaner production, 99:1–16.
- [15] Wu, P., Low, S.P. (2010) Project management and green buildings: lessons from the rating systems, Journal of professional issues in engineering education and practice, Volume 136. [https://doi.org/10.106/\(ASCE\)EI.1943-5541.0000006](https://doi.org/10.106/(ASCE)EI.1943-5541.0000006) .
- [16] Frederico GF, Garza-Reyes JA, Anosike A, Kumar V (2019) Supply Chain 4.0: Concepts, Maturity and Research Agenda. Supply Chain Management: An International Journal 25(2): 262-282. <https://doi.org/10.1108/SCM-09-2018-0339>
- [17] Kamburowski, J. An Upper Bound on the Expected Completion Time of PERT Networks. Eur. J. Operat. Res. 21(no. 2), 206–212 (1985).
- [18] Kulkarni, V. G. & Adlakha, V. G. Markov and Markov-Regenerative PERT Networks. Operat. Res. 34(no. 5), 769–781 (1986).
- [19] Maggott, J. & Skudlarski, K. Estimating the Mean Completion Time of PERT Networks with Exponentially Distributed Durations of Activities. Eur. J. Operat. Res. 71(no. 8), 70–79 (1993).
- [20] Kwon, H., Lippman, S., McCardle, K. & Tang, C. Project Management Contracts with Delayed Payments. Manufact. Service Operat. Manage. 12(no. 4), 692–707 (2010).
- [21] Liu B, Huo T, Meng J, Gong J, Shen Q, Sun T (2016) Identification of key contractor characteristic factors that affect project success under different project delivery systems: empirical analysis based on a group of data from China. J Manag Eng 32(1):05015003
- [22] Ratnasabapathy S, Rameezdeen R (2006) Design-bid-build vs design-build projects:

performance assessment of commercial projects in Sri Lanka. In: Symposium on sustainability and value through construction procurement, Salford, UK, 2006, University of Salford, pp 474–481

[23] Konchar M, Sanvido V (1998) Comparison of US project delivery systems. *J Constr Eng Manag* 124(6):435–444

[24] Ling FYY (2004) How project managers can better control the performance of design-build projects. *Int J Project Manag* 22(6):477–488

[25] Ling FYY, Kerh SH (2004) Comparing the performance of design-build and design-bid-build building projects in Singapore. *Archit Sci Rev* 47(2):163–175

[26] Chakra HA, Tannir A, Ashi AT (2017) Validating the integration among project management knowledge areas in Lebanon. *Int J Innov Manag Technol* 8(1):38–42

[27] Shen, Fangyang; Roccasalvo, Janine; Zhang, Jun; Tian, Yun; Yi, Yang Online technological STEM education project management. *Education and Information Technologies* (2023). doi: 10.1007/s10639-022-11521-7

[28] Itzik, David; Roy, Gelbard Does agile methodology fit all characteristics of software projects? Review and analysis. *Empirical Software Engineering* (2023). doi: 10.1007/s10664-023-10334-7

[29] Couto, Julia Colleoni; Kroll, Josiane; Ruiz, Duncan Dubugras; Prikładnicki, Rafael Extending the Project Management Body of Knowledge (PMBOK) for Data Visualization in Software Project Management. *SN Computer Science* (2022). doi: 10.1007/s42979-022-01168-z

[30] Abdelkhalik, Heba Farouk; Azmy, Hisham Hussein The role of project management in the success of green building projects: Egypt as a case study. *Journal of Engineering and Applied Science* (2022). doi: 10.1186/s44147-022-00112-5

[31] Frederico, Guilherme F. Project Management for Supply Chains 4.0: A conceptual framework proposal based on PMBOK methodology. *Operations Management Research* (2021). doi: 10.1007/s12063-021-00204-0

[32] Zenkevich, N. A.; Sokolov, Y.; Fattakhova, M. V. Game-Theoretic Modeling of the Project Management Contract. *Automation and Remote Control* (2020). doi: 10.1134/s0005117920110107

[33] Abou Chakra, Hadi; Ashi, Amina Comparative analysis of design/build and design/bid/build project delivery systems in Lebanon. *Journal of Industrial Engineering*

International (2019). doi: 10.1007/s40092-019-00323-1

3. Project Management, Agile Methodology

Machine generated summaries

Machine generated keywords: business model, business, innovation, digital, digital technology, organization, tool, company, customer, entrepreneurship, sustainable, technology, sustainability, framework, service

New product development process and case studies for deep-tech academic research to commercialization [228]

This is a machine-generated summary of:

Kruachottikul, Pravee; Dumrongvute, Poomsiri; Tea-makorn, Pinnaree; Kittikowit, Santhaya; Amrapala, Arisara: New product development process and case studies for deep-tech academic research to commercialization [228]

Published in: Journal of Innovation and Entrepreneurship (2023)

Link to original: <https://doi.org/10.1186/s13731-023-00311-1>

Copyright of the summarized publication:

The Author(s) 2023

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming

from.

Abstract-Summary

"This research proposes a new product development (NPD) framework for innovation-driven deep-tech research to commercialization and tested it with three case studies of different exploitation methods."

"The proposed framework, called Augmented Stage-Gate, integrates the next-generation Agile Stage-Gate development process with lean startup and design thinking approaches."

"Early activities focus on scouting for potential socioeconomically impactful deep-tech research, developing a business case, market analysis, and strategy for problem–solution fit, and then, moving to a build–measure–learn activity with a validated learning feedback loop."

"Applying the framework to the case studies results in successful university research commercialization."

"The model, case study, and lessons learned in this paper can be useful for other deep-tech incubator programs to successfully launch deep-tech research for commercialization."

"The case studies' positive outcomes validate the Augmented Stage-Gate framework, yet their success is not entirely guaranteed due to external factors like regulatory constraints, entrepreneur characteristics, timing, and the necessary ecosystem or infrastructure, particularly in emerging markets."

Introduction

"For deep-tech innovation to become successful exploitation from the research ideation stage until commercialization, it requires a product development model suitable for university research initiation and developing market environment."

"To accelerate deep-tech innovation in Thailand, the Chulalongkorn University Technology Center (UTC) was established in 2019 as a platform to spring-board academic research to commercialization and facilitate among stakeholders within the ecosystem based on triple helix model, which promotes the way of working that the government, private sector, and academia must collaborate to form a solid, deep-tech innovation ecosystem (Leydesdorff & Etzkowitz, 1) to support manpower, finance, know-how, production facilities, regulation, and sandbox testing in order to expedite the speed of innovation development."

"The next-generation stage-gate development system integrated with agile development, lean startup, and design thinking methods is selected and then applied together with the

insights obtained from qualitative research as the NPD model to develop successful business-driven deep-tech innovation."

Methods

"The interview was conducted at the end of the program and focused on understanding the pain points in the research-to-commercialization process in terms of entrepreneurship, business development, networking, financial, technology transfer process, progress assessment, and goal."

"Information reported (as appropriate to each stage) includes team, research and development progress, regulatory process, business plan, project planning and concept, product design, milestones, risk assessment, technology verification and validation (MVP), market validation, legal activities, IP status, implementation and operations, sales and marketing, and financial activities."

"The technology development team participates in a build-measure-learn activity to reach the closest version of a commercial product, while the business development team focuses on delivering a commercial final version of the business plan, sales and marketing strategy, IP strategy, regulatory planning, team formation and financial strategy to select the best commercial option with the highest probability of success and return on investment."

Results and discussion

"The case studies below highlight the importance of having an NPD framework that is adaptable to deep-tech within university research and emerging market contexts, yet extensive enough to cover all the essential components to transform deep-tech research into an innovation that has a high-fidelity MVP, an accomplished business and market strategy, a clear pathway towards implementation in the real world, and a complete IP strategy and technology transfer process from academia IP."

"ReadMe, a national award-winning research project, was a deep-tech text reader that was in development for six years, had a research prototype proven well in the lab with a TRL of 4 and an IRL of 1, was the state-of-the-art Thai text reader that was more accurate than other better-known OCR technologies, and is a high-potential technology that could impact the business, medical, and transport industries."

Conclusion

"This study develops a modified NPD framework that incorporates agile, lean startup, and design thinking to the Stage-Gate model for effective research to commercialization process generated from within the university in developing markets."

"Using the proposed Augmented Stage-Gate framework that has six stages (Innovation Ideation, Build Business Case, Development, Test and Validation, Launch, and Scale-up), we have presented three case studies from the Chulalongkorn University Technology Center."

"The approach is structural and based on critical thinking, which helps the technology incubator to accelerate the idea-to-launch process, decide the Go/No-Go of each innovation project stage to prioritize resource contribution, and reduce the risk of failure."

"Engaging the Next-generation Stage-Gate's Triple A System, (Adaptive, Agile and Accelerated) and Agile development to the NPD process is very important."

Sustainable smart product-service systems: a causal logic framework for impact design [229]

This is a machine-generated summary of:

Ries, Lena; Beckmann, Markus; Wehnert, Peter: Sustainable smart product-service systems: a causal logic framework for impact design [229]

Published in: Journal of Business Economics (2023)

Link to original: <https://doi.org/10.1007/s11573-023-01154-8>

Copyright of the summarized publication:

The Author(s) 2023

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit

<http://creativecommons.org/licenses/by/4.0/> .

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Transitioning to smart PSS does not guarantee sustainability."

"To understand the impact of smart PSS holistically, we take a two-pronged approach."

"We use the theory of change to conceptualize the causal link between sustainable smart PSS and their ultimate impact."

"We develop a three-step causal logic framework consisting of design, causation, and impact."

"Within this framework, we identify the business model properties of sustainable smart PSS as design characteristics and categorize the eventual impacts based on the triple bottom line."

"Visualizing our results, we develop a morphological box as a toolkit for managers to develop their own impact-oriented logic model by identifying and activating the multi-causal pathway that fosters the desired sustainability effects."

"By linking the theory of change with the business model impact, we contribute toward a conceptual synthesis for understanding the impact of (sustainable) smart PSS."

Introduction

"More research is needed on the sustainability impacts of smart PSS and the role of sustainability within these business models (Kohtamäki and others 2)."

"Extensive research is available on BMPs (design characteristics) and the sustainability effects of (sustainable) smart PSS (impact characteristics)."

"By conceptualizing the causal link between sustainable smart PSS and their impact based on the theory of change and constructing four types of mechanisms based on our SLR, we engage in theory extension, which "borrows theory from outside the field, thereby enriching studied content and broadening the available theoretical repository" (Seuring

and others 3, p. 5)."

"By linking the theory of change with business model impact, we advance the conceptual understanding of the effects caused by (sustainable) smart PSS."

"For managerial practice, our morphological box provides a toolkit to develop logic models, while our checklist with guiding questions for impact design can assist in innovating impact-oriented sustainable smart PSS."

Conceptualizing multi-causal pathways based on the theory of change

"While the business model is a valuable framework for describing mechanisms of value creation, delivery, and capture (Teece 4), it does not provide guidance for analyzing the causation of sustainability effects."

"Mirroring the logic model's inputs, the initial design step focuses on how innovators define the BMPs of sustainable smart PSS."

"To acknowledge the interplay of multiple causes and feedback loops (Funnell and Rogers 5, p. 189), we introduce the term multi-causal pathways and define them as the processes by which business models contribute to specific sustainability effects through a series of steps."

"Conducting an SLR, Geissdoerfer and others (6) identified three design characteristics of sustainable business models: sustainable value, pro-active multi-stakeholder management, and a long-term perspective."

"As all frameworks have weaknesses, we rely on the TBL to operationalize sustainability effects within our causal logic framework because this approach best aligns with the accepted understanding of sustainable business models (Bocken and others 7; Schaltegger and others 8)."

Methods

"Our search string for Scopus was: TITLE-ABS-KEY((sustainab* OR environ* OR eco* OR green OR eco-efficiency OR social OR societal OR ethic* OR csr OR corporate sustainab* OR "sustainable development" OR circular* OR closed-loop OR ecolog* OR resource* OR "life cycle assessment" OR lca OR stewardship OR responsib* OR fair) AND (smart* OR digital* OR data-driven*) AND (pss OR "Product-Service System") AND (innovat* OR process OR engineering OR design* OR value OR collaborat* OR approach OR framework OR tool OR method* OR "Business Model")) The first three clouds represent the three business model dimensions of sustainable smart PSS."

"It visualizes all options identified in the literature for the design and impact characteristics and the mechanisms linking the two, and thus represents a logic modeling tool for managers to identify multi-causal pathways and test hypothesized relationships regarding the impact of sustainable smart PSS in business model innovation."

Results

"Studies dealing with customer behavior highlight that this is crucial for the impact of sustainable smart PSS because the use phase is often decisive for sustainability effects (Haftor and Climent 9; Reim and others 10; Valencia and others 11)."

"Complementary approach, we developed our causal logic framework connecting the three business model dimensions of sustainable smart PSS, as well as their mechanisms and the TBL effects to explain the causal link between sustainable smart PSS and their sustainability impacts (RQ1)."

"To avoid the failure mode of careless customer behavior (D1), operational support is a BMP that can induce a change in user knowledge and behavior through a mechanism cascade of increased interaction and customer stewardship behavior."

"To operational support, the newly identified BMP behavioral support combined with smart BMPs offers potential to reverse the adverse mechanism of careless customer behavior (D1)."

Discussion: research propositions and managerial questions for impact design

"Based on the theory of change, we conceptualize a three-step causal logic framework that opens the black box between the design and impact of sustainable smart PSS."

"We thus posit: Proposition 2b: The design and management of sustainable smart PSS benefit from specific indicators that measure not only the final impact, but also the performance of mechanisms in the causation step."

"To previous research (Allen Hu and others 12; Schöggel and others 13), this impact approach allows for a more nuanced sustainability assessment of sustainable smart PSS, by distinguishing between the actual (dis)value created and the mechanisms that lead to the respective effect."

"By distilling a causal logic framework for the impact design of sustainable smart PSS, we contribute toward a conceptual synthesis for understanding the effects caused by (sustainable) smart PSS."

"To create impactful, sustainable smart PSS, innovators need to consider multi-causal pathways."

Conclusion

"We identify BMPs of sustainable smart PSS as design characteristics and categorize the impacts based on the TBL."

"By distinguishing design, causation, and impact and identifying individual characteristics and mechanisms, our framework aligns the literature on sustainability, smart technologies, and PSS, thus contributing to greater conceptual clarity between the research fields."

"By visualizing the BMPs, mechanisms, and potential positive and negative TBL effects, a structure emerges for creating a system map of sustainable smart PSS that depicts all the critical causal links of the impact logic."

"To realize the opportunities offered by sustainable smart PSS, the morphological box can help innovators rethink and align the design of BMPs based on the innovation goal, i.e., the target impact."

"The checklist helps innovators to actively design sustainable smart PSS to promote positive and avoid negative TBL impacts."

The digital transformation of management consulting companies: a review [230]

This is a machine-generated summary of:

Crişan, Emil Lucian; Marincean, Adrian: The digital transformation of management consulting companies: a review [230]

Published in: Information Systems and e-Business Management (2023)

Link to original: <https://doi.org/10.1007/s10257-023-00624-4>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer

Nature 2023

Copyright comment: Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Management consulting (MC), as a knowledge-based industry, is regarded as fertile ground for digital transformation (DT)."

"This paper is a systemic review of 18 cases presented in the literature concerning the digital transformation (DT) of management consulting companies (MCCs)."

"It builds prescriptive knowledge for researchers and practitioners concerning the different approaches used to employ DT in the management consulting (MC) field."

"Our analysis of the cases, based on the CIMO framework, reveals three mechanisms that explain how DT transforms MC: it supports the platformization of traditional MC; it creates an opportunity for MC through crowdsourcing, in which the consultant acts as a crowd manager; and it changes the consultant-client matching process."

"Our study presents different layers of DT in the management consulting industry based on the complexity of the solutions identified."

Introduction

"The existing research about DT in MC is not homogeneous, except for the following narratives that recur in studies: first, DT in MC is recognized as a growing phenomenon, and, second, for a long time, MC successfully eluded the adoption of digital tools, but going forward, digital business models (BM) are inevitable (Mosonyi and others 15)."

"By considering this perspective, DT is acknowledged as an intrinsic part of MC, and Bode (16) concludes that digital innovations will inevitably transform traditional MC in IT

consulting."

"A paradox exists in which the adoption of DT in MC remains low, with consultants advising IT companies about digital tools, even though they are way behind with the adoption of digital tools in their own business (Bode and others 17)."

"The mechanisms that we identify provide a useful guide for both research and practice by clarifying where, how, and why DT is adopted/used in MC."

Literature review

"In their literature review on MC, Tavoletti, Cerruti, and Grieco (18) build on the ideas of Christensen, Dina, and Derek (19), suggesting that, in the digital age, consultants' skills are changing, and so are traditional BMs."

"By considering a wider perspective concerning DT in general and not only in MC, the literature on DT maturity models states that the adoption of digital tools is not enough to call the DT process complete, but it also implies a new organizational mind-set in doing business (Teichert 20)."

"The main focus of the literature in terms of developing digital maturity models is manufacturing, which lacks a prescriptive perspective, and the approach concentrates on creating descriptive models considering variables such as technology, digital skills, and business processes (Teichert 20)."

"The fact that the literature on general and domain-specific digital maturity models is marked by heterogeneity, and no standard assessment blueprint exists, leaves room for analyses that construct prescriptive models for specific industries such as MC, as we perform below."

Methodology

"We then reviewed the abstracts of these papers considering inclusion (sources presenting cases of MCCs' DT) and exclusion criteria (sources with a different topic, focusing mainly on DT without a specific focus on management consulting)."

"Because a single paper might cover one or more case studies, we shifted the main focus of the CIMO analysis from a single paper to the case study(ies) presented in each paper."

"We selected 14 papers, which describe 18 cases of MC DT for further analysis."

"We analyze the 18 cases by considering each C-I-O dimension, as follows: (1) for context,

we analyze the triggers for DT (if there was one); (2) for intervention, we analyze the types of DT presented in the studies, in which way and which business model parts have been affected by DT; and (3) for outcome, we map the outcomes of DT by considering their categorization in first-order and second-order benefits (Bunduchi and others 14)."

Results

"In terms of market changes, Johann and others (21) reveal that the maturity of MC depends on the adoption of digital BM and the digitized services they use; thus there seems to be an acknowledgment that maturity in consulting depends on the digitization level and continuous innovation potential in the business model."

"Those clients want to innovate their BM, their value delivery process, not just launch new products on the market (Christ and others 22).Stummeyer(23) is one of the most visible examples of this type of trigger and offers a real-life example of a digital consulting service that deals only with dental medical businesses."

"Both platforms and automation allow the modularization of MC services because consulting companies can present and offer modular and customized services based on different consulting skills or approaches to many more potential customers, and the availability of each service grows significantly because duplication in much of the prior logistics is reduced (Johann and others 21)."

Mechanisms, discussion, and limitations

"Considering the first path or mechanisms that we have identified, DT affects traditional MC, as traditional consulting services are increasingly provided through platforms."

"This transition from a human-based business model to a digital data-based BM is seen even at large MCCs, and the nature of MC and the management consultant profession is experiencing major changes related to this market major trend."

"The DT of the consultant-client matching process mechanism, increases access to more MCC providers and customers, which seems inimical to traditional MC from the perspective of the management consulting elite halo (Christensen and others 19)."

"Both crowdsourcing and the DT of the consultant-client matching process allow customers or consultants that represent their interests (MC project coordinators) to pay for portions of services, representing the transformation of management consulting in the platform or gig economy (Friedman 24)."

Conclusion

"In terms of intervention (I), we find that platformization dominates the approaches of MCCs concerning DT, with different types of platforms: those for finding customers, those for identifying partners for implementing more complex MC projects, those for finding partners that facilitate the transformation of traditional MC services but still enable consultants to offer advice to customers, and platforms on which everything is automated and customers receive automatic reports based on the data they upload (self-service or algorithmic consulting)."

"We present our findings in the form of three paths/mechanisms that MCCs could employ: platformization of traditional management consulting services, MC crowdsourcing in which the consultant acts as a crowd manager, and the DT of MC in terms of the consultant-client matching process."

Customer relationship management and its impact on entrepreneurial marketing: a literature review [231]

This is a machine-generated summary of:

Guerola-Navarro, Vicente; Gil-Gomez, Hermenegildo; Oltra-Badenes, Raul; Soto-Acosta, Pedro: Customer relationship management and its impact on entrepreneurial marketing: a literature review [231]

Published in: International Entrepreneurship and Management Journal (2022)

Link to original: <https://doi.org/10.1007/s11365-022-00800-x>

Copyright of the summarized publication:

The Author(s) 2022

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is

not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Entrepreneurship is one of the business forces with the greatest power to transform today's society, due to its ability to discover and take advantage of new opportunities to satisfy customer new and changing needs and expectations."

"Customer relationship management (CRM) has proved to be both a highly influential business management strategy and a powerful business management technology solution, with a particularly relevant impact in the area of entrepreneurship."

"This paper uses semi-systematic review to the study of the reality of the link between CRM and entrepreneurial marketing in business."

"This approach is used to comprehensively describe the state of the art of the impact that CRM can have in the modern business environment, through the empowerment of entrepreneurial marketing."

"In a structured manner, the present paper reviews the 86 most relevant studies of how CRM affects entrepreneurial marketing policy development through its alignment with relationship marketing and customer-centric business models."

Introduction

"This makes the development of entrepreneurial businesses especially difficult, which is why it is shown that all those tools and technological solutions that can have a high impact on customer management and entrepreneurial marketing are key, an area in which Customer Relationship Marketing (CRM) has proven to have a special impact."

"Marketing (understood as the management of commercial relationships with customers within the market), and more specifically entrepreneurial marketing (as a powerful association of marketing tools and the innovative and transforming power of entrepreneurship) is therefore one of the great forces that promote the economic

development of society."

"Regarding marketing area impactful tools, Customer relationship management (CRM) is one of the leading business strategies and business management tools (Al-Omouh and others, 25), and it has been shown to be crucial in developing sales, marketing, and production planning strategies."

Literature review

"This section initially analyzes the concept and relevance of entrepreneurial marketing, and then the concept and evolution of CRM solutions, to later proceed to establish the marketing approach to the CRM customer-centric management theory, all of it as previous stages for finally stating the state of the art on the impact of CRM on entrepreneurial marketing specifically."

"Having established the importance of CRM as a business management technology solution with a major impact in the field of marketing, and especially on entrepreneurial marketing, it is important to identify the marketing approach that is most closely aligned with the CRM customer-centric management theory."

"Considering previous research and the intention to establish a complete state of the art for CRM technology, there is a lack of studies that specifically address the entrepreneurial marketing side of CRM."

"This paper thus offers a comprehensive review of the literature on the potential of applying CRM technology solutions through their impact on companies' management of entrepreneurial marketing strategies."

Methods

"The first step to classifying the articles that explore the links between CRM and entrepreneurial marketing (i.e., the articles whose content is relevant to the present study) and to building a comprehensive state of the art was to identify the dimensions and elements that characterize CRM and those that characterize entrepreneurial marketing."

"When performing an extensive search for previous studies of literature reviews or the creation of a state of the art of CRM, different CRM dimensions and elements can be used to classify the articles."

"Each of these four dimensions of CRM has several elements, which are used in this study to classify the selected articles in the field of marketing in CRM."

"Samiee and Walters (26) concluded that the following constructs can be used to classify

articles (in order of appearance in the studied articles): Trust Power Commitment Conflict Relationship quality Reciprocity Investment in the relationship Information exchange The third literature review considered on relationship marketing is the most recent one."

Results

"The most commonly used CRM element for assisting business decision makers is loyalty programs (within the CRM retention dimension), with 23 results, representing 26.75% of the 86 selected articles."

"The CRM elements with the next highest numbers of results are customer lifetime value (within the CRM development dimension) and direct marketing (within the CRM attraction dimension), both with 14 results, each representing 16.28% of the 86 selected articles."

"Relationship management is the most commonly used entrepreneurial marketing dimension, with 38 results of the 86 selected articles, representing 44.19%."

"The selected articles were also classified according to the journal where they were published."

"In the period under study, the Journal of Business & Industrial Marketing published the most articles (five), representing a percentage of 5.81% of the total of 86 selected articles."

Discussion and conclusions

"After reviewing the most recent literature on the impact of the use of customer relationship management strategy and systems in the field of entrepreneurial marketing, the general conclusion is that effectively a good efficient use of these tools appears in these studies as a strong link between business management and company results."

"This contribution provides interesting ideas about what future lines of research can be undertaken by researchers interested in the impact of the use of CRM combined with entrepreneurial marketing in the search for a joint and powerful impact on the effective management of customer relationships within the current changing and dynamic world in which entrepreneurship finds its greatest asset to demonstrate its power to transform the market and society as a whole.. The most important conclusion for future research is that the field of scientific research on the use of CRM as a strategy and technological solution that accelerates and stimulates the entrepreneurial marketing, is developing and growing, as reflect by most of the recent bibliometric studies on the subject."

Four-step approach to idea management sequencing: redefining or reinventing values in a business model [232]

This is a machine-generated summary of:

Mikelsone, Elina; Uvarova, Inga; Segers, Jean-Pierre: Four-step approach to idea management sequencing: redefining or reinventing values in a business model [232]

Published in: Journal of Innovation and Entrepreneurship (2022)

Link to original: <https://doi.org/10.1186/s13731-022-00236-1>

Copyright of the summarized publication:

The Author(s) 2022

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The purpose of this paper is to create and test an idea management sequence framework to reinvent or redefine the value proposition."

"This paper suggests a new approach—a systematic, 4-step idea management sequence to redefine or reinvent value proposition in a business model, which was validated through an action-based research method involving 20 managers from practice by applying the proposed framework."

"This research contributes to previous studies of the design thinking and innovation by substantiating a concept of the idea management sequencing and proposing a new 4-step approach that can be applied by organisations to redefine or reinvent value proposition in their business models."

Introduction

"The latter two, to a large extent, exploit the design thinking and the IM methods for generating, redesigning, testing, and experimenting with new business models and values."

"The authors have described the idea generation and evaluation processes based on the IM approach and have applied design thinking to create the sequence of the approaches incorporated into the IM process."

"Based on the IM approach, authors describe the idea generation and evaluation processes by applying the design thinking approach and their possible moderation elements that could be ascertained to an organisation to find a new or reinvent an existing value proposition."

"There are several contributions: (1) the IM construct characterised in the context of the value proposition of the business model; (2) the IM sequencing as the managerial process is substantiated and linked within the context of the business models and values; (3) the practical sequence of the IM is created and tested with the proposed 4-step approach."

Theoretical background

"The project management perspective applies to this study as it proposes the managerial perspective on how to organise several tasks, steps or activities into the network or path leading to the result, so called a sequence-based approach (Shi and others, 27), which in the case of this study is the definition of new value proposition using the IM approach."

"The IM sequencing provides the systematic management of such processes as—the generation of new ideas and their evaluation."

"According to Geissdoerfer and his co-authors (28), the use of design thinking methods in the value innovation process provides an opportunity to create new types of value, as well as to expand the range of different stakeholders to whom the value proposition can be

addressed."

"The action-based research provides the possibility to test the feasibility and nature of new ideas (Kaplan, 29) that in the context of this study ensured greater options to test and advocate new values generated during the interaction sessions with involved participants."

Results

"The second step is to define contrasting values and evaluate where among them your target persona could place herself/himself."

"Copy and paste the descriptions of the value groups from step 2."

"After all these steps, the post-session could be developed to give for the evaluation all created value descriptions to different stakeholders and also give criteria for evaluation."

"During the second step, all the teams generated 3–4 groups of values and in each group 2–4 sub-values were included."

"Even the groups started with the same values—until the end of this method came up to just 3 main values that duplicated, but later the descriptions of a theme were quite different (in step 4, these values would be merged)."

"Step 3—Enrich the value definitions: during this step the teams copy pasted the descriptions of value groups, including the sub-values."

"After this step, the descriptions of values were evaluated by the criteria."

Discussion

"The aspiration of the 4-step IM sequencing approach is to provide a more systematic view on how to get to the best possible values by creating and evaluating them."

"A key practical implication is related to the possibility of using created sequences' templates for the value creation or reinvention process."

"The approach may help organisation and enterprise innovators who desire to create a more systematic and playful value creation process."

"The IM may provide far more quality and playfulness to the complex, innovative processes of inventing new and reinventing established values in business models."

"A key theoretical implication is related to the new combination and modification of the IM approaches to adapt them to this specific aspect of the business model and a value reinvention."

"Future research should focus on the effectiveness of longer and shorter sequences of IM methods to reinvent the values for business models."

Conclusions

"Main theoretical implication is conceptualisation and testing of the 4-step IM sequencing approach to redesign or reinvent the values for business models."

"Our findings reveal that this 4-step sequencing approach of the IM methods enhances the participants' ability to reinvent values."

"There have been three main limitations: (1) analysed literature sources amount based on the research design (selected databases, time frame and selection approach); (2) application of only 4 IM methods; (3) only one organisation involved in this action research and a case study."

"Based on the limitations, authors have developed suggestions for future studies: For future studies, scholars may create alternative concepts for sequencing tasks and test other sequences of the IM methods."

"Study authors plan to attract experts to validate the created sequence, involving experts that represent not only the IM and business model disciplines, but also practitioners and representatives of companies that are responsible about reinvention of the values."

Multi-sided platforms in competitive B2B networks with varying governmental influence – a taxonomy of Port and Cargo Community System business models [233]

This is a machine-generated summary of:

Tessmann, Ruben; Elbert, Ralf: Multi-sided platforms in competitive B2B networks with varying governmental influence – a taxonomy of Port and Cargo Community System business models [233]

Published in: Electronic Markets (2022)

Link to original: <https://doi.org/10.1007/s12525-022-00529-z>

Copyright of the summarized publication:

The Author(s) 2022

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Our knowledge on differences in business model characteristics of thriving and failing Multi-Sided Platforms in competitive B2B networks (B2B-MSP) and potential influences of increasing governmental involvement remains fragmented."

"The taxonomy provides practitioners with a differentiated view on the configuration options of CS business models including the involvement of governmental institutions, while the presented archetypes contribute an aggregated view of CS business models."

"The statistical analysis of our results provides initial explanatory approaches on CS business model dimension interdependencies, thereby laying the basis for a deeper understanding of sectoral and geographic differences of B2B-MSP and their diffusion dynamics as well as facilitating a higher contextualization of future research."

Introduction

"Existing taxonomies of digital platform business models are not directly applicable to CS due to their special attributes, such as a sometimes- strong governmental influence or geographic boundedness."

"By using a CS-specific taxonomy, interested parties can better identify other platforms using similar business models on the market, the difficulties they face as well as potential growth opportunities."

"MSP research can benefit from a detailed view on CS business models as the contextualized insights from B2B-focused, locally bounded MSPs with varying governmental influence can support a better understanding of MSPs as a comprehensive concept."

"We present archetypes of CS business models which can serve researchers and practitioners in comparing existing CS amongst each other and to other digital platforms based on their characteristics."

"The article proceeds as follows: First, we describe and discuss the domain background of CS as well as extant taxonomies on platform and digital business models."

Domain background

"Although we looked specifically for taxonomies on platform and digital business models that cover local boundedness of such, we were not able to identify any."

"Hodapp and others (30)'s taxonomy for Internet of Things platform business models, which can comprise both B2C and B2B interactions, is too specific to be useful for classifying CS on the one hand and also does not account for the governmental influence and local boundedness of these platforms."

"We conclude that the digital business model taxonomy of Bock & Wiener (31) is not specific enough for our context, given that it neither accounts for the B2B focus of CS nor the role governmental actors or the implications of the local boundedness of the ecosystem."

"The taxonomy of Passlick and others (32) is too specific for our context, as it neither focuses on platform nor solely digital business models and also does not account for regional limitations of companies' business models."

Research methodology

"It is intended to integrate several overlapping meta-characteristics and dimensions from platform and digital business model taxonomies."

"When all objects that have been identified for the taxonomy development have been examined, when no objects were merged with similar object or split into multiple objects in the last iteration, at least one object is classified under every characteristic of every dimension, no new dimensions or characteristics were added, merged or split in the last iteration, every dimension is unique and not repeated and every characteristic is unique within its dimension as well as each combination of characteristics is unique and not repeated, the iteration process is terminated."

"We started the iteration process with the conceptual-to-empirical cycle, as we wanted to leverage knowledge from extant literature on both CS as well as taxonomies from the platform and digital business model context, to build a solid baseline for our taxonomy. (4c – 6c) First iteration (conceptual-to-empirical): Based on the four meta-characteristics described above, we derived dimensions and characteristics from extant literature on platform and digital business model taxonomies as well as CS background literature."

Taxonomy of Community Systems business models

"We also summarized compliance services such as services related to dangerous goods and services that (actively) support CS stakeholders in submitting regulatory documents compliantly, as logistical value-added services."

"Data related value-added services are the last category and comprise services such as data warehousing or business process optimizations, i.e., identifying optimization potentials for stakeholders based on the exchanged information."

"As data sharing is essential in a CS, the taxonomy distinguishes how stakeholders are encouraged to share data, i.e., how the data governance is set up."

"It can be based on a give-and-receive scheme, i.e., stakeholders can only use the CS if they share data themselves or a monetary compensation can be implemented, where the provider of valuable data is compensated for sharing it (Lievens, 33; Moyersoen, 34)."

"Governmental stakeholders can take different roles within a CS, from being external to it (e.g., Cheng & Wang, 35) to being the sole operator. ""

Taxonomy application—Community System archetypes

"If two CS from the "Innovation oriented port eco-systems" and the "B2B-focused CS" archetype groups shall be compared, one should investigate dimensions such as the "Geographic scope" or "Communication services" as those are distinctive for both archetype groups."

"All CS but the ones from the "B2B-focused CS" archetype group also include B2G activities and only the CS from the "Innovation-oriented port eco-system" and the "Non-profit CS" archetype groups also include G2G activities, i.e., connecting multiple governmental stakeholders, thereby facilitating the communication and cooperation of governmental agencies."

"The openness of the platform to complementors and who can be involved in decision making differs for the "Innovation oriented port eco-systems" archetype group compared to the remaining CS."

Discussion

"To the best of the authors' knowledge, this dimension has not been included in any platform or digital business model taxonomy before."

"To the best of the authors' knowledge, data security and data governance have not yet been included as dedicated dimensions in any digital or platform business model taxonomy."

"As companies in any context are hesitant to share critical and sensitive data with competitors, complementors or even "neutral" entities such as governmental actors, the "Data governance" dimension has implications for other MSP business models also: It presents a new incentivization scheme for sharing such data, especially in a B2B platform context."

"While some existing platform business model taxonomies have dimensions that point in a similar direction, none exhibits the same focus on data providers or owners."

"Potential services from existing platform business model taxonomies can be identified that have not been applied to the CS context yet."

Conclusion

"Data security and data governance approaches as crucial aspects of the CS business models have also been identified which can play an important role in creating trust amongst the diverse set of stakeholders involved in these MSP which have not yet been included in any MSP related business model taxonomy, though."

"It adds to the descriptive knowledge on multi-sided platform business models, as it develops a context-specific taxonomy for CS."

"The effects of geographic boundaries on MSP business models could be investigated, as we find that the local boundedness of CS might be one of the reasons for new and innovative ways of cooperation between different platforms."

"These different developments of MSP business models can be an interesting starting point for future research in the field, as different CS can be easily compared with the presented taxonomy but do not overlap due to the local boundedness aspect."

Digital transformation as an interaction-driven perspective between business, society, and technology [234]

This is a machine-generated summary of:

Van Veldhoven, Ziboud; Vanthienen, Jan: Digital transformation as an interaction-driven perspective between business, society, and technology [234]

Published in: Electronic Markets (2021)

Link to original: <https://doi.org/10.1007/s12525-021-00464-5>

Copyright of the summarized publication:

Institute of Applied Informatics at University of Leipzig 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"An analysis of 41 digital transformation frameworks following a developmental literature

review shows that several areas can be expanded upon."

"We propose a novel framework that deals with the underrepresented areas by consolidating the various concepts found in the literature, explicitly including the role of society, highlighting the evolution over time, and including the drivers of digital transformation that we classified into 23 'digital transformation interactions' across six categories."

"This novel perspective contributes to our macro-understanding of digital transformation and can be used as a lens for further research to generate fresh insights into unanswered research avenues."

Introduction

"This study set out to critically investigate and compare these frameworks which led to the identification of several research opportunities."

"There exists a disparity between the frequently mentioned role of society in the DT literature (e.g. Loebbecke & Picot, 36 and 36; Matt, Trenz, Cheung, & Turel, 2019) and its absence in DT frameworks."

"The framework, of which a preliminary version was introduced in previous work (Van Veldhoven & Vanthienen, 37), is based on the consolidated insights from the DT literature and the analysis of 41 DT frameworks stemming from a developmental literature review."

"In the third section, we go deeper into the identified research gaps after which we propose our framework that highlights the highly interactive nature between changes in business, society, and digital technologies in section four."

"Based on the framework, we open a discussion on the current and future research on DT and propose a research agenda in section five."

Background and related work

"For the inclusion criteria, we consider papers termed with DT and dealing with the transformation happening in business or society due to digital technologies."

"The framework can be used as a tool for businesses to simulate potential disruptions, changes, or DT projects."

"While these models explain what DT is, they do not offer any advice on how a company should initialize DT projects."

"Transformation frameworks describe how DT projects are typically carried out or should be implemented in companies."

"Maturity frameworks describe the different states of DT maturity in organizations."

"A different perspective is taken by Westerman and others (38) who created four levels of digital maturity based on the digital intensity of IT capabilities and the transformation management intensity of DT leadership."

The need for a novel framework

"In the analyzed frameworks, DT is often explained as a response to novel digital technologies."

"Although iterative frameworks are a good fit since it is generally agreed that DT is a continuous process (Gerbert, Gauger, & Steinhäuser, 39; Parviainen and others, 40; Warner & Wäger, 41), a more detailed formalization of the technologies and changes can be beneficial to better understand what is happening."

"A DT framework with a larger focus on the drivers should be a welcome addition to the IS research field."

"Despite the numerous frameworks that seek clarification, many 'synonymous' terms of DT, such as digitalization and IT-enabled transformation, can be found in the literature without a clear agreement on their exact meaning, scope, and relationship (Kane and others, 42 and 43; Riasanow and others, 44)."

"A conceptual framework that clearly outlines the meaning of DT, its evolution, and its related terms can be beneficial to advance the research field."

The proposed interaction-based DT framework

"While most reviewed frameworks are focused on the entities business and technology, we propose a broader one that also includes society."

"The framework contains three axes to represent the main entities: digital technologies, business, and society."

"We also included 23 drivers of DT, represented by the circular arrows between the axes, and categorized them based on the location in the framework."

The three axes: Changes in digital technologies, business, and society

"The business axis represents the common, major changes happening over time in organizations, companies, industries, and sectors due to the increased influence of digital technologies and the digitalized society."

"We list the major changes happening to people, customers, employees, cities, and governments due to the increased influence of digital technologies and digitalized businesses."

"The DT of business is influenced by both the changes in society and digital technologies, i.e. the DTI of business."

"The DTI of digital technologies describe the influences of business and society that steer the innovation of digital technologies."

"The DTI of business describe the drivers from digital technologies and society that pressure the business into DT."

"The DTI of society describe why society is changing drastically due to the profound impact of digital technologies and digitalized businesses (Goerzig & Bauernhansl, 45; Heavin & Power, 46; Matt and others, 47; Stolterman & Fors, 48)."

Discussion

"This paper contributes to our macro-understanding of DT by summarizing the major developments in business, society, and digital technologies and by linking these developments together as an integral part of the phenomenon."

"DT is generally broader defined as major changes in business, people, and society due to the cumulative impact of increasingly capable digital technologies (Ebert & Duarte, 49; Gurbaxani & Dunkle, 50; Kane, 51)."

"We define DT as the continuously increasing interaction between digital technologies, business, and society, which results in transformational effects and increases the change process' velocity, scope, and impact (Van Veldhoven & Vanthienen, 37)."

"As digital technologies evolve, they cause changes not only in business but also in society."

"A reactive chain process is activated in which the changing business and society influence each other into digitally transforming."

"Businesses both digitally empowered customers and forced adaptation of their digital solutions, accelerating the DT in society."

Research agenda

"Using this lens, researchers gain the opportunity to further enhance their understanding of DT and can gain novel insights about the complex change process and the way it unfolds."

"Another research avenue is investigating how maturity models can be combined with the DT framework to create maturity stages in each category in each dimension."

"We hope that the DT research community will also widen its research focus to investigate the larger changes of DT such as the shift from customer-centricity to the everyone-to-everyone economy (Berman & Marshall, 52), self-servitization, traditional industry borders that are fading, digital ecosystems, shifting business models, and so forth."

"Further research can investigate the role and effect of society and individuals in the DT process (Matt and others, 47)."

"We believe DT has the academic interest and power to bring together social and IS research streams to investigate the role of society in DT."

Conclusion

"We conducted a developmental review of 41 DT models which identified four research opportunities."

"We contribute to the DT research by classifying our insights around a novel, comprehensive framework that includes the major changes in business, society, and technology."

"By connecting both the business and society, we hope to bring together these research streams to better understand the role of society."

"This work can be the first step towards a unified understanding of DT."

Exploring the resources, competencies, and capabilities needed for successful machine learning projects in digital marketing [235]

This is a machine-generated summary of:

Blomster, Miikka; Koivumäki, Timo: Exploring the resources, competencies, and capabilities needed for successful machine learning projects in digital marketing [235]

Published in: Information Systems and e-Business Management (2021)

Link to original: <https://doi.org/10.1007/s10257-021-00547-y>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"This study aimed to explore the organizational resources, competencies, and capabilities needed for the successful implementation of machine learning development projects for digital marketing operations in marketing organizations."

"The findings suggest that marketing organizations' capability to understand and refine data by taking into the notion the impact of the marketing environment is the most crucial competence of machine learning development projects because it forms a solid base for algorithm execution and successful project implementation for marketing purposes."

"Personnel's understanding of the data's characteristics and capabilities for running successful machine learning projects were also seen as key competencies for marketing organizations."

Introduction

"There is a growing need in marketing organizations to understand the ML project structure and the organizational resources, competencies, and capabilities that are needed to achieve sustainable benefits from the implementation of ML in DM operations."

"Against this background, the main objective of this exploratory study was to identify the essential capabilities needed for the successful completion of an ML development project in a marketing organization."

"The study contributes to the ongoing discussion on marketing capabilities by exploring which organizational capabilities are essential in the implementation of ML in DM operations."

"To achieve the main objective defined above, we first needed to understand how ML development projects are structured in marketing organizations."

"We used the formed characterization of the ML development projects' steps to identify how marketing management and personnel affect the implementation of ML development projects in marketing organizations and what organizational capabilities are needed to overcome obstacles."

Framework for investigating machine learning projects in marketing organizations

"Use of this model as the framework of investigation on an ML development project makes it possible to form a comprehensive understanding of the content and workflow of different phases and to identify the personnel roles, resources, competencies, and capabilities of the marketing organization that are needed for successful project implementation."

"The dynamic capabilities approach emphasizes that three key sets of capabilities are essential if the firm is to sustain itself as customers, competitors, and technologies change: sensing opportunities related to changing customers' needs (identifying external developments); (2) seizing value from addressing such needs (execution steps and mobilizing internal resources); and (3) transforming the firm by continuous renewal (leverage and concrete changes, which require leadership) (Teece 53; Hunt and Madhavaram 54; Baden-Fuller and Teece 55)."

"We focused mainly on organizations' internal dynamic capabilities and the adaptive marketing capabilities needed in ML implementation to DM operations; therefore, we left the business model and organizational structure out of focus."

Methodology

"The research focused on exploring the marketing organizations' capabilities to conduct

successful ML projects rather than organizational structure or culture; thus, a relatively homogeneous population with similar experiences (i.e., marketing professionals with ML experience) that included between 6 and 12 participants was considered adequate to reach saturation (Guest and others 56)."

"The open-ended, semi-structured interviews were led by six themes based on the literature review: (1) the respondents' own DM and ML projects, processes, and methods; (2) data used for ML development; (3) data sources, quality, and management; (4) ML model/algorithm in development projects; (5) phases in ML development projects and processes; and (6) organization and personnel roles, knowledge, capabilities, and management in ML development projects and processes for DM operations."

"(data display), the data was organized using the study's guiding framework (Chapters 2.2 and 2.3), followed by second-cycle coding, in which the categories were grouped according to the content, process, and context of the ML development projects (Miles and others 57)."

Findings

"The data assessment showed that ML development projects in marketing organizations often follow the 5-stage, 5-gate model."

"The competitive need or purpose of the ML development was seen to define the marketing environment (i.e., the media in which the ML solution would be embedded), the kind of data it would need, and the type of algorithm and features wanted from the ML model."

"It was reported that it was important to help the ML development team form an understanding of the competitive need for the ML model and the DM systems in which it would be embedded to provide the correct data for the project's purposes."

"Data are widely available for DM purposes from third-party services and companies' own databases and that there is a possibility to create new data for ML purposes, marketing management and personnel need to establish a deep understanding, together with the ML development team, about the possibilities, limitations, and possible sources of data."

Discussion

"This study's findings support this angle by providing evidence that vigilant market learning and vigilant leadership are important capabilities for marketing organizations and management if they wish to fulfill ML development projects."

"By describing the projects' phases and the elements within the stages, the study illustrates how ML development projects in marketing organizations are dependent on the adaptive capabilities of marketing management and personnel to learn and support the ML

development team with proper data."

"ML utilization in the marketing organizations in this study was seen to be dependent on the organizations' internal competencies, ability to provide adequate technological and data resources, and ability to recruit, retain, and develop their personnel's knowledge of DM management and ML development."

"Marketing organizations need to develop their adaptive marketing capabilities and management procedures to utilize their internal and external competencies for data governance so that they will be ready to provide suitable data for ML purposes."

A systematic literature review concerning the different interpretations of the role of sustainability in project management [236]

This is a machine-generated summary of:

Friedrich, Kevin: A systematic literature review concerning the different interpretations of the role of sustainability in project management [236]

Published in: Management Review Quarterly (2021)

Link to original: <https://doi.org/10.1007/s11301-021-00230-z>

Copyright of the summarized publication:

The Author(s) 2021

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit

<http://creativecommons.org/licenses/by/4.0/> .

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Although significant research has already been conducted within the field of integrating sustainability into project management, different interpretations of the role of sustainability appear."

"This is a major issue for the scientific community, as due to these varying interpretations it is difficult to put publications into context; accordingly, it might lead to communication issues within the community."

"Using a synthesis approach based on grounded theory, we define three different categories of interpretations of the role of sustainability in the current state of research."

"Following this approach we are not only able to review the development of each interpretation over time, but also to identify that many publications contain multiple interpretations."

"Based on our findings, we give recommendations for the reflection of the existing literature, the writing of new publications and communication in the research field."

"We also redefine the concept of 'sustainable project management' based on a major theoretical characteristic we synthesise during our grounded theory approach to give guidance to future researchers."

Introduction

"Although many contributions already exist in the research field of integrating sustainability into project management (Aarseth and others 58; Goel and others 59; Silvius and Schipper 60), there exists a gap in research as the role of sustainability in project management is interpreted as conceptually different within the research field, as we will present in detail in the next section."

"We want to close this gap by defining categories of the different interpretations of the role of sustainability and, furthermore, by defining sustainable project management based on a main theoretical characteristic to give assistance in the research field."

"The research question this paper wants to answer is: How can the existing literature for integrating sustainability into project management be conceptually structured regarding the interpretation of the role of sustainability?"

"In the upcoming chapters, we will give a short introduction to the current state of research and the different interpretations of the role of sustainability in project management we could identify in the first instance."

State of research

"Although all scientific contributions about integrating sustainability into project management act within the same field of research and base their research mostly on the same definition of sustainability, we see after a first evaluation of the literature that there exist different or even opposing interpretations of the role of sustainability as follows."

"Within the context of our research question, we intend to clarify which of the different interpretations of the role of sustainability in project management exist in the research field, how they can be categorised, what their relationship is and reflect the existing definitions of sustainable project management."

"As we have seen, the interpretations of the role of sustainability in project management already differ in the existing literature, which creates a gap in the research field."

"Section, we will describe our research method in detail to synthesise the different interpretations of the role of sustainability in project management, create a stage model out of these and re-define sustainable project management."

Method

"An SLR has a goal not only to identify but also to synthesise relevant literature on a topic (Torraco 61), just like we want to bring the different interpretations of the role of sustainability in the research field in relation."

"For the quality appraisal (Okoli 62), we decided to review the type of literature and included all potential literature (so peer-reviewed studies and articles, books and book chapters, but also scientific grey literature, not peer-reviewed studies and articles, conference papers and reviews, project management methodologies and frameworks like PMBOK/Prince2/ICB and editorials) with scientific relevance to the research question."

"It was our decision to follow the approach of Petticrew and Roberts (63, p. 100) regarding when to stop the search for further literature: "when the search has covered all the most relevant databases and bibliographies, and when further searches of databases, and

scanning of bibliographies of review papers do not add to the tally of included studies.””

Results

"During the open coding we identified more than 4212 codes and created 397 memos from the publication regarding their interpretations of the role of sustainability in project management."

"To obtain a better understanding of the different interpretations, we first analysed from which project management and sustainability aspects the literature distances in these codes."

"When analysing the literature, we saw 'Sustainability as a constraint' as a first interpretation of the role of sustainability in project management."

"Sustainability is interpreted as a genuine goal (Marnewick 64); interpretations in this category go beyond the conventional project management by focusing on multi-dimensional economic, environmental and social sustainability goals in the project."

"Of the following section, we assign the literature to the different interpretations of the role of sustainability in project management for further analysis."

Discussion

"We synthesised as a common theoretical basis the term 'value ascribed to sustainability aspects in project management' as the main theoretical characteristic for the interpretation of the role of sustainability in the research field."

"We reflected upon the different interpretations of the role of sustainability in project management based on the aforementioned characteristic of 'value ascribed to sustainability aspects in project management'."

"We base this definition on the synthesised term of value ascribed to sustainability in project management and the interpretation of the role of sustainability as intrinsic value that underlines sustainable project management as a paradigm shift: Sustainable project management is a project management approach of ascribing intrinsic value to sustainability aspects by including all sustainability dimensions as equal parts of the project's success and therefore creating a business case for sustainability."

Conclusion

"It seems that different interpretations of the role of sustainability exist in the research

field."

"The aim of our research was to give researchers and practitioners guidance regarding the identification and order of the varying interpretations, as well as the development of a new definition for sustainable project management."

"We identified different interpretations of the role of sustainability in project management through which the literature on sustainable project management can be conceptually structured."

"Based on our study, we created an agenda for future research to further develop the field of sustainable project management."

"Between the stages of sustainability as a constraint and as instrumental value it could be researched if other interpretations exist in practice, which we did not find in the literature and how a transition between the stages might occur."

How do business model tools facilitate business model exploration? Evidence from action research [237]

This is a machine-generated summary of:

Athanasopoulou, Alexia; De Reuver, Mark: How do business model tools facilitate business model exploration? Evidence from action research [237]

Published in: Electronic Markets (2020)

Link to original: <https://doi.org/10.1007/s12525-020-00418-3>

Copyright of the summarized publication:

The Author(s) 2020

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or

format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"This paper examines whether and how business model tools facilitate the process of business model exploration."

"Through action research, we find three ways in which business model tools can better facilitate the process of exploring, reframing and comparing alternative business models."

"The paper contributes to business model literature and managerial practice by providing empirical evidence on how tooling facilitates business model exploration."

Introduction

"The goal of this study is to examine how business model tooling facilitates business model exploration."

"This study aims to answer: How do business model tools facilitate business model exploration?"

"Action research is suitable for our purposes since it allows applying interventions (i.e. business model tools) in a real-life setting (i.e. a project aimed to develop business models for a new offering) throughout a long-term and unstructured process (i.e. business model exploration)."

"Based on our analysis, we recommend how business model tools could be designed to facilitate the business model exploration process."

"This study contributes to the literature on business model tooling (Teece 4) by studying

how tooling facilitates the processes of business model exploration."

"Managerially, our study provides lessons on how to facilitate a process of business model exploration with tools, in settings where innovation project teams pursue new business model opportunities with high uncertainties."

Background

"Regarding business models in times of change, scholars mainly discuss established organizations that have to innovate their existing business model due to a new market (e.g., Landau and others 65) or uncertainty (Schneckenberg and others 66)."

"We consider four main activities of business model exploration, which need not be linear and sequential: (1) develop initial ideas on the new business model (ideate) (Cavalcante and others 67), (2) conceptualize alternative business models (reframe) (Sosna and others 68), (3) explore and assess alternatives (envision) (Heikkilä and others 69), and (4) formulate concrete actions to implement the business model (action-formulation) (Baden-Fuller and Morgan 70; McGrath 71)."

"The literature on business model tools is expanding rapidly (De Reuver and others 72)."

"Whereas some tools cover the full scope of a business model (e.g. Business Model Canvas), others focus on one specific aspect (e.g. Value Proposition Canvas)."

"One array of tools provides patterns that represent solutions or 'proven' configurations of specific business model components (e.g. Lüttgens and Diener 73)."

"Szopinski and others (74) create a taxonomy of online business model tools, focusing on their modelling, collaboration and technical characteristics."

Method

"Action research allows researchers to develop and test theoretical ideas on the efficacy of specific actions, through a process of interacting and intervening with practitioners in a naturalistic setting (Baskerville 75)."

"As the process of business model exploration is iterative, action research is particularly appropriate."

"The interventionist nature of action research further allows us to test the efficacy of business model tools in facilitating business model exploration."

"Based on the initial plan for the project, the ultimate goals for the project were: (1) making a product, described as a digital toolbox that improves the road behavior of young people, (2) creating a start-up that will offer the developed product on the market."

"Ideas for the product were to create online communities of young drivers, to model driving behavior based on data collected in the communities, and to offer gamified systems to educate road safety to young drivers."

Analysis

"The researchers 'directed' the change with the introduction of different business model tools, based on the action plan."

"For the ideate activity, we used the widely used business model Canvas tool to create a first overview of the business model of the start-up, the Persona tool to identify potential stakeholders and the STOF business model to collect ideas of project participants."

"While the business model Canvas tool is user-friendly, it was challenging for the project partners to fill out the empty template as the offering was not yet defined."

"For the next processes of envision and action-formulation, we used tools to explore potential solutions and to design business models for later phases of the start-up."

"For the action-formulation process, we used business model tools like the business model roadmap and the pricing strategy cards to design a plan for the future of the start-up."

Evaluation

"The use of the tooling helped to make the business model design more specific, which was the main challenge in this project."

"The product was not clearly defined in the early stages of the project; hence the initial business model designs do not fully match the final product."

"Another challenge was that the business model tools are not made for businesses that are still exploring."

"Project partners were asking the researchers to suggest a business model, whereas this was challenging without a specific offering."

"We learn that when the offering is not clear, alternative business model scenarios are

needed."

"Using business model tooling from the start of an innovation project allows identifying questions that need to be answered, thus providing more direction in subsequent steps of business model development."

"Business model tools helped make the design process more focused."

Discussion

"The start-up is based on the delivered business models."

"We found existing business model tools mainly facilitate the creation of single business model designs."

"Existing tools do not support the design of alternative business models, which is necessary when offerings and target market are not defined."

"Existing tools are not tailored to illustrate alternative business models."

"We suggest that future business model tools should have features that support the decision-making between business model alternatives."

"We provide our recommendations on how existing tools could facilitate business model exploration."

"The need for tools to support creating multiple alternative business models resonates with ideas from Augenstein and Maedche (76), who develop a configuration tool to quickly make and evaluate changes in business models."

"Our findings indicate that available business model tools provide limited support to decision making."

Conclusions

"We examined how existing business model tools facilitate the process of business model exploration, in settings where companies actively create new business model opportunities."

"To Iriarte and others (77), who argue that additional research is necessary on how managers in practical settings can choose and use tools for service value proposition design, we argue that additional research on the business model tools can be useful to

improve the business model innovation process."

"The results are important for understanding the scope in which existing business model tools can be applied, as we show that existing tools do, to some extent, facilitate business model exploration."

"In a realistic setting, how well a business model tool is used, depends on the user."

"We argue that an agile approach could support the iterative process of business model exploration, especially within innovative projects in which researchers, managers and consultants collaborate (Bouwman and others 78)."

Business process management (BPM): terminologies and methodologies unified [238]

This is a machine-generated summary of:

Ubaid, Alaa M.; Dweiri, Fikri T.: Business process management (BPM): terminologies and methodologies unified [238]

Published in: International Journal of System Assurance Engineering and Management (2020)

Link to original: <https://doi.org/10.1007/s13198-020-00959-y>

Copyright of the summarized publication:

The Society for Reliability Engineering, Quality and Operations Management (SREQOM), India and The Division of Operation and Maintenance, Lulea University of Technology, Sweden 2020

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Business process management (BPM) is one of the effective performance management methodologies used in managing process-oriented organizations."

"Having a unified list of the BPM critical success factors (CSFs) and BPM principles considered one of the important research areas."

"The literature review showed that despite the majority of BPM principles and CSFs are the same or there are minor differences between them, different terminologies were used to describe them."

"The main objectives of this research are building insights about BPM's most recent developments, unifying BPM principles and CSFs and proposing a comprehensive BPM."

"The mapping process was used to propose a unified list of BPM CSFs and BPM principles."

"A comprehensive BPM methodology was proposed, the proposed methodology combining the steps of generic BPM methodologies and BPMS methodologies and it is unifying the terminologies used in the reviewed methodologies."

"The proposed CSPs can be further analyzed to find the relationship between CSPs and how each one of them can affect BPM implementation."

"The proposed BPM methodology can be tested by applying it to the different business sectors and measure organizations' performance during implementation stages."

"For the practical side, the proposed methodology can provide a guide for managers and organization leaders about the right steps to be followed during implementing BPM and conducting BPM projects."

"CSPs can guide BPM project managers, organization leaders, and business excellence units to focus their efforts on the significant improvement areas and actions to be taken on strategic and operational levels."

Introduction

"Viewing organization as a set of cross-functional processes at different levels and through organization's boundaries is one of the recent and effective approaches for managing organizations' business (Škrinjar and Trkman 81; Looy 82; Mäkinen 83)."

"Business process management (BPM) is one of the effective methodologies used for improving the efficiency and performance of the process-oriented organizations (Ongena and Ravesteyn 79; Suša Vugec and others 80)."

"BPM developed gradually from merging the quality approach and business process reengineering (BPR) approach (Rosemann and Brocke 84)."

"BPM defined as a management discipline that considers business processes as the main contributor to achieving the organization's objectives by improving, continuously managing performance of essential business processes, and govern it (Jeston 85)."

"Taking the aforementioned BPM issues into consideration, the main objectives of this research are building insights about BPM's most recent developments, unifying the similarities in the BPM principles and CSFs and proposing a comprehensive BPM methodology that able to integrate the generic BPM methodologies and the Business Process Management Systems (BPMS) methodologies."

Literature review

"In 2018, BPM defined by John Jeston, as a management discipline that considers business processes as the main contributor to achieving the organization's objectives by improving, continuously managing performance of essential business processes, and govern it (Jeston 85)."

"In the enablement phase, an organization should work to develop the necessary capabilities to drive four main components namely people, process, technology, and BPM project management which represent business success components, i.e. it is mandatory for BPM project success."

"Launchpad Three major actions need to be taken that includes; (1) deciding location where to start next or new BPM activity, i.e. location of process to be improved; (2) define the goals of process under improvement which should be aligned with organization strategy; (3) establishing activities need to be taken to improve process and achieve process goals."

Research methodology

"The methodology used in the current research encompasses analyzing the literature on three parallel lines."

"In the first line, the literature will be analyzed to extract the BPM developments and discuss them in the results discussion section."

"In the second line, the literature related to BPM CSFs and BPM principles will be analyzed, summarized and then mapping process will be used to find the similarities between CSFs and principles and the unique CSFs and principles."

"In the third line, the literature related to BPM methodologies will be analyzed to identify the pros and cons of each methodology, highlight the gaps in each methodology and then propose a comprehensive BPM methodology that able to fill the gaps of the previous methodologies."

Unifying CSFs and BPM principles

"BPM principles defined as a set of best practices any organization implementing BPM should follow to sustain competitive advantage and ensure BPM projects success (Hung 86)."

"Institutionalization The implemented BPM project or approach should be embedded and integrated with organization systems and plans, i.e. it shouldn't add another layer to organizational structure."

"Organizational structure change BPM implementation should change organization structure to ensure horizontal linkages, cross-functional nature of processes, and make processes focused on delivering value to customers."

"BPM implementation An effective BPM implementation process that characterized by its simplicity, i.e. resources used by BPM should be economical, and contextual awareness, i.e. while implementing BPM, organization setting factors such as size, strategy, business scope, BPM objectives, available resources, and types of processes should be considered."

"Collaborative working environment in BPM, due to the cross-functional nature of processes, employees' participation and contribution to processes analysis and improvement from across organizations should be emphasized."

Comprehensive BPM methodology

"Only two methodologies were found as generic methodologies, i.e. it considers the common steps or phases followed during BPM implementation."

"The analysis conducted on both methodologies and mapping the Elzinga and others methodology to the Jeston framework showed that those methodologies have a common logic and the stated steps or phases for implementing BPM are almost the same but terminologies used were different."

"Develop and implement phases from the Jeston framework can be mapped to the implementation step from Elzinga and others methodology."

"“realize the value and sustainable performance” phases from the Jeston framework can be mapped to the continuous improvement cycle step from Elzinga and others methodology."

"The proposed methodology combines the steps of generic BPM methodologies (Elzinga and others 87; Jeston 85) and BPMS methodologies (Ko and others 88; van der Aalst 89) and unify the terminologies used in reviewed methodologies."

"If BPM project goals achieved, the improved processes, by using diagnosis standards from BPMS, will be analyzed and monitored."

Results discussion

"BPM developed over the years from merely systematic and structured approach used for improving and managing organization performance to management discipline that, in addition to what mentioned before, start using methods, techniques, and software for improving and managing organization performance, i.e. BPM approaches start to combine knowledge from information technology and management sciences for improving business processes."

"In 2018, BPM major activities were classified to four major activities that represent the walls of BPM house and it includes alignment with organization strategy, identification of the essential business processes that should be enhanced first, Business process improvement and people change, and the activities related to benefits realization and performance management."

"The analysis conducted on the BPM CSFs and BPM principles literature reveals that when organizations, during implementing BPM, reach to CSFs development stage, they should refer to the BPM principles and adapt it to fit for their business by focusing on the principles that will gain more weight in term of fulfilling organizations' goals and objectives and delivering the desired value to the customers and stakeholders."

Conclusions and future research agenda

"Business process management (BPM) is one of the effective performance management methodologies used in managing process-oriented organizations."

"The proposed methodology starts with the preparation process by analyzing organization vision, mission, goals, strategy, and CSPs to identify CSFs and work on needed culture change to prepare the organization for implementing BPM."

"The pros of the proposed methodology may include but not limited to explaining what BPMS standards to be used during BPM methodology implementation, in which stage it should be used and how it will interact with human factors within the organization."

"The proposed BPM methodology can be tested by applying it to different business sectors and measure organizations' performance during the implementation stages."

"From the practical side, the proposed methodology can provide a guide for managers and organizations leaders about the right steps to be followed during implementing BPM and conducting BPM projects."

Business model innovation in corporate entrepreneurship: exploratory insights from corporate accelerators [239]

This is a machine-generated summary of:

Urbaniec, Maria; Żur, Agnieszka: Business model innovation in corporate entrepreneurship: exploratory insights from corporate accelerators [239]

Published in: International Entrepreneurship and Management Journal (2020)

Link to original: <https://doi.org/10.1007/s11365-020-00646-1>

Copyright of the summarized publication:

The Author(s) 2020

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain

permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Corporate accelerators are considered as an innovation fostering approach within new ventures provided by start-ups."

"The aim of the paper is twofold: firstly, to explore the motives behind corporations' engagement with start-ups in launching corporate accelerators, and secondly, to identify the corporate benefits and challenges of this business model innovation."

"Our research expands on prior findings and suggests that corporate accelerators are driven by internal and external push and pull motives."

"The study contributes to expanding the scope of corporate entrepreneurship research in regard to the challenges and benefits of corporate accelerators."

"It provides evidence that corporate accelerators are a source of innovation that can be used to foster entrepreneurial-market logic and entrepreneurial learning."

Introduction

"In order to meet the challenges of the contemporary market, corporations look for new business models of value creation involving a wide array of market players in the process of generating innovation that foster corporate entrepreneurship."

"The latest sub-stream of corporate entrepreneurship research focuses on the involvement of external partners, as well as significant company resources in innovation generation processes through exploitation of new business models."

"Recent studies on corporate entrepreneurship report a growing interest in new business models of outsourcing innovation to the start-up sector (Kanbach and Stubner 90; Kohler 91; Trimi and Berbegal-Mirabent 92; Weiblen and Chesbrough 93) which leads to an optimal exploitation of available opportunities for corporate entrepreneurship initiatives."

"Research results suggest that corporate business accelerators present a promising

opportunity for business model innovation in existing mature companies; authors point out that innovations are often costly and time-consuming, requiring significant initial investment ranging from research and development to specialized resources, new plant and equipment, and even entirely new business units (Amit and Zott 94)."

Literature review

"This means that corporate entrepreneurship occurs in "formal or informal activities aimed at creating new businesses in established companies through product and process innovations and market developments" (Zahra 95, p. 262)."

"In its quest for innovation, the technology industry in particular, has experimented with a variety of business models involving start-ups, e.g. corporate accelerator programs."

"While the first three types of corporate accelerators are focused on specific strategic goals (e.g. understanding recent trends and developments in respective markets, and initiating relationships; identifying, developing, and integrating new products and services into the parent company's value chain; creating a protected environment to test promising internal and external business ideas), the latter is used for financial purposes (investing in promising start-ups, making them more valuable, and earning a financial premium)."

"Corporate accelerators are considered as a business model innovation when the companies strive for continuous improvement of their performance and innovativeness."

Material and methods

"In line with this, data were collected for all three categories of corporate accelerators identified in prior studies, i.e. internal, external (independent provider) and public acceleration programs (run and co-financed by a government agency)."

"The study is based on different sets of data: five in-depth interviews (IDIs) with corporate accelerator executives, one focus group interview (FGI) with experts, and secondary data sources."

"Of the research, potential respondents (executives of the selected corporate accelerators), were contacted directly in order to conduct in-depth interviews (IDI)."

"The third phase included a focus group interview (FGI) with four experts of corporate accelerators, who were not involved directly in their implementation."

"The focus group was scheduled for October 2019, lasted two hours, and similar issues with the individual interviews with corporate accelerator executives were covered in order to obtain the participants' interpretations of other data sources (Gibbs and O'Neill 96) and

validation of priorly gathered data."

Research findings

"The decision to establish a corporate start-up accelerator is made by the top management of the company."

"Based on the data analysis, we make the following hypothesis: Hypothesis 2: The main challenges faced by corporate accelerators are associated with limited human capital skills, complex management practices and distinct business model logics between corporations and start-ups."

"Based on the data analysis of the reported benefits of corporate accelerators, we make the following hypothesis: Hypothesis 3: The key benefits of corporate start-up accelerators refer to long-term strategic gains, such as access to new market knowledge, organizational learning, expanding the company's networks and improving the company's image."

"In order to unlock the potential of corporate accelerators, managers need a deeper understanding of how to design processes that add value to the start-ups and the joint projects and, hence, can generate fast-to-market innovation."

Discussion and conclusions

"The study focused on corporate accelerators operating in Poland that demonstrate exploratory and exploitative business model logics."

"Hypothesis 2: The main challenges faced by corporate accelerators are associated with limited human capital skills, complex management practices, and the distinct business model logics between corporations and start-ups."

"Based on the empirical study, the results make several distinctive practical and theoretical contributions to corporate entrepreneurship by enhancing the understanding of the business model logic of corporate accelerators."

"The study demonstrated that corporation accelerators apply explorative and exploitive business model logics in striving for innovation development."

"Our research suggests that corporations must create new and agile management practices, which are not limited to the accelerators, since critical decisions regarding contracts with start-ups are made outside of the accelerator framework, at a top management level with corporate managers often involved in the evaluation phase."

Shipping digitalization management: conceptualization, typology and antecedents [240]

This is a machine-generated summary of:

Lambrou, Maria; Watanabe, Daisuke; Iida, Junya: Shipping digitalization management: conceptualization, typology and antecedents [240]

Published in: Journal of Shipping and Trade (2019)

Link to original: <https://doi.org/10.1186/s41072-019-0052-7>

Copyright of the summarized publication:

The Author(s) 2019

License: OpenAccess CC BY 4.0

This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Digital transformation is a topical theme in shipping research and professional practice, today."

"In order to understand the full complexity of shipping digitalization activities, we addressed technology and management aspects in a coalesced framework."

"Our research outcome is an overarching theoretical model, which systematizes the

technological components (technology typology), the prevailing management rationales (strategic drivers) and determinant factors (practices) of shipping digitalization."

Introduction

"Our study addresses the following primary research questions: which are the effectual technologies of contemporary shipping digitalization and how these technologies resonate in shipping management; which management logics necessitate the adoption of digital technologies in shipping and which digitalization management practices enable them."

"Our multi-case, qualitative research took place within five of the largest and most advanced shipping institutions, worldwide; including two shipping companies, one classification society and one autonomous ship and one maritime blockchain consortium, henceforth making the research setting suitable for investigating the phenomenon of interest, namely shipping digitalization - constituent technologies and management dimensions and determinants."

"In section 3, we elaborate the typology of shipping technologies and solutions identified, while in section 4, the digitalization management aspects are presented in detail."

Conceptualization of shipping digitalization

"Digital innovation in shipping is articulated along three basic pillars: (1) innovative digital technologies (IoT, analytics, A.I., blockchain) (2) innovative digital solutions (smart shipping systems and services, maritime blockchains), and (3) digital business concepts, models and management practices (i.e. digital mindset and skillset, technology partnerships, digitalization resourcing)."

"In order to create and operate digital business models and management practices shipping companies need to develop and enact a digitalization capability, which may be reduced to a set of simple rules and process heuristics (best practices); an ability to think strategically about digital technologies, approaching digitalization as an opportunity for new value creation (Barrett and others, 97)."

"Our preliminary observations regarding digitalization management practices reveal that incumbent, leading shipping companies, today, primarily develop innovative digital solutions (i.e. blockchain based smart contracts) while aligning strategic and operational needs and objectives with digital technologies affordances."

Shipping digitalization: technologies and solutions

"IoT technology, namely sensors, actuators, or processors are embedded in vessels' technical systems, namely engines, communications and data fusion systems, propellers or

cargo systems, constituting the Internet of Ships and Sea Services. (Levander, 98) Embedded software platforms integrate and manage the increasingly automated functions of ships and the interconnected shipping business processes, as well as the connected maritime logistics service systems (Lycett, 99; Shmueli and others, 100; Thomas and others, 101)."

"Self-management and autonomous systems design principles and capabilities, i.e. monitoring, control, optimization and autonomy at various levels (0–5 or 6) and functional areas of ship operations (navigation, cargo handling) are relevant."

"An autonomous ship is operated by a land-based surveillance and control center connected with a collection of digital technologies such as IoT, data analysis technology, and broadband communication."

"A.I. is supporting a number of application areas at the tactical level of shipping management, including asset optimization, fleet planning, service planning and chartering."

"The business model of Distributed Autonomous Organizations, where shipping is algorithmically managed, coalescing the above technologies (IoT, 5G, A.I. and blockchain) into autonomous solutions may be tested soon too."

Digitalization management: concepts, models and practices

"In our second iteration of the theoretical base refinement, the value creation and business model angle was partly overlooked for further development and synthesis with the rest of the research lenses, as merely overlapping with adjacent concepts and management tools in practice-oriented shipping digitalization management."

"Among a wealth of related frameworks, based on Bharadwaj (102), we employed digital innovation capabilities as a practice oriented construct with six dimensions: digitalization strategic thinking, digital infrastructures (assets), digital business partnerships, and digital business process integration, structures and network orientation/connectivity."

"We examine the course of the various digital transformation activities and management practices along the different phases of the innovation process (sense-seize-transform digitalization loops), namely digital opportunity identification/ideation, digital initiative exploration and testing, and lastly, actual launching/operation of the digital technology systems/services (Salerno and others, 103)."

Methodology and cases

"The interviewees were asked to describe in detail how the particular key technologies of shipping digitalization enlisted are applied, used or offered by the interviewees' company;

furthermore, to explain whether (and which) new functions, services are enabled by the digitalization projects or platforms they are involved, to explain to which extent current processes embed or leverage the functions, and to describe implications of the emergence of smart ship and smart shipping or blockchain technology with regards to their organizations' business processes and business models."

"We ensured that the interviewees' position, experience and complementary perspectives would allow us to investigate how shipping digitalization is shaped and is shaping the industry, and individual companies' and organization's management practices and strategies, as well as identify the technological trajectory of smart shipping services and autonomous ship systems."

"The interviewees groups included at least one and up to three C-level Executives, responsible for the respective digitalization project(s), being the head of respective departments/units (i.e. Smart Shipping Division, Marketing Division, ICT Strategy Department or Information System Department), or Project Managers of the respective initiatives (i.e. blockchain platform)."

Summary: theoretical contribution, managerial implications and limitations

"Based on the field research findings, the extent of validation and the insights we gained with experts' interviews, our work contributes with an overarching model of digitalization, which presents pertinent technological and managerial aspects to be further developed, enhanced and validated by forthcoming maritime research studies."

"We present: (i) a concise model of three prevailing, intertwined dimensions to take into consideration while engaged in real life digitalization efforts; we elaborate in detail (ii) an accessible typology of pertinent technological components of shipping digitalization and (iii) a list of related managerial action fields to focus on while engaging in shipping digitalization projects."

"We provide one single accessible knowledge source for maritime professionals who wish to be updated in shipping digital technology and resultant managerial issues."

"Fostering the academic dialogue on shipping digitalization, also contributes in expanding maritime business professionals understanding of digitalization aspects and enriches their managerial agency quality."

Concluding discussion: digital entrainment - old drivers, appropriated practices, new value?

"The intensity and direction in which resources are explored and combined are correlated with digitalization performance and needs further examination. (ii) Our insights suggest

that innovation process practices, including industry-spanning search, complex system thinking style (sensing capability) and orchestration (seizing) capabilities are correlated with digitalization performance, also linked to the radicalness of digital innovation (i.e. business model innovation such as blockchain platforms and autonomous ships projects vs. process innovations). (iii) Digital value creation logics and processes apparently overlap and are interwoven and need to be further scrutinized. (iv) Managing digitalization is more complicated than acquiring, bundling and orchestrating physical and digital resources."

"Using competently analog shipping knowledge to bridge traditional and digital generations of shipping can have a positive impact on digitalization performance. (v) Likewise, our insights suggest that resource complementarity is the primary driver for which shipping companies pursue interorganizational collaboration; it constitutes a process with potential partners reciprocally strategizing through interactions and mingled actions."

AI and robotics in the European restaurant sector: Assessing potentials for process innovation in a high-contact service industry [241]

This is a machine-generated summary of:

Blöcher, Katharina; Alt, Rainer: AI and robotics in the European restaurant sector: Assessing potentials for process innovation in a high-contact service industry [241]

Published in: Electronic Markets (2020)

Link to original: <https://doi.org/10.1007/s12525-020-00443-2>

Copyright of the summarized publication:

The Author(s) 2020

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative

Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Enabled by artificial intelligence (AI), mobile apps, kiosks and chatbots revolutionize the guest experience and robots automate restaurant operations."

"Despite the increasing interest, the use of AI and robotics in restaurants is still in its early stage and restaurant managers are seeking guidance to leverage these technologies for service excellence."

"The present research analyzes the current state of AI and robotics in the restaurant sector and proposes a systematic identification of process innovation potentials."

"A market analysis of the European AI and robotics market for restaurant operations is conducted, which yields a first knowledge base for future research and conceptual work."

Introduction

"Following the call for more research on service technologies (Kunz and others 111; Wirtz and others 112), it systematizes current service solutions using AI and robotics technologies and contributes to the understanding of the opportunities for process innovation in the restaurant sector."

"It enriches current research on AI and robots in service operations, which is still in its infancy and requires knowledge on how technologies impact business practices and human work (Ferreira and others 113; Kunz and others 111)."

"Even if research demonstrates the potential of AI and robotics for all human tasks in service operations (Frey and Osborne 114; Huang and others 110), a quantitative view on existing technologies is missing to fully understand their capabilities, specifically in a high-contact service sector."

"Two research questions are suggested: RQ 1: Which opportunities for process innovation are offered by current AI and robotics service solutions in the European restaurant sector?"

Theoretical foundations

"The adoption of AI and robotics service solutions offers a range of possibilities for process innovation in this industry (Ivanov, and Webster, C. (Eds.)."

"Ivanov and others (106) and Ivanov and Webster (107) provide a general overview of the applicability and effects of AI and robotics technologies in business processes."

"The examination of the European technology market of AI and robotics vendors offers novel empirical insights to develop a systematic view of current opportunities for process innovation, which may serve as a knowledge base for practitioners and researchers."

"In the current hospitality literature, AI and robotics technologies primarily substitute functional and repetitive tasks that lack intellectual and socio-emotional capabilities (Ivanov and others 106; Rosete and others 115)."

"Academic literature emphasizes the need for future research that focuses on the deployment of AI and intelligent robots adopting emotional work in the hospitality sector (Ivanov and others 106; Lu and others 116)."

Research methodology

"Following the AI literature (e.g. Russell and Norvig 117), AI solutions should feature at least the following skills of intelligent systems: (1) natural language processing (NLP), (2.) knowledge representation, (3) automatic reasoning to identify patterns, (4) machine learning to learn from its own activities and new circumstances, (5) computer vision in the form of image analysis and processing and (6) robotics to move or manipulate objects."

"The fourth analysis dimension was examined to improve the understanding on how subprocesses are currently empowered by AI and robotics solutions and how vendors position the role of service solutions in association to service employees (augmentation vs. substitution)."

"In order to classify the respective AI and robotics service solutions, several coding rules were defined to minimize the effects of interpretations and to achieve consistency during the analysis phase (e.g. Bryman 118)."

Analysis results

"In back-of-house processes AI service solutions are present as expert systems in human resource management or business and finance operations."

"42 vendors position their solutions in a way that AI and robotics services replace the responsibilities of service employees in front-of-house processes."

"AI and robotics service solutions that support subprocesses and tasks on a mechanical level are intended more to replace human work whereas the look at subprocesses with thinking and emotional tasks reveals that most solutions still augment service employees in service process."

"For some business processes, AI and robotics vendors offer more AI and robotics service solutions, resulting in different levels of opportunities for process innovation: In processes, such as customer operations and food and beverage preparation, the potential for innovation is higher whereby processes, such as marketing, and reputation management are on a lower level."

Decision support for service managers

"The business process perspective has the purpose of planning and coordinating operational tasks, clarifying responsibilities and aligning IS technologies to (service) employees (e.g. Davenport 119)."

"A perspective on business processes should be adopted that structures the application domain of AI and robotics in service operations and coordinates tasks along business operations."

"Looking at service solutions in the context of business processes facilitates the identification of use cases and may guide service managers where to start with applying AI and robotics."

"The business requirements and the appropriate use case for AI service solutions need to be identified in specific business processes, e.g. in the subprocess of staff planning in human resource management."

"Service managers must think of new tasks for service employees as well as creative workflows of human-robot collaboration."

Contributions

"In accordance with the call for more research on service technologies (Kunz and others 111; Wirtz and others 112), this paper analyzed the current European market of AI and

robotics service solutions in the restaurant business as a high-contact service sector."

"Four main contributions shall be mentioned: First, the vertical analysis of a single service sector provides empirical data on how existing AI and robotics technologies already perform human tasks corresponding to business processes and tasks in a high-contact service industry."

"Similar to existing literature (Chui and others 120; CUF 121; Ivanov and others 106), the analysis demonstrates that a broad range of subprocesses and tasks in the restaurant sector require skills on a mechanical intelligence level and that the majority of identified AI and robotics service solutions currently assume these activities."

"Early results indicate that such a maturity level may depend on the type and the number of processes being supported and that about 30 AI and robotics service solutions already provide assistance in multiple business processes and subprocesses."

Research limitations

"The primary research objective was the analysis of the current market situation for AI and robotics service solutions in the five largest European food markets."

"MMC Ventures (122) showed that Sweden and Ireland have developed more AI service solutions than Spain and Italy in other sectors."

"Since available corporate websites and online documentation of vendors were analyzed in detail, these AI vendors do not always fully describe the use of AI capabilities, e.g. the use of computer vision in robotics solutions."

"This signifies that vendors present their solution as AI technology for marketing purposes although they have solely developed single rule-based systems."

"Due to its strong organizational focus, other significant aspects related to AI and robotics have not yet been considered and should be added in future development cycles, e.g. the availability of data for AI services (Hofmann and others 123) or topics, such as data security, data privacy issues, or the quality of algorithms (e.g. Berezina and others 108)."

This is a machine-generated summary of:

Joos, Hannah Charlotte; zu Knyphausen-Aufseß, Dodo; Pidun, Ulrich: Project Stakeholder Management as the Integration of Stakeholder Salience, Public Participation, and Nonmarket Strategies [242]

Published in: Schmalenbach Business Review (2020)

Link to original: <https://doi.org/10.1007/s41464-020-00092-0>

Copyright of the summarized publication:

The Author(s) 2020

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The literature on project stakeholder management does not have sufficient theoretical substantiation to address this issue."

"To fill this knowledge gap, we integrate the concepts of stakeholder salience, public participation, and nonmarket strategy, and apply them to two urban infrastructure projects in Germany."

"It offers a dynamic and conceptual model for project stakeholder management, providing explanations for different conflict intensities."

"Examples include the identification and clustering of so-called nonmarket assets, an examination of the influence of nonmarket strategies on managers' perceptions of stakeholder salience, and the study of public participation in a corporate-political context, rather than a purely political one."

Introduction

"Our focus on these concepts and their interplay fills the gap in the literature on project management, which does not contain sufficient theoretical substantiation to address the aforementioned issue as it is still a nascent discipline which, for a long time, focused on operational and technocratic aspects while ignoring projects' strategic framing and broader scope (e.g., Killen et al. 124; Koskela and Howell 125; Packendorff 126; Söderlund 127)."

"Despite an increase in the number of publications on project stakeholder management (PSM), key topics, such as stakeholder influence strategies and interrelationships, remain obscure (Aaltonen et al. 128; Achterkamp and Vos 129; Eskerod and Vaagaasar 130; Littau et al. 131; Mok et al. 132; Nguyen et al. 133; Turkulainen et al. 134)."

"We deviate from this approach not only by highlighting the conflict intensity as the final outcome to be explained, but also by introducing broadly accepted and applied theoretical concepts from strategic management into the project management literature."

"It provides a conceptual dynamic model for PSM by highlighting how the complex interplay between stakeholder salience, public participation, and nonmarket strategy affects conflict intensity."

Theoretical Background

"PSM explains a broad range of topics such as stakeholder analysis, stakeholder influence and stakeholder management strategies, as well as stakeholder engagement and project evaluation—that is, project success, risks, and performance (Littau et al. 131; Nguyen et al. 133)."

"The first component in the PSM process is analysis, "an interpretation process by project managers in analyzing the project stakeholder environment" (Mok et al. 132, p. 452)."

"This corresponds to the desired outcome of stakeholder analysis, especially since the definition of power is based on the same arguments as the concept of harm and help (cf. Mitchell et al. 135, p. 860)."

"We have determined the theoretical base for the two components of the PSM process, analysis and interaction, but still lack the strategic component that makes PSM a key success factor for projects (e.g., Suttrfield et al. 136)."

Methodology

"This study analyzes how the interplays among nonmarket strategy, stakeholder salience, and public participation explain PSM with regard to the special case of conflict with citizens."

"We adopted a multiple case study approach following the guidelines of Eisenhardt (e.g. 137)."

"While single interpretive case studies based on grounded theory (e.g., Gioia 138) have become popular, a comparative case study design is more suitable for several reasons."

"Difficulties in finding access to similar constellations resulted in a limited sample; however, the analysis of distinct project phases allowed for comparisons across points in time, thus ensuring theoretical saturation (Eisenhardt 139)."

"Secondary data were not used for quotes, but it ensured an efficient focus and accurate interview interpretation, thus minimizing the risk of deriving less-than-insightful primary data."

"The richness of the secondary data helped ensure the results were sufficiently robust, despite the relatively few interviews conducted."

Case Analysis

"The second subsection then shows how nonmarket strategies influence stakeholder analysis, or the salience attributed to local communities, highlighting the importance of adequate stakeholder perception through the different phases of a project."

"Each of the following subsections introduces the detailed research approach, presents the findings from the two cases, and strives to substantiate them with the three theoretical concepts of nonmarket strategy and assets, stakeholder salience, and public participation."

"The results revealed that the absence (existence) of a private-oriented nonmarket strategy decreases (increases) the salience attributed to local communities, especially prior to implementation."

"The analysis demonstrates that in the first two project phases, Stuttgart 21 perceived the

salience of local communities to be too low, whereas Runway North-West/T3 did the opposite."

"As private-oriented nonmarket strategies did not exist, it is likely that the perceived salience influenced the chosen stakeholder interaction."

Towards an Integrative Framework for PSM

"This is interlinked with the fact that in the end, both projects showed integrated CPA and CSR strategies with corresponding approaches to public participation, having a positive—or diminishing—impact on conflict intensity."

"It promotes interaction forms that aim to find acceptable compromises without putting the project at higher risk."

"These findings emphasize the influence of strategy on managerial perception, and thus, stakeholder analysis and interaction."

"They also highlight the importance of a more specific and context-related view on PSM, especially regarding stakeholder interaction."

"Stakeholder salience helps examine the analysis component, while public participation gives substantiation to interaction."

"The cases also revealed that analysis depends on interaction, as information exchange improves decision-making, for instance."

"Strategies such as public CPA, private CPA, or politicized CSR influence the analysis through their impact on managers' perception of important stakeholders (cf. Buysse and Verbeke 140; Henriques and Sadorsky 141)."

Contributions, Limitations, and Future Research

"Owing to diverse cases such as the Keystone XL Pipeline, calls for the democratization of business processes are becoming louder, emphasizing the need for project stakeholder management (PSM) focusing on civic stakeholders (e.g., Crane et al. 142; El-Gohary et al. 143; Invernizzi et al. 144; Rothfuß et al. 145)."

"Our study revealed that it is possible to balance knowledge exchange, consideration of needs, and the ability to act when applying public participation tools."

"It enriched nonmarket strategy research by offering a practical example of the coupling of

corporate political activity and corporate social responsibility (cf. Mellahi et al. 146)."

"Scholars could use the model as guidance in refining our understanding of the linkages between PSM and the three theoretical approaches we selected for this study, or make use of other concepts that help connect the project management and the strategic management disciplines and contribute to productive theory building (Whetten 147)."

Dual focus: service-product orientation to manage the change paradox following servitization strategy [243]

This is a machine-generated summary of:

Zighan, Saad; Abualqumboz, Moheeb: Dual focus: service-product orientation to manage the change paradox following servitization strategy [243]

Published in: Service Business (2022)

Link to original: <https://doi.org/10.1007/s11628-022-00483-y>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature 2022

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"This paper examines the change management process throughout the servitization strategy."

"The study finds that synergistic interaction between product and service systems will

create greater customer value when following the servitization strategy."

"This paper complements extant research on change management in servitization by proposing apparent change as a relaxed strategy to allow for changes following servitization with delicate alignment with existing organizational values and culture."

Introduction

"Previous research acknowledged that organizations undergoing servitization process and operating in product-service systems face several paradoxes such as service paradox (Gebauer and others 148), cost-profit paradox (Neely 149), sales growth paradox (Kastalli and Looy 150), co-opetition paradox (Raza-Ullah and others 151), branding paradox (Nenonen and others 152), performance paradox (Wang and others 153), supply-demand paradox (Gölgeci and others 154), and innovation paradox (Kohtamäki and others 155)."

"Change paradox is another challenge facing organizations and their supply networks following the servitization strategy (Benedettini and Neely 156)."

"A product-oriented organization will need to make necessary changes following the execution of a servitization strategy (Nuutinen and Lappalainen 157)."

"Baines and others (158) investigated the servitization change process moving from product-oriented to services-oriented logic and the forces impacting this process, maintaining that this process is challenging with multiple catastrophes and tipping points."

"This paper seeks to answer the question of how the change process is managed when an organization moves from product-oriented to services-oriented logic and reduce the change paradox when adopting the servitization strategy?"

Literature review

"Moving to a services orientation may cause inconsistencies in the organization's operation system, leading to a potential strategic failure, in which case, an effective organizational change process should be put in place (Oliva and Kallenberg 159; Gebauer and others 148)."

"In this debate, servitization as a change process may incur paradoxes such as performing, belonging, and organizing (Luscher and others 160)."

"The paradox of performing reflects the challenges organizations face when their roles change from product-oriented to product service oriented (e.g., mixed messages to their customer base)."

"A revolutionary change process with radical and impulsive alterations to services-oriented logic is more appropriate when adopting servitization."

"This revolutionary change process is necessary to promptly enforce the services component across all organizational dimensions (Nuutinen and Lappalainen 157; Brax and Visintin 161)."

"This evolutionary change process is based on the organization's learning ability and the development of changing capabilities toward service orientation."

Research design

"This study explores how change is managed when an organization moves from product-oriented to services-oriented logic by adopting a servitization strategy."

"These organizations have explicitly employed a servitization strategy and now generate revenue by selling products and advanced services in their respective market networks."

"Since 2016, the company has been developing a servitization strategy to offer differentiated managed services, including cloud-based computing, data security, recovery, and maintenance solutions."

"Due to safety regulations and ergonomics, in 2017, the company repurposed its operations to target international market and transformed its business strategy to shift from product-based to product-service systems through a transformative servitization."

"The second part focuses on understanding the underlying conflict between product and product operations and service orientation and the organization's servitization-related challenges."

"The third part focuses on understating the organization's transformational process from product oriented to services oriented and the change management strategy that underlies this transformation process."

Data analysis and findings

"The four companies also agreed that a slightly more advanced level of integration (i.e., the amalgamation of product and service rather than a comprehensive integration) between service and product is needed to provide an advanced customized service that is key to improving customer value."

"The changes that accompanied this level included, for example, the delegation of authority

and training of employees, improved product quality, and customized service provision, which resulted in businesses attaining greater customer satisfaction and successful organizational performance."

"At this level, the four companies moved to offer system solutions and changed their business models to be an integrated system that is services oriented."

"Whereas offering integrated services [in the third level of servitization] is usually a required fundamental change towards a greater focus on services provision, to better fit with specific customer needs."

Discussion, conclusion, limitations and future studies

"This paper explains how companies might navigate the required changes to servitize their product offering without excessively focusing on service orientation and further explains why an excessive focus on service might not be a preferred route to servitization."

"We argue that an apparent change strategy is more appropriate for a servitization strategy that does not take focus away from product but at the same time considers service, which we call dual focus."

"This signposts to organizational dimensions that needs to significantly change toward a balanced product-service orientation (i.e., dual focus), including, for instance, new organizational arrangements, behaviors, innovation practices, customer relations, and activities that are necessary to produce and deliver various services that form the value of a product-service system (c.f."

"This paper advocates a dual focus that equally considers both service orientation and product orientation in a balanced way that would alleviate several challenges when implementing servitization, that otherwise would crop up in the evolutionary and revolutionary change strategies."

Promoting Entrepreneurship through a Community Learning Model – Case Study: Green Businesses [244]

This is a machine-generated summary of:

Ramírez, María Catalina; Navas Castaño, Libia Alejandra; Delgado, Ángela; González, Miguel

Angel; Caicedo, Luis Camilo; Peralta, Mauricio: Promoting Entrepreneurship through a Community Learning Model – Case Study: Green Businesses [244]

Published in: Systemic Practice and Action Research (2019)

Link to original: <https://doi.org/10.1007/s11213-019-9477-z>

Copyright of the summarized publication:

Springer Science+Business Media, LLC, part of Springer Nature 2019

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"This article presents a community learning model formulated by Engineers Without Borders Colombia with the aim of providing communities with tools to create sustainable productive solutions which have relevancy for members and for potential customers."

"This collection will prove useful in replicating the learning model in other similar rural communities."

Introduction

"Colombia owns 94% of the rural territory and is apt to develop this type of alternative undertakings but currently there is a lack of stimulation of rural work, because the producer receives about 35% of the final value of fresh food or 15% of the price when it is processed, which usually does not cover production costs. (Baquero and others 162)."

"As it was mentioned before, sustainable development must respond to the needs of the most vulnerable, but the inappropriate stakeholder analysis and management often lead to conflict, controversies and eventually project failures (Ha and others 163); frequently the opinion and efforts of the people for whom projects are directed are forgotten, resulting in externally- driven development and projects imposed on communities (Network of Community Exchange Systems in Asia, Africa, and Latin America 164)."

"Engineers without Borders Colombia (ISF-COL), an alliance between University of los

Andes (UNIANDES) and Minuto de Dios University Corporation (UNIMINUTO), developed a participatory community learning model concerned about how to promote sustainable internally-driven entrepreneurial systems by formulating productive solutions which must reflect local and rural contexts; sustainability problems are regularly contextual and complex, becoming critical to operationalize participatory processes in formulating future visions, objectives and action plans (Hara and others 165)."

Context

"The Guavio Province province is located close to Colombia's capital, Bogota."

"Despite life quality of population settled in Bogota and its surrounding areas depends on Guavio's environmental sustainability, 27.2% of inhabitants has unfulfilled basic needs and main economic activities have traditional commercial schemes based on agriculture and livestock, where producers received low payments from intermediaries and ecosystems biodiversity and sustainability are threatened (Cámara de Comercio de Bogotá 166)."

"Small-scale farming is ubiquitous and smallholder farmers must tackle multiple obstacles such as a lack of access to productive resources, lack of market information, poor human and physical capitals, low competitiveness of produce and poor bargaining power (Ha and others 163), among others."

Theoretical Framework

"As a learning model is developed, it is important to review organizational learning, which is the capacity to create, organize, and process information from its sources to generate new knowledge at different organizational levels, creating a culture that favors learning and conditions to develop new capacities, to design products and services, to increase existing offer, and to improve processes focused on durability (Garzón and Fisher 167)."

"The objective of this model is to promote social development, therefore productive solutions' formulation is also supported on the notion of green business, which is socially and environmentally helpful, care for customers and clients, improve communities and lead to sustainable growth (Ali and others 168)."

"Participatory research has its roots in liberation theology, approaches to community development and human rights activism, distinguish from conventional research by attributes, such as shared ownership of research projects, community-based analysis of social problems, and an orientation toward community action (Kemmis and McTaggart 169)."

Research Methodology

"According to these objectives, ISF-COL formulated the ECL-POCDI model (Entrepreneurial Community Learning- Preparation and Observation, Conception, Design and Implementation), supported on the PAR methodology; a qualitative research methodology that allows to reveal features of an individual's signs, feelings and patterns without manipulation or control from the researcher."

"Various methods for data collection are used in PAR and their utilization is collaborative, determined by participants and researchers according to the specific situations."

"Between these methods, the three most commonly cited methods in the literature are participant observation, interviews and focus groups (MacDonald 170). Participant observation allows researcher to obtain first-hand knowledge of social behavior (Gillis and Jackson 171)."

"This method involves systematic observation and the recording of events, behaviors and objects using thorough field notes (Marshall and Rossman 172). Interviews are face-to-face verbal interactions appropriate for collecting data, regarding human experiences by enabling participants to describe their ideas, thoughts and memories in their own words."

ECL-POCDI Model

"The knowledge resulting from the application of this learning model is expected to be focused on the successful introduction of productive solutions into a market."

"Process, identifying relevant stakeholders, their potential influence on a project, interests and expectations is a key element of stakeholder engagement and analysis, helping to address critical success factors for a project, such as generating an environment for collaboration and trust, building interrelationships and developing mutual understandings (Ha and others 163)."

"Since this stage is meant not only to share knowledge and improving skills but also to formulate solutions to previously identified needs, learning comprises the Argyris and Schön (173) single-cycle, where individuals, under their mental models, detect inconsistencies in terms of expectations and respond to them by modifying strategies and assumptions in constant organizational bylaws."

Case Study: Guavio Region Community Green Business Strengthening Project

"Part of this project was devoted to consolidating a network of at least 35 productive units (companies or entrepreneurships), located in Gachetá, Junín, and Guasca municipalities, strengthening their green profile through a community learning process."

"This initiative has evolved consistently with the regional commitment to consolidate a touristic water circuit, using the learning generated from the project to strengthen the consolidation of the participants with productive units as touristic operators."

"ASOPROQUINUA, focused on boosting quinoa production, recollection and future commercialization, was constituted through four participatory design spaces: a space for interaction with the members of the association, a field school, a quinoa commercialization workshop and a space for the design of a prototype focused on the inclusion of quinoa in people's diets."

"A team integrated by an entrepreneur and students formulated a business model for a soap in bar and liquid presentations, developed with an expert help in the participatory design spaces with the aim of initiating a portfolio of honey byproducts."

Discussion on Findings

"On Friday, August 11, 2017, more than three years after project ending, allowing community members to evaluate their generated capabilities, a 'focus group' was established with more than 10 participants, belonging to Guasca municipality."

"Both college and university students had an expected participation in the project of an academic period and did not generate a commitment of them to the project in the long term."

"The proposed ECL-POCDI Model can help development project practitioners to effectively integrate Design Thinking and the PAR approach into their work, allowing the generation of really innovative and participative solutions to the community's problems."

"The Conception phase allows a co-creation of the solutions between all the stakeholders, and generating high levels of engagement; even more, allows to use, through the Design Thinking Tool, all the creative power of the project participants."

Conclusions

"This learning process design and application help to fill the current research gap on participant relationships and knowledge creation amongst projects, by presenting practical evidence of how PAR and Design Thinking approaches provide actionable knowledge which strengthens participants' capacity to handle problems that are of their common interest."

"As described here, these initiatives may be valuable opportunities to introduce students to real context involvement, strengthening their academic learning processes through

experiences, knowledge and problematics shared by community members."

"Among the model application in the case study, elements of AR which are also present in social innovation processes were identified, such as knowledge cogeneration and socialisation, shared problem-setting, mutual empowerment, and the development of specific capabilities that facilitate self-managed transformation processes, opening lines of research related to the application of learning models like this in other innovation processes within several social context (Estensoro 174)."

Classification tools for business models: Status quo, comparison, and agenda [245]

This is a machine-generated summary of:

Schoormann, Thorsten; Schweihoff, Julia; Jussen, Ilka; Möller, Frederik: Classification tools for business models: Status quo, comparison, and agenda [245]

Published in: Electronic Markets (2023)

Link to original: <https://doi.org/10.1007/s12525-023-00639-2>

Copyright of the summarized publication:

The Author(s) 2023

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"To be aware of and manage the set of possible design options, one can rely on classification tools, including taxonomies, typologies, and classification schemes."

"Following a descriptive literature review approach, this paper structures the diverse body of classification research by presenting a repository of tools and deriving an analytical grid to disclose the similarities and differences between selected tool types."

"This paper (1) raises awareness for the plurality of tools and their underpinning concepts, (2) provides a status quo overview across tool types, and (3) derives design-relevant knowledge for the tools, points to current challenges, and paves the ground for future research on the building, evaluation, and use of this class of tools."

Introduction and problem formulation

"Despite the increasing interest, there is, to the best of our knowledge, only scarce guidance on what type of classification tool is suitable for a specific purpose within the context of business models."

"We formulated the following two research questions: What is the distribution of classification tools for business models (RQ1)?"

"What are the key characteristics in the design and use of different classification tool types for business models (RQ2)?"

"We provide a status quo overview of taxonomies, typologies, classification schemes, and other classification tools in the business model domain."

"Our work organizes design options for each classification tool type as well as initial production patterns, which help designers in making purposeful decisions during the building and evaluation of new tools, ultimately paving the ground for prescriptive knowledge on business model classification design."

Research background

"Attributes of real companies in which business models are seen as elements determined "by empirically classifying real world manifestations of organizations as a function of their measured similarity on observed variables" (p. 76)."

"The relevance has already been stressed by Pateli and Giaglis (175), who found in their review of e-business models that "a great deal of research has been devoted towards developing typologies of business models by classifying them under a set of criteria" (p. 308)."

"Since classification tools help to organize both empirical and conceptual knowledge for the development and adoption of business models, they are promising to face today's situations coined by complexity, inconsistency, and growing design options."

"This type of classification can be matched to Massa and others's (176) interpretation of business models as "attributes of real firms," which are examined empirically by classifying real-world organizations."

Research method

"We excluded the following papers: duplicates (e.g., papers appearing both in AISel and the Top Basket) and papers obtaining classifications tools that do not directly refer to business models (e.g., taxonomies of business model development tools, Szopinski and others, 74, 177)."

"We specified the following initial taxonomy dimensions: empirical- and conceptual-informed research approach (e.g., Bailey, 178), grounding and development (e.g., Nickerson and others, 179), demonstration and evaluation (e.g., Szopinski and others, 180), communication and visualization (e.g., Szopinski and others, 74, 180), application and use (e.g., Schoormann and others, 181), and general aspects for purpose and scope of a tool."

"In Iteration 2, we randomly selected five papers for each of the main types of tools, namely, taxonomies, typologies, and classification schemes."

"We classified an additional set of 30 randomly selected papers, regardless of which type of classification tool was presented."

"Following this, we applied the analytical grid (i.e., taxonomy) from the previous phase to extract and compare the distribution of characteristics across all classification tool types."

Extraction of classification tools for business models

"The following subsection presents an overview of the tools along with the four major

types of taxonomies, typologies, classification schemes, and other classification tools (see Appendix 3 for the entire list of papers; see Appendix 4 for representations that stood out)."

"Taxonomies focus on entire business models (42/46) instead of specific business model components (4/46), such as key resources or key partners."

"To the actual taxonomy, researchers often apply their results to arrive at business model archetypes (i.e., typical configurations of the characteristics) (19/46) as well as derive future trends and potential for subsequent research (15/46)."

"While most of them shed light on entire business models (7/12), contrarily to other types, several classification schemes also lay a focus on specific business model components (5/12), such as partners (#37) or outputs (#60)."

"The majority of papers do not report on types or clusters of business models (8/12)."

Analysis of classification tools for business models

"The first meta-dimension contains five dimensions, including the type of tool, primary goal, business model scope, domain focus, and technology focus."

"As the most basic aspects, the tool type (G₁) differentiates between taxonomy, typology, classification scheme, and other types to also incorporate rarely used tools (e.g., some authors refer to frameworks (#69) or cluster profiles (#31))."

"As another aspect, the classification tools differ in what they analyze, including specific technologies (e.g., taxonomy for artificial intelligence-based business models, #97) or certain industries (e.g., a typology for tourism, #39)."

"Besides, scholars draw on classification tools to reflect on the advantages of business model types (#2), discuss gaps and trends within a certain domain of interest (#36), derive testable propositions (#9), and develop further artifacts (e.g., create a holistic framework, #37)."

Discussion

"With the holistic view of classification tools, our work extends available insights, for instance, on the construction of empirical business model taxonomies (e.g., Möller and others, 182) and business models in general (Groth & Nielsen, 183)."

"In line with this, we can observe some waves with regard to the specification from

classification tools: starting rather strictly by differentiating a specific grounding for a specific type (e.g., typologies are derived conceptually) towards allowing for combining several approaches (e.g., taxonomies derived both conceptually and empirically)."

"Since appropriate and transparent grounding is an essential ingredient in research (e.g., Goldkuhl, 184; vom Brocke and others, 185), scholars might want to investigate specific grounding approaches for business model classification tools (RD3)."

"Future research should investigate specific methods and criteria for evaluation (RD4), including questions concerning what constitutes a useful business model classification tools (e.g., applicable by practice) and which criteria should be taken into account (e.g., number of generated ideas, degree of consistency in a new model, generated revenues from a new business model)."

Conclusion

"We set out to explore the vast landscape of classification tools for business models."

"To structure this vast field, we present an overview of classification tools proposed for business models, an analytical grid in the form of a taxonomy, and a systematic comparison of different tool types."

"Our work is intended to complement available business model research and allows researchers to build upon knowledge captured by available tools, select suitable tool types for their individual projects, and make informed design decisions for new tools."

"Because we have already experienced situations in which classification tools serve a valuable input to adapt, innovate, and create new business models, we hope to contribute to leveraging the full potential of those tools."

Transforming workplaces into performing workspaces—Holistic evaluation concept for managing workspace change projects [246]

This is a machine-generated summary of:

Kämpf-Dern, Annette; Will-Zocholl, Mascha: Transforming workplaces into performing workspaces—Holistic evaluation concept for managing workspace change projects [246]

Published in: Zeitschrift für Immobilienökonomie (2022)

Link to original: <https://doi.org/10.1365/s41056-022-00058-y>

Copyright of the summarized publication:

The Author(s) 2022

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Transforming traditional workplaces into high-performing workspaces is a complex venture, not only in terms of design and preparation, but also in terms of implementation and management with regard to the realization of the intended goals."

"Starting with the definition of goals and performance metrics, evaluation must be established from the very beginning and then continuously be applied to the project."

"The evaluation concept—like a controlling system, only with workspace-specific aspects and KPIs—covers two areas: The main dimensions of workspace design with the involved stakeholders and their performance parameters, and the processes of implementation, the change management aspects."

"The study excerpt presented here addresses the evaluation of transformation projects in

the field of working environments."

"An evaluation concept supports those responsible for the workspace project to keep on track by deducting and tracking relevant KPIs, offering tools and methods for group and team processes regarding the change project, and providing those."

"To combine design and change management of workspace projects in one evaluation concept and to provide a structured list of possible instruments/methods for evaluation over the different phases of such a project is new and thus original for workspace management."

Introduction

"The term 'workspace' includes a broad variety of physical work environments, used technologies, data space, services provided, corporate culture etc 'Workspace' thus reflects much better the complexity of today's work, and the multidisciplinary efforts that are necessary to transform traditional 'workplace' concepts into today's modern 'workspaces' to reach new levels of performance."

"This led us to reflect, and resulted in the question addressed here: What are the preliminaries for an impactful evaluation, an evaluation that effectively supports a learning organization in its work environment transformation projects?"

"Because of the severe consequences (e.g. productivity or even employee losses) in case of not learning effectively from workspace transformation pilots and projects, the question above and the goal to optimize transformation processes systematically, using evaluations, are important."

Need for and understanding of 'workspace evaluation'

"As is clearly depicted in the office ecology model in regards to its elements, workspace transformation projects are particularly complex, not only in their design and preparation (e.g. initiating, planning and managing the physical, technological and social change processes), but also in their implementation and steering towards their objectives."

"Effective WS plans consist of actual and target figures for the various relevant dimensions, as well as on measures to be implemented, with the implementation being managed by the operative management."

"The implementation of a WS transformation project requires to plan in change phases, as e.g. mentioned in (Levin 186), with different phases involving different participants and methods of involvement."

"A transformation project can only be successful, i.e., achieve the intended targets at the end of the project, if strategic goals are broken down into operational KPIs and operational control variables during the planning phase."

Performance-oriented workspace change project evaluation concept

"An evaluation concept should also include and cover some KPIs' leading indicators that are determined at different moments of the change project to enable the organizations to set up the project in the best way and identify and make adaptations early on, if necessary."

"A mixed-methods approach is needed, consisting of various data collection instruments in the context of workspace change projects: Prerequisite for an effective WS change project and its evaluation is the profound knowledge of the WS situation."

"For the evaluation of WS change projects, interviews can be used additionally with focus groups or at certain events, e.g. after moving into the new space (Tuzcuoğlu et al. 187) and in different forms, like semi-structured interviews (Kavantera et al. 188) or expert interviews (Kohlert 189)."

"Comprehensive evaluation of WS change projects as suggested is thus an important contribution to a learning organization."

Case study: directbank

"Those surveys were supposed to be linked with the pulse checks through anonymous identifiers allowing a longitudinal analysis on individuals' user journey Final interviews respective focus groups to discuss the insights of the prototype with representatives of all stakeholder groups: employees and affected managers, as well as from the involved departments like HR, IT, etc A very important part of the evaluation was the continuous analysis of the data that included reflection of the team of internal managers and external scientific team regarding the findings and the resulting necessary adaptation measures."

"While the pulse checks form the basis for the ongoing management of WS transformation projects, the final surveys and focus groups serve to assess the achievement of objectives on the one hand, and—in comparison with the original objectives—also to gather knowledge for subsequent projects."

Conclusion

"The paper provides a concept for evaluating WS transformation projects that relates to the ideas of the 'Performance evaluation and improvement' of the ISO 55000 series 'Asset Management', and thus is a part of the overall corporate management systems."

"To fulfil the purposes of performance evaluation and the requirements of the multi-dimensional office ecology model including change management alike, the concept combines methods and instruments from strategic management and business controlling with empirical social research, communication sciences, and methods derived from medicine."

"A comprehensive design and change management model together with the evaluation concept suggested here, provide an effective toolset to plan, evaluate, steer, and control WS change projects, though admittedly, the evaluation concept is to be developed further to facilitate usage and lower costs."

"Practice can profit from the evaluation concept, as it is integrated in the corporates' management systems and provides a structured overview of the most important steps, instruments and methods for evaluation, 'translated' to WS transformation projects including respective change processes."

A framework for implementing robotic process automation projects [247]

This is a machine-generated summary of:

Herm, Lukas-Valentin; Janiesch, Christian; Helm, Alexander; Imgrund, Florian; Hofmann, Adrian; Winkelmann, Axel: A framework for implementing robotic process automation projects [247]

Published in: Information Systems and e-Business Management (2022)

Link to original: <https://doi.org/10.1007/s10257-022-00553-8>

Copyright of the summarized publication:

The Author(s) 2022

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source,

provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Robotic process automation is a disruptive technology to automate already digital yet manual tasks and subprocesses as well as whole business processes rapidly."

"To other process automation technologies, robotic process automation is lightweight and only accesses the presentation layer of IT systems to mimic human behavior."

"Due to the novelty of robotic process automation and the varying approaches when implementing the technology, there are reports that up to 50% of robotic process automation projects fail."

"To tackle this issue, we use a design science research approach to develop a framework for the implementation of robotic process automation projects."

"We analyzed 35 reports on real-life projects to derive a preliminary sequential model."

"They structure how to manage knowledge and support processes for the execution of robotic process automation implementation projects."

Introduction

"Whereas traditional off-the-shelf software (such as enterprise software) as well as BPM software itself have turned out to be too heavyweight for rapid automation projects robotic process automation (RPA) is a lightweight automation technique (Santos and others 191)."

"Although academic literature already provides several case studies, most of them refer to specific companies and therefore do not enable a generalization of the findings to support RPA projects."

"We aspire to close this gap by consolidating findings from reported cases to develop a framework for RPA implementation projects and refining it in an expert interview study."

"With these contributions, we answer the call for research on RPA by van der Aalst and others (192193) and we address several challenges that Syed and others (194) have put forward, namely contributing to better methodological support for the adoption and implementation, socio-technical implementation, and in particular the systematic design, development, and evolution of RPA projects."

Business process management and robotic process automation

"RPA is an approach that does not require new APIs or software services to replace current practices, but installs software robots that mimic the behavior of human users and interact with their already existing graphical UIs invoking a sense of anthropomorphism (Czarnecki and Fettke 195; Lacity and others 196; Penttinen and others 197)."

"RPA implementations are often not managed by the IT department, but by the business departments that are directly affected by the process's automation (Hofmann and others 198)."

"RPA can be defined as technology for the lightweight and rapidly deployable automation of tasks and processes using software robots that operate on the UI layer of preexisting software."

"BPM software aims to coordinate and orchestrate process automation while communicating through programming or APIs accessing the data and business logic layer (Hofmann and others 198) constituting heavyweight IT (Bygstad 199; Penttinen and others 197)."

"This entails that one can distinguish symbolic RPA, which relies on handcrafted process models and rules, and intelligent RPA, which uses AI technology to enable human-like cognitive abilities for selected tasks (Herm and others 200)."

Research methodology

"We have performed three design iterations of data collection and suggestion, development, and evaluation and conclusion: Iteration 1: Structured literature review to enhance theoretical sensitivity, meta-synthesis, initial framework, Iteration 2: Expert interview study, data coding, consolidated framework, demonstration, and expert feedback, Iteration 3: Framework refinement, evaluation workshops, final framework."

"In line with the challenges put forward by Syed and others (194), the artifact of this

research is a framework to facilitate and guide the introduction of RPA in companies to aid the systematic design, development, and evolution of RPA implementations."

"Based on the evaluation of the structured literature analysis through the interview study, we combined the identified stages and phases from both analyses."

"The first version of the framework emerged from the results of the literature analysis, which were adapted and supplemented by the expert interviews."

Literature review

"We screened and then analyzed the full text of the resulting 541 hits for articles that contain stages of RPA projects and conducted a forward/ backward search to identify case studies that were not listed in the databases."

"During the literature review, we have analyzed the 35 contributions in terms of their content for stages or phases within RPA projects."

"It is apparent that most contributions only consider between three and five stages for RPA implementation projects, while only six contributions consider eight stages for RPA implementation projects."

"Few cases approach RPA projects in a structured fashion early on or consider the long-term benefits and challenges: that is, not many cases report on a structured screening of technologies (n = 9) let alone provide thoughts on long-term service (n = 5) or the transfer (n = 3) of results in future RPA projects."

"Our literature review summarizes the current state of academic literature on the different phases and stages within RPA implementation projects and, thus, serves as our first key contribution."

Expert interviews and workshops

"Since RPA mostly addresses process automations across different software without API, W2 and W4 consider RPA to be a bridging technology without a defined expiry date."

"Processes with low complexity as well as few exceptions (I3, I5, I8, W2, W4), which are financially lucrative to automate (I5), should be used for initial RPA projects."

"Hereby, expert knowledge from RPA consultants can be helpful to allow for more rapid and less stressful development of the software robots (W4)."

"According to the experts, an RPA pilot should focus on simple but relevant processes (I3, I6-7, W1-4)."

"The analysis of the interviews suggests that the experts consider these aspects to be part of the CoE, RPA support processes as well as the scaling of RPA services stage (I1-2, I6-7)."

Framework for implementing RPA projects

"These continuous stages represent project-external influences that support concrete RPA implementation: in particular, this is the establishment and enhancement of a CoE. As the framework has been developed through 35 literature use cases as well as eight expert interviews and five workshops with different companies, it represents a comprehensive and actionable prescription to support the systematic design, development, and evolution of RPA projects in practice."

"In the initialization phase, identification, alignment, and technology screening are completed and the implementation phase stages of process selection, RPA software selection, RPA pilot, and the evaluation of business case start."

"All stages are complemented by a continuous cycle of RPA support processes and through a CoE. It became evident that the initialization phase differs, when only few RPA implementation projects have been completed in contrast to abundant experience with RPA implementation projects."

"With an increasing number of RPA implementation projects, the stage of adoption and scaling is gradually transferring into a continuous cycle of RPA support processes."

Discussion

"Further, the presentation of the framework as well as the evaluation through the workshops has revealed that an own framework for RPA is warranted as RPA differs from traditional IT automation not only in the technical dimension but also in an organizational and social dimension."

"Our proposed framework guides practitioners to implement RPA projects within their companies."

"Due to the holistic and flexible nature of the framework, practitioners are able to orient themselves on which stages they may or may not need to apply for their RPA implementation projects."

"While this was not the focus of our research, we can deduce the RPA phase of initialization

can take place before, during, or after the BPM phases of process identification through process redesign depending on the urgency of automation as a temporary bridge or the informed decision to automate using a software robot rather than BPM software."

Conclusion and outlook

"We investigated the status quo of RPA research focusing on the challenge of the systematic design, development, and evolution of RPA projects while considering aspects of socio-technical design and adoption (Syed and others 194)."

"Following a structured literature review, an interview study as well multiple workshops to uncover differences and similarities between practice and scholarly literature, we developed a framework of three phases, nine project-based stages, and two continuous stages of project support."

"While promising concepts have already been developed in theory, companies have generally not yet addressed these issues in practice, especially if they represent long-term benefits such as establishing a CoE. In response, our framework can be considered as a prescription that can narrow the gap between theory and practice as all experts saw value in the framework."

"It provides clear methodological guidance on how to approach RPA implementation projects comprehensively and it is of practical value for companies as confirmed by the interviews and workshops."

Software tools for business model innovation: current state and future challenges [248]

This is a machine-generated summary of:

Szopinski, Daniel; Schoormann, Thorsten; John, Thomas; Knackstedt, Ralf; Kundisch, Dennis: Software tools for business model innovation: current state and future challenges [248]

Published in: Electronic Markets (2019)

Link to original: <https://doi.org/10.1007/s12525-018-0326-1>

Copyright of the summarized publication:

Institute of Applied Informatics at University of Leipzig 2019

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"To address these issues, we synthesize knowledge from research on software tools for business model development and adjacent fields with the results of an analysis of 24 software tools from practice."

"We provide a comprehensive taxonomy that identifies 43 characteristic functions of software-based business model development tools."

"We thus support practitioners' decision making on tool (re-)design and investment, and provide the foundation for a cumulative stream of research on software tools for business model development."

Introduction

"Given the collaborative and creative nature of business model innovation, software-based business model development tools (BMDTs) are said to have great potential to support their users in innovating business models (e.g., Ebel and others 201; Osterwalder and Pigneur 202; Veit and others 203)."

"The goal of this study is to respond to these calls by addressing the following research question: What are characteristic functions of software tools for business model development?"

"Based on contributions from business model research and adjacent domains as well as from the insights gained from the classification of existing tools, we derive an agenda for future research on the functions of BMDTs."

"For researchers, our theory for analyzing (i.e., the taxonomy) and our research agenda lays the foundation for a cumulative stream of research on software tools for business model

development, and for theories that are more advanced and go beyond our theory for analyzing."

Background

"Studies are also relevant if they address software tools for tasks that share similarities with the task of business model development (e.g., innovation tasks in contexts other than business model innovation), as such studies promise to yield insights that could fruitfully augment our knowledge on BMDTs."

"These software tools allow their users to perform actions that are not even possible with 'pen & paper' tools (e.g., collaborative business model development in distributed teams, Ebel and others 201)."

"The developmental step of employing software-based tools to facilitate the development of such models has already been started in business process research (Kettinger and others 204; Recker 205)."

"While the domain of the modeling object is different (for process vs. business model, see Gordijn and others 206), given the similarities, research on the functions of process modeling tools promises to be relevant also for the functions of BMDTs."

Taxonomy building

"The method proposed by Nickerson and others (207) allows to systematically develop a taxonomy and is rigorous as it clearly defines the necessary seven steps: First, the purpose and the target group of the taxonomy is defined (step 1 "Determine Meta-Characteristic") for directing the development of the characteristics (i.e., properties) and dimensions (i.e., groups of properties) of the taxonomy."

"For determining when to stop the iterative buildup of the taxonomy, we adopted the ending conditions from Nickerson and others (207), with one exception: Following Gimpel and others (208), we did not apply the condition whereby "at least one object is classified under every characteristic of every dimension" (Nickerson and others 207, p. 344) – as this would have hindered us from retaining functions in the taxonomy that are not yet available in BMDTs (but that are potentially useful as suggested by previous research, see Background)."

"For developing the taxonomy of any tool with multiple versions, we used the version with the largest range of functions."

Taxonomy description

"This dimension distinguishes between elements that describe components of a business model by using sticky notes (which can be moved around freely; while tools without this function only allow entering information in one free text field for every component), element connections to make the connection between elements explicit, and templates which, to facilitate the idea generation, suggest predefined elements for a certain component (e.g., in the form of lists with elements such as 'retail stores' for the component 'channels') or the entire business model (e.g., in the form of business model patterns)."

"For facilitating the handling of a business model, the navigation and filtering dimension distinguishes between six supporting functions: Link to business models (or parts of them) and framework support describe the embedding and linkage with further business models or architectures (e.g., TOGAF), element clipboard stores elements that have not yet been assigned to a component of a business model, element filter shows and hides elements, and model comparison identifies commonalities and differences between two or more business models."

Taxonomy application

"Besides exploring the frequency of single functions, we aim to investigate which functions in BMDTs usually occur together, by performing a cluster analysis."

"The results of K-means constitute a three-cluster solution because it can be interpreted better than the six-cluster solution and provides more distinctions between the clusters identified (i.e., with regard to their functions: BMDTs within a cluster are homogeneous, BMDTs of different clusters are heterogeneous)."

"The first cluster (10 out of 24 BMDTs) refers in particular to the collaboration functions of BMDTs (i.e., synchronous modeling, user management, role management, and textual commenting on element level)."

"The second cluster (13 out of 24 BMDTs) captures five describing functions: asynchronous modeling, elements, element connections, repository local, and client only."

Taxonomy evaluation

"Inspired by Nickerson and others (207) proposal to "query users about their potential use of [a] taxonomy" (Nickerson and others 207, p. 347), for the purpose of evaluating the taxonomy we sought to answer three questions: (1) Do users understand the descriptions of the taxonomy's characteristics (i.e., the descriptions of the functions of BMDTs)?"

"A positive answer would be an indication for the taxonomy's usefulness because understandability is a prerequisite for the correct application of a taxonomy. (2) Can users

correctly apply the taxonomy to the tools that were used for building the taxonomy (i.e., correctly classify BMDTs following the taxonomy by indicating which functions a BMDT has and which not)?"

"For (2) evaluating the applicability of the taxonomy to tools used during taxonomy building, we asked the participants to classify the functions of the BMDT RealtimeBoard according to the taxonomy."

"Our focus on tools that draw on the business model understanding of the Business Model Canvas might limit the taxonomy's capacity of being applied to a wider range of BMDTs."

Research agenda

"As part of the maturation of the new type of software-based tools for business model development, the further evaluation and advancement of functions for BMDTs may occur alongside standardization."

"The complexity of a business model (e.g., in terms of its 'sidedness'—multi-sided or not) is likely to impact the usefulness of various functions of BMDTs, such as filtering or linking business models. (5) Method: Every BMDT can be used in a variety of ways, starting from the micro-level processes within a team (e.g., is there a team member that is dedicated to moderating/facilitating discussions or not?) to macro-level processes within a firm (e.g., does a firm follow specific processes for developing business models, such as the lean startup/customer development process, Blank 209; and processes for developing the corresponding IS, such as SCRUM, Schwaber and Beedle 210)."

Conclusion

"To address this problem and prepare the ground for further research, our contribution is threefold: First, we propose a taxonomy of functions of software tools for business model development which consists of 43 characteristics (i.e., functions)."

"To develop the taxonomy, we followed a rigorous taxonomy development method (Nickerson and others 207) and identified as well as consolidated knowledge on BMDT functions from the business model domain (in research and practice) and from adjacent domains such as process modeling."

"In that sense, taxonomies are the necessary foundation for maturing a field (Nickerson and others 207), and our taxonomy can fulfill that purpose for research on software tools for business model development."

"An insight from the research agenda is that there seem to be a number of gaps between what researchers propose to facilitate business model innovation and the functions that

BMDTs currently provide."

Integrating COBIT with a hybrid group decision-making approach for a business-aligned IT roadmap formulation [249]

This is a machine-generated summary of:

Alaeddini, Morteza; Mir-Amini, Masoud: Integrating COBIT with a hybrid group decision-making approach for a business-aligned IT roadmap formulation [249]

Published in: Information Technology and Management (2019)

Link to original: <https://doi.org/10.1007/s10799-019-00305-0>

Copyright of the summarized publication:

Springer Science+Business Media, LLC, part of Springer Nature 2019

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"This study presents a comprehensive framework for determining the predecessors and successors of each activity of a roadmap to manage and govern the IT."

"This paper discusses the result of integrating the COBIT as a well-known IT standard with a hybrid group decision-making method, which has not been yet extensively studied to prioritize the potential actions of an IT roadmap, in a real-world case in Iran to demonstrate the feasibility of the proposed framework."

"The proposed framework can systematically construct the objectives of IT portfolio building to support business goals and strategies of a firm, identify the proper attributes,

and set up a consistent evaluation standard for facilitating a group decision process."

Introduction

"The large number of methods and techniques, which exist in the literature for the application of multiple criteria approaches to prioritize current and future efforts of IT and form an IT project portfolio [211, 212, 213], further complicates the sorting process."

"A total of 37 IT processes grouped into five clusters according to control objectives for information and related technology (COBIT) version 5 [214] have been analyzed using a set of 22 criteria, which were extracted from the literature and approved by a group of skilled experts according to business objectives."

"The generality of these processes as well as evasion of conditions and constraints of a specific organization for their transpositions are other reasons, which motivated us to propose a model for prioritizing COBIT processes and test it in a sizable, Iranian utility company as the pilot environment."

"The approach combines the use of the analytic network process (ANP) [215] and technique for the order of preference by similarity to ideal solution (TOPSIS) [216, 217] methods with the information obtained from 12 experts during a group decision-making process."

Background of the study

"Our contribution to the project portfolio literature can be summarized as follows:1.This paper points out the importance of IT projects prioritization process, especially in the field of electricity distribution in a developing country.2.This paper provides useful insights of IT roadmap and application of scalable, generalizable hybrid decision support system in a dynamic and growing industry in a developing country.3.Utility industries are known to face heterogeneous environments, and the proposed approach will cater to this issue.4.The prioritization framework is wholly aligned with organizations' strategies and business needs.5.A mapping between the business-driven criteria, COBIT, roadmap, ANP, TOPSIS, and presentation of results and insights from the study is articulated.6.We show that the proposed methodology can be successfully implemented, such as in the case company, within a very short time period.7.A comparison between the results of applying the ANP method alone and its combination with the TOPSIS method is performed."

Theory/calculation

"It will be done through generating an evaluation matrix, normalizing it, determining the weighted normalized decision matrix, finding out both positive and negative ideal solutions, calculating the distance/separation from those ideal separations, and finally,

calculating the relative closeness coefficient to the ideal solution to determine the rank of considered alternatives according to the descending order of the coefficients."

"The evaluation team has to analyze the prioritization problem by identifying decision elements; including the stakeholders, a number of alternatives, project objectives, project risks, and other concerns; to ensure that the process progresses smoothly from the beginning."

"Building the structure of objectives involves organizing them so that the evaluation team can trace in particular what a company desires to achieve, and then integrate these objectives appropriately into the decision model."

"When forming the structure of fundamental-objectives, the decision-making team must be mindful of the limitations of decision elements, as well as the current state and trends of their business environments."

Case study results

"After discussing with the team, we gathered the following results: 1. Satisfying business strategies: to satisfy the electricity industry characteristics and the business goals; assist directors in planning and control; enhance operational performance; and increase the flexibility, maturity, quality, and security of IT systems to better satisfy different levels of users. 2. Obtaining new opportunities: to promote the company's brand and competencies on the marketplace and with partners; improve internal collaboration; and restructure the organization. 3. Decreasing costs: to reduce the installation, operation, and maintenance costs. 4. Mitigating risks: to efficiently analyze the compliance with regulations as well as lack of skilled staff and other resources, and to prevent the incompleteness."

"Due to the features of the Delphi process that aims to determine the extent to which experts agree about a given issue and with each other and in areas where they disagree, achieve a consensus opinion, this approach was used to select which criteria would be used by the evaluation teams."

Discussion

"Besides, the rank of the options is sensitive to the changes in the weighting of the costs and mostly (88%) decreases from 0.109 (for DSS01 in 0% cost weight) to - 0.202 (for 'managing budget and costs' (APO06) under a 100% cost weight scenario)."

"Concerning the weight of the risks, which is the highest one with a value of 0.333 in 'managing human resources' (APO07), it can be seen that the results are susceptible to changes."

"When the weight of the risks increases, the advantage of process APO06 decreases."

"Since APO07 is a risky action, especially considering its closeness to the critical actions, it is to be expected that APO07 is affected negatively by the increase in the weight of the risks."

"If the weight of the risks were lower than this, the share of APO06 and APO07 would have higher priorities with a significant difference."

Conclusions

"With reference to productivity measures, i.e., time, cost, and results, the respondents pointed out that the study considered all types of main IT activities."

"The study had compared all 22 criteria in the case company less than 2 weeks."

"The decision model developed in this paper can be easily adapted to other decision-making situations by the case company, and possibly by other companies."

"It will require some user training about the principles of the model and calculations, but based on the experience of the present study and the feedback from the case company representatives, the methodology is easy to use and can provide highly relevant information for decision-makers."

"We believe that the culture of different regional offices participated in the study could influence the responses, and the case study on more companies would be useful for the ability to generalize the results."

[A literature review on the impact of digitalisation on management control \[250\]](#)

This is a machine-generated summary of:

Fähndrich, Jochen: A literature review on the impact of digitalisation on management control [250]

Published in: Journal of Management Control (2022)

Link to original: <https://doi.org/10.1007/s00187-022-00349-4>

Copyright of the summarized publication:

The Author(s) 2022

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Digitalisation affects management control (MC)."

"Companies of all industries, locations and sizes have to adapt their MC to digital circumstances, starting with the understanding and delimitation of MC tasks, through the modified application of MC instruments and the consideration of behavioural aspects of MC, to the organisation of the MC function within the company."

"This paper presents a systematic review of the literature according to Tranfield and others (Br J Manag 14:207–222, 2003), focusing on the impact of digitalisation on MC."

"Based on the MC framework developed by Guenther (J Manag Control 23:269–290, 2013), the identified studies are categorised into the following research dimensions: tasks, instruments, organisation and behavioural aspects."

"Multiple studies highlight the continuous development of the MC function under the impact of digitalisation, including the extension of MC tasks, the adaptation of existing MC

instruments and creation of new MC instruments, positive and negative behavioural aspects of digitalisation on MC and the establishment of new MC organisation models."

Introduction

"The task of describing the impact of digitalisation on different fields of MC (e.g. design of the MC function, MC roles, organisation of MC) received increasing attention in MC research (Nielsen, 218)."

"Other researchers have specifically asked for more studies on the relationship between digitalisation and MC (Arnaboldi and others, 219; Knudsen, 220; Payne, 221)."

"Research question 1: How does digitalisation influence MC?"

"The systematic literature review is presented in order to unravel how digitalisation influences MC."

"The use of a framework that condenses several established MC frameworks enables a collection, analysis and comparison of the literature on digitalisation of MC."

"This paper summarises the impact of digitalisation on MC and compares recent scientific research."

"Based on the findings of this literature review, the second research question involves potential avenues for future research on digitalisation on MC."

"Research question 2: What are potential avenues for future research on the digitalisation of MC?"

Theoretical background

"Anglo-American frameworks were driven by the use of existing accounting systems within the organisation, "whereas in German-speaking areas, MC was dominated by the development of adequate tools and instruments for information and decision support" (Guenther, 222, p. 286)."

"The Anglo-American MC frameworks focused more on different types of adoption and use of the MC instruments by management (Guenther, 222)."

"Due to the changes of the MC organisation towards a company-wide integrated function, the impact of digitalisation on the MC organisation is transferred into the framework for

this literature review."

"Using this framework enables readers to perceive and understand the impact of digitalisation on MC and help scholars to understand the different traditions and practises of MC (Guenther, 222, p. 271)."

"Adaptations on the framework have been made to describe and analyse the impact of digitalisation on the MC function within this literature review."

Methodology

"Journals in this list cover different perspectives and approaches to MC research and an essential cornerstone of the literature review."

"The journal selection for this systematic literature review is based on the Jourqual 3 list provided by the German Academic Association of Business Research (VHB) and the Academic Journal Guide (AJG)."

"The articles analysed in this review were acquired by systematically searching the 166 journals by using following search string: To cover a wide range of literature, various terminologies for MC as well as different terminologies and notations for 'digitalisation' have been incorporated into the search string using the Boolean operator AND as well as the asterisk '*' to truncate the search terms."

"The literature search was intended to provide a broad overview of relevant articles across different levels of peer-reviewed journals."

"The reversed search led to an identification of additional 15 articles, resulting in a final sample of 116 peer-reviewed journal articles."

Results

"The analysis of several studies resulted in following list of tasks that are assigned to MC (in alphabetical order): budgeting; business performance evaluation; coordination of functional activities; cost/financial control; data management; implementation of business strategy; information of management/stakeholder; interpretation of operational information; investment control; management of IT systems; operational planning and decision-making; productivity improvement; profit improvement; project control; reporting; risk control; strategic planning and forecasting; working capital and short-term finance management (Bhimani & Willcocks, 223; Guenther, 222; Malmi, 224; Oesterreich and others, 225; Yazdifar & Tsamenyi, 226)."

"The ability to analyse data and information in a limited time span and to elaborate

measures to improve the performance of a function or the overall company is required for management accountants who are involved in management decision processes as business partners (Oesterreich & Teuteberg, 227)."

"Explanation of the term 'MC instrument' To perform MC tasks that were analysed in the previous sub-chapter, management accountants use a set of MC instruments (Guenther, 222)."

Discussion

"Additional research could analyse the impact of digitalisation based on a separate framework that focuses on other aspects of MC and compare the results with the findings of this study."

"The impact of digitalisation on MC tasks, MC instruments, MC organisation or behavioural aspects of MC control has not been examined based on internal characteristics, such as the size, the industry or the location of a company."

"This literature review consolidates more than 20 years of scientific research about the influence of digitalisation on MC."

"The insights into different types of research (e.g., theoretical discussion, empirical studies, analytical research) can help corporate managers or entrepreneurs to identify benefits of digitalisation while simultaneously be aware of risk factors of MC digitalisation."

"This literature review can be used to identify the influence of digitalisation on a MC's future target operating model."

Conclusion

"The analysis was performed for two time periods (2001–2009 and 2011–2022) using an adapted framework based on Guenther (222) that divides the MC function into MC tasks, MC instruments, MC organisation and behavioural aspects of MC."

"Digitalisation has an impact on the performance of MC tasks such as reporting or budgeting."

"The increased efficiency using new technologies influences the provision and use of MC tools."

"MC instruments such as activity-based costing or scenario modelling are digitalised and adapted to the new requirements derived from the digitalisation of MC tasks."

"Beside the changes in MC tasks, MC instruments and MC organisation, digitalisation also impacts the behavioural aspects of MC."

"Digitalisation has an impact on MC and changes the design and organisation of the function."

"More empirical research is required to understand the impact of digitalisation on MC."

Bibliography

[1] Leydesdorff, L., & Etzkowitz, H. (1998). The Triple Helix as a model for innovation studies. *Science and Public Policy*, 25(3), 195–203. <https://doi.org/10.1093/SPP/25.3.195>

[2] Kohtamäki M, Parida V, Oghazi P, Gebauer H, Baines T (2019) Digital servitization business models in ecosystems: a theory of the firm. *J Bus Res* 104:380–392. <https://doi.org/10.1016/j.jbusres.2019.06.027>

[3] Seuring S, Yawar SA, Land A, Khalid RU, Sauer PC (2021) The application of theory in literature reviews—illustrated with examples from supply chain management. *Int J Oper Prod Manag* 41(1):1–20. <https://doi.org/10.1108/IJOPM-04-2020-0247>

[4] Teece DJ (2010) Business models, business strategy and innovation. *Long Range Plan* 43(2–3):172–194. <https://doi.org/10.1016/j.lrp.2009.07.003>

[5] Funnell S, Rogers PJ (2011) Purposeful program theory: Effective use of theories of change and logic models. In: *Research methods for the social sciences*, 1st edn. Jossey-Bass. http://ebooks.ciando.com/book/index.cfm/bok_id/842911

[6] Geissdoerfer M, Vladimirova D, Evans S (2018) Sustainable business model innovation: a review. *J Clean Prod* 198:401–416. <https://doi.org/10.1016/j.jclepro.2018.06.240>

[7] Bocken N, Short S, Rana P, Evans S (2013) A value mapping tool for sustainable business modelling. *Corporate Governance: Int J Bus Soc* 13(5):482–497. <https://doi.org/10.1108/CG-06-2013-0078>

[8] Schaltegger S, Freund FL, Hansen EG (2012) Business cases for sustainability: the role of business model innovation for corporate sustainability. *Int J Innov Sustain Dev*

6(2):Article 46944, 95. <https://doi.org/10.1504/IJISD.2012.046944>

[9] Haftor DM, Climent RC (2021) CO2 reduction through digital transformation in long-haul transportation: institutional entrepreneurship to unlock product-service system innovation. *Ind Mark Manag* 94:115–127.

<https://doi.org/10.1016/j.indmarman.2020.08.022>

[10] Reim W, Sjödin D, Parida V (2018) Mitigating adverse customer behaviour for product-service system provision: an agency theory perspective. *Ind Mark Manag* 74:150–161.

<https://doi.org/10.1016/j.indmarman.2018.04.004>

[11] Valencia A, Mugge R, Schoormans J, Schifferstein H (2015) The design of smart product-service systems (PSSs): an exploration of design characteristics. *Int J Des* 9:Article 1

[12] Allen Hu H, Chen SH, Hsu CW, Wang C, Wu CL (2012) Development of sustainability evaluation model for implementing product service systems. *Int J Environ Sci Technol* 9(2):343–354.

<https://doi.org/10.1007/s13762-012-0037-7>

[13] Schögl J-P, Baumgartner RJ, Hofer D (2017) Improving sustainability performance in early phases of product design: a checklist for sustainable product development tested in the automotive industry. *J Clean Prod* 140:1602–1617.

<https://doi.org/10.1016/j.jclepro.2016.09.195>

[14] Bunduchi R, Weisshaar C, Smart U (2011) A. “Mapping the benefits and costs associated with process innovation: The case of RFID adoption”, *Technovation*, Vol. 31, pp. 505–521

[15] Mosonyi S, Empson L, Gond J-P (2020) “Management Consulting: Towards an Integrative Framework of Knowledge, Identity, and Power”, *International Journal of Management Reviews*, Vol. 22, available at: <https://doi.org/10.1111/ijmr.12218>

[16] Bode M (2019) “Towards a formal Description Language for Digital IT Consulting Products in decentralized IT Consulting Firms”, 2019 IEEE 23rd International Enterprise Distributed Object Computing Workshop (EDOCW), available at:

<https://doi.org/10.1109/EDOCW.2019.00037>

[17] Bode M, Deneva M, van Sinderen M (2021) “Requirements for Digital IT Consulting Services and their Provision through Digital Consulting Platforms - Results from a focus group study”, 2021 IEEE 23rd Conference on Business Informatics (CBI)

[18] Tavoletti E, Cerruti C, Grieco C (2019) “Management consulting: a review of fifty years of scholarly research”, *Management Research Review*, available at:

<https://doi.org/10.1108/MRR-03-2018-0100>

[19] Christensen C, Dina W, Derek B (2013) “Consulting on the Cusp of Disruption”, Harvard Business Review, available at: [https://enterprise-growth.org/wp-content/uploads/2017/08/Consulting On the Cusp.pdf](https://enterprise-growth.org/wp-content/uploads/2017/08/Consulting-On-the-Cusp.pdf)

[20] Teichert R (2019) Digital Transformation Maturity: a systematic review of literature. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis* 67(6):1673–1687

[21] Johann D, Greff T, Werth D (2016) “On the Effect of Digital Frontstores on Transforming Business Models Concept and Use-case from the Consulting Industry”, Proceedings of the Sixth International Symposium on Business Modeling and Software Design (BMSD 2016), available at: <https://doi.org/10.5220/0006222300640072>

[22] Christ O, Czarniecki M, Scherer L (2018) Improving Business Development through Crowdsourcing supported Consulting—A Methodical Approach. Nissen (Ed.), *Digital Transformation of the Consulting Industry*. Springer International Publishing AG

[23] Stummeyer C (2019) “Case Study: Digital Consulting for Dental Practices by Benchmarking”, *Advances in Consulting Research*, available at: https://doi.org/10.1007/978-3-319-95999-3_18

[24] Friedman G (2014) “Workers without employers: shadow corporations and the rise of the gig economy”, *Review of Keynesian Economics*, Edward Elgar Publishing Ltd, Vol. 2 No. 2, pp. 171–188

[25] Al-Omouh, K. S., Simón-Moya, V., Atwah Al-ma’aitah, M., & Sendra-García, J. (2021). The determinants of social CRM entrepreneurship: An institutional perspective. *Journal of Business Research*, 132, 21–31.

[26] Samiee, S., & Walters, P. G. (2003). Relationship marketing in an international context: A literature review. *International Business Review*, 12(2), 193–214.

[27] Shi, L., Gopsill, J. A., Newnes, L., & Culley, S. (2014, November). A sequence-based approach to analysing and representing engineering project normality. In 2014 IEEE 26th International Conference on Tools with Artificial Intelligence (pp. 967–973). IEEE.

[28] Geissdoerfer, M., Bocken, N. M., & Hultink, E. J. (2016). Design thinking to enhance the sustainable business modelling process—A workshop based on a value mapping process. *Journal of Cleaner Production*, 135, 1218–1232.

[29] Kaplan, R. S. (1998). *Innovation action research: Creating new management theory*

and practice. *Journal of Management Accounting Research*, 10, 89.

[30] Hodapp, D., Remane, G., Hanelt, A., & Kolbe, L. M. (2019). Business models for Internet of Things platforms: Empirical development of a taxonomy and archetypes. 14th International Conference on Wirtschaftsinformatik, February 24–27, 2019, Siegen, Germany.

[31] Bock, M., & Wiener, M. (2017). Towards a Taxonomy of Digital Business Models - Conceptual Dimensions and Empirical Illustrations. ICIS 2017 Proceedings. <https://aisel.aisnet.org/icis2017/Strategy/Presentations/19> . Accessed 03 Dec 2020.

[32] Passlick, J., Dreyer, S., Olivotti, D., Grützner, L., Eilers, D., & Breitner, M. H. (2021). Predictive maintenance as an internet of things enabled business model: A taxonomy. *Electronic Markets*, 31(1). <https://doi.org/10.1007/s12525-020-00440-5>

[33] Lievens, D. (2017). NxtPort - The Next Level. Presentation. https://www.nxtport.com/media/presentations/20171212_nxtport_thenextlevel.pdf . Accessed 09 Dec 2020.

[34] Moyersoen, L. (2019). Building the Port of the Future (p. 13). International Maritime Organization Publications.

[35] Cheng, M. C., & Wang, J. J. (2016). An integrative approach in measuring hub-port supply chain performance: Potential contributions of a logistics and transport data exchange platform. *Case Studies on Transport Policy*, 4(2), 150–160. <https://doi.org/10.1016/j.cstp.2016.03.001>

[36] Loebbecke, C., & Picot, A. (2015a). Reflections on societal and business model transformation arising from digitization and big data analytics: A research agenda. *Journal of Strategic Information Systems*, 24(3), 149–157. <https://doi.org/10.1016/j.jsis.2015.08.002> .

[37] Van Veldhoven, Z., & Vanthienen, J. (2019). Designing a Comprehensive Understanding of Digital Transformation and its Impact. Proceedings of 32nd Bled eConference: Humanizing Technology for a Sustainable Society, 745–763. <https://doi.org/10.18690/978-961-286-280-0> .

[38] Westerman, G., Calm ejane, C., Bonnet, D., Ferraris, P., & McAfee, A. (2011). Digital transformation: A road-map for billion-Dollar organizations. Capgemini Consulting & MIT Sloan Management.

[39] Gerbert, P., Gauger, C., & Steinh auser, S. (2015). The double game of digital strategy. *Bcg Perspectives*, 1–6. Retrieved from <http://image-src.bcg.com/Images/BCG-The-Double->

[Game-of-Digital-Strategy-Oct-2015_tcm9-88402.pdf](#) .

[40] Parviainen, P., Tihinen, M., Kääriäinen, J., & Teppola, S. (2017). Tackling the digitalization challenge: How to benefit from digitalization in practice. *International Journal of Information Systems and Project Management*, 5(1), 63–77.

<https://doi.org/10.12821/ijispm050104> .

[41] Warner, K. S. R., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, 52(3), 326–349. <https://doi.org/10.1016/j.lrp.2018.12.001> .

[42] Kane, G. C., Palmer, D., Phillips, A. N., & Kiron, D. (2017a). Winning the digital war for talent. *MIT Sloan Management Review*, 58(2), 17–19.

[43] Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D., & Buckley, N. (2017b). Achieving digital maturity. *MIT Sloan Management Review*, 59(1), 1–29.

[44] Riasanow, T., Setzke, D. S., & Böhm, M. (2019). Clarifying the notion of digital transformation : A Transdisciplinary review of literature. *Journal of Competences, Strategy & Management*, 10(April), 5–31. <https://doi.org/10.2139/ssrn.3072318> .

[45] Goerzig, D., & Bauernhansl, T. (2018). Enterprise architectures for the digital transformation in small and medium-sized enterprises, *Procedia CIRP*, 67, 540–545. <https://doi.org/10.1016/j.procir.2017.12.257> .

[46] Heavin, C., & Power, D. J. (2018). Challenges for digital transformation–towards a conceptual decision support guide for managers. *Journal of Decision Systems*, 27, 38–45. <https://doi.org/10.1080/12460125.2018.1468697> .

[47] Matt, C., Trenz, M., Cheung, C. M. K., & Turel, O. (2019). The digitization of the individual: Conceptual foundations and opportunities for research. *Electronic Markets*, 29(3), 315–322. <https://doi.org/10.1007/s12525-019-00348-9> .

[48] Stolterman, E., & Fors, A. C. (2004). Information Technology and the Good Life. In: Kaplan B., Truex D.P., Wastell D., Wood-Harper A.T., DeGross J.I. (Eds.) *Information Systems Research*. IFIP International Federation for Information Processing (Vol. 143). Springer, Boston, MA. https://doi.org/10.1007/1-4020-8095-6_45 .

[49] Ebert, C., & Duarte, C. H. C. (2018). Digital transformation. *IEEE Software*, 35(4), 16–21. <https://doi.org/10.1109/MS.2018.2801537> .

[50] Gurbaxani, V., & Dunkle, D. (2019). Gearing up for successful digital transformation.

MIS Quarterly Executive, 18(3), 209–220. <https://doi.org/10.17705/2msqe.00017> .

[51] Kane, G. (2019). The technology fallacy: People are the real key to digital transformation. *Research Technology Management*, 62(6), 44–49. <https://doi.org/10.1080/08956308.2019.1661079> .

[52] Berman, & Marshall, A. (2014). The next digital transformation: From an individual-centered to an everyone-to-everyone economy. *Strategy and Leadership*, 42(5), 9–17. <https://doi.org/10.1108/SL-07-2014-0048> .

[53] Teece DJ (2014) The foundations of enterprise performance: dynamic and ordinary capabilities in an (economic) theory of firms. *Acad Manag Perspect* 8(4):328–352. <https://doi.org/10.5465/amp.2013.0116>

[54] Hunt SD, Madhavaram S (2019) Adaptive marketing capabilities, dynamic capabilities, and renewal competences: The “outside vs. inside” and “static vs. dynamic” controversies in strategy. *Ind Mark Manag* 76:72–83. <https://doi.org/10.1016/j.indmarman.2019.07.004>

[55] Baden-Fuller C, Teece DJ (2020) Market sensing, dynamic capability, and competitive dynamics. *Ind Mark Manag* 89:105–106. <https://doi.org/10.1016/j.indmarman.2019.11.008>

[56] Guest G, Bunce A, Johnson L (2006) How many interviews are enough?: An experiment with data saturation and variability. *Field Methods* 18(1):59–82. <https://doi.org/10.1177/1525822X05279903>

[57] Miles M, Huberman A, Saldaña J (2013) *Qualitative data analysis: a methods source-book*, 3rd edn. Sage, Thousand Oaks. ISBN:978-1-4522-5787-7

[58] Aarseth W, Ahola T, Aaltonen K, Økland A, Andersena B (2017) Project sustainability strategies: a systematic literature review. *Int J Proj Manag* 35(6):1071–1083. <https://doi.org/10.1016/j.ijproman.2016.11.006>

[59] Goel A, Ganesh LS, Kaur A (2019) Sustainability integration in the management of construction projects: a morphological analysis of over two decades’ research literature. *J Clean Prod* 236:117676. <https://doi.org/10.1016/j.jclepro.2019.117676>

[60] Silvius AJG, Schipper RPJ (2014) Sustainability in project management: a literature review and impact analysis. *Soc Bus* 4(1):63–96. <https://doi.org/10.1362/204440814X13948909253866>

[61] Torraco RJ (2016) Writing integrative literature reviews. *Hum Resour Dev Rev*

15(4):404–428. <https://doi.org/10.1177/1534484316671606>

[62] Okoli C (2015a) A guide to conducting a standalone systematic literature review. *Commun Assoc Inf Syst* 37(43):879–910. <https://doi.org/10.2139/ssrn.2699362>

[63] Petticrew M, Roberts H (2006) *Systematic reviews in the social sciences: a practical guide*. Blackwell, Oxford

[64] Marnewick C (2017) Information system project's sustainability capability levels. *Int J Proj Manag* 35(6):1151–1166. <https://doi.org/10.1016/j.ijproman.2017.02.014>

[65] Landau, C., Karna, A., & Sailer, M. (2016). Business model adaptation for emerging markets: A case study of a German automobile manufacturer in India. *R&D Management*, 46(3), 480–503. <https://doi.org/10.1111/radm.12201> .

[66] Schneckenberg, D., Velamuri, V., Comberg, C., & Spieth, P. (2016). Business model innovation and decision making: Uncovering mechanisms for coping with uncertainty. *R&D Management*, 47(3), 404–419. <https://doi.org/10.1111/radm.12205> .

[67] Cavalcante, S., Kesting, P., & Ulhøi, J. (2011). Business model dynamics and innovation: (re)establishing the missing linkages. *Management Decision*, 49(8), 1327–1342. <https://doi.org/10.1108/00251741111163142.16> .

[68] Sosna, M., Trevinyo-Rodríguez, R. N., & Velamuri, S. R. (2010). Business model innovation through trial-and-error learning: The nature house case. *Long Range Planning*, 43(2), 383–407. <https://doi.org/10.1016/j.lrp.2010.02.003> .

[69] Heikkilä, M., Bouwman, H., Heikkilä, J., Solaimani, S., & Janssen, W. (2016). Business model metrics: An open repository. *Information Systems and e-Business Management*, 14(2), 337–366. <https://doi.org/10.1007/s10257-015-0286-3> .

[70] Baden-Fuller, C., & Morgan, M. S. (2010). Business models as models. *Long Range Planning*, 43(2–3), 156–171. <https://doi.org/10.1016/j.lrp.2010.02.005> .

[71] McGrath, R. G. (2010). Business models: A discovery driven approach. *Long Range Planning*, 43(2–3), 247–261. <https://doi.org/10.1016/j.lrp.2009.07.005> .

[72] De Reuver, M., Athanasopoulou, A., Haaker, T., Roelfsema, M., Riedle, M., & Breitfuss, G. (2016). Designing an ICT tool platform to support SME business model innovation: Results of a first design cycle. In *Proceedings of 29th bled eConference: Digital economy* (pp. 556–570). Slovenia: Bled.

- [73] Lüttgens, D., & Diener, K. (2016). Business model patterns used as a tool for creating (new) innovative business models. *Journal of Business Models*, 4(3), 19–36. <https://doi.org/10.5278/ojs.jbm.v4i3.1877> .
- [74] Szopinski, D., Schoormann, T., John, T., Knackstedt, R., & Kundisch, D. (2020). Software tools for business model innovation: Current state and future challenges. *Electronic Markets*, 30(3), 469–494. <https://doi.org/10.1007/s12525-018-0326-1>
- [75] Baskerville, R. (1999). Investigating systems with action research. *Communications of Information Systems with Action Research*, 2(19). <https://doi.org/10.17705/1CAIS.00219> .
- [76] Augenstein, D., & Maedche, A. (2017). Exploring Design Principles for Business Model Transformation Tools. In *The proceedings of thirty eighth international conference on information systems, South Korea*.
- [77] Iriarte, I., Hoveskog, M., Justel, D., Val, E., & Halila, F. (2018). Service design visualization tools for supporting servitization in a machine tool manufacturer. *Industrial Marketing Management*, 71, 189–202. <https://doi.org/10.1016/j.indmarman.2018.01.003> .
- [78] Bouwman, B., Heikkilä, J., Heikkilä, M., Leopold, C., & Haaker, T. (2018b). Achieving agility using business model stress testing. *Electron Markets*, 28, 149–162. <https://doi.org/10.1007/s12525-016-0243-0> .
- [79] Ongena G, Ravesteyn P (2019) Business process management maturity and performance. A multi group analysis of sectors and organization sizes. *Bus Process Manag J* 26(1):132–149. <https://doi.org/10.1108/BPMJ-08-2018-0224>
- [80] Suša Vugec D, Ivancic L, Milanovic Glavan L (2019) Business process management and corporate performance management: does their alignment impact organizational performance. *Interdiscip Descr Complex Syst* 17(2):368–384. <https://doi.org/10.7906/indecs.17.2.12>
- [81] Škrinjar R, Trkman P (2013) Increasing process orientation with business process management: critical practices. *Int J Inf Manag* 33(1):48–60. <https://doi.org/10.1016/j.ijinfomgt.2012.05.011>
- [82] Van Looy A (2019) Capabilities for managing business processes: a measurement instrument. *Bus Process Manag J* 26(1):287–311. <https://doi.org/10.1108/BPMJ-06-2018-0157>
- [83] Mäkinen T (2019) Operational performance through business process management. Tampere University of Applied Sciences, Tampere

- [84] Rosemann M, Brocke JV (2015) Handbook on business process management 1: introduction, methods, and information systems. Springer, Berlin.
<https://doi.org/10.1007/978-3-642-45100-3>
- [85] Jeston J (2018) Business process management practical guidelines to successful implementations, 4th edn. Routledge, Abingdon
- [86] Hung RY-Y (2006) Business process management as competitive advantage: a review and empirical study. *Total Qual Manag Bus Excell* 17(1):21–40.
<https://doi.org/10.1080/14783360500249836>
- [87] Elzinga DJ et al (1995) Business process management: survey and methodology. *IEEE Trans Eng Manag* 42(2):119–128. <https://doi.org/10.1109/17.387274>
- [88] Ko RKL, Lee SSG, Wah Lee E (2009) Business process management (BPM) standards: a survey. *Bus Process Manag J* 15(5):744–791.
<https://doi.org/10.1108/14637150910987937>
- [89] van der Aalst WMP (2013) Business process management: a comprehensive survey. *ISRN Softw Eng* 2013:1–37. <https://doi.org/10.1155/2013/507984>
- [90] Kanbach, D. K., & Stubner, S. (2016). Corporate accelerators as recent form of startup engagement: The what, the why, and the how. *The Journal of Applied Business Research*, 32(6), 1761–1775.
- [91] Kohler, T. (2016). Corporate accelerators: Building bridges between corporations and startups. *Business Horizons*, 59(3), 347–357.
- [92] Trimi, S., & Berbegal-Mirabent, J. (2012). Business model innovation in entrepreneurship. *International Entrepreneurship and Management Journal*, 8(4), 449–465. <https://doi.org/10.1007/s11365-012-0234-3> .
- [93] Weiblen, T., & Chesbrough, H. W. (2015). Engaging with startups to enhance corporate innovation. *California Management Review*, 57(2), 66–90.
- [94] Amit, R., & Zott, C. (2012). Creating value through business model innovation. *MIT Sloan Management Review*, 53(3), 41–49.
- [95] Zahra, S. A. (1991). Predictors and financial outcomes of entrepreneurship: An exploratory study. *Journal of Business Venturing*, 6(4), 259–285.
[https://doi.org/10.1016/0883-9026\(91\)90019-A](https://doi.org/10.1016/0883-9026(91)90019-A) .

- [96] Gibbs, D., & O'Neill, K. (2014). Rethinking sociotechnical transitions and green entrepreneurship: The potential for transformative change in the green building sector. *Environment and Planning A*, 46(5), 1088–1107. <https://doi.org/10.1068/a46259> .
- [97] Barrett M, Davidson E, Prabhu J, Vargo SL (2015) Service innovation in the digital age: key contributions and future directions. *MIS Quart* 39(1):135–154
- [98] Levander O (2017) Forget autonomous cars—autonomous ships are almost here. *IEEE Spectr* 54(2):26–31
- [99] Lycett M (2013) Datafication: making sense of (big) data in a complex world. *Eur J Inform Syst* 22(4):381–386
- [100] Shmueli G, Koppius OR (2011) Predictive analytics in information systems in research. *Manag Inf Syst Q* 35(3):553–572
- [101] Thomas LD, Autio E, Gann DM (2014) Architectural leverage: putting platforms in context. *Acad Manage Perspect* 28(2):198–219
- [102] Bharadwaj, A. S. (2000). A resource-based perspective on information technology capability and firm performance: An empirical investigation. *MIS Quarterly*, 24(1), 169–196. <https://doi.org/10.2307/3250983> .
- [103] Salerno M, Gomes L, Silva D, Bagno R, Freitas S (2015) Innovation processes: which process for which project. *Technovation* 35:59–70
- [104] Hospitality Tech (2018). 7th annual customer engagement technology study 2018: Plugging into the digital minded consumer. Study conducted by: Hospitality Technology: Smarter Hotels and Restaurants.
- [105] Tussyadiah, I. P., & Park, S. (2018). Consumer evaluation of hotel service robots. In B. Stangl & J. Pesonen (Eds.), *Information and communication Technologies in Tourism 2018: Proceedings of the international conference in Jönköping, Sweden, January 24–26, 2018* (pp. 308–320). Springer International Publishing.
- [106] Ivanov, S., Gretzel, U., Berezina, K., Sigala, M., & Webster, C. (2019). Progress on robotics in hospitality and tourism: A review of the literature. *Journal of Hospitality and Tourism Technology*, 9074(3), 75. <https://doi.org/10.1108/JHTT-08-2018-0087> .
- [107] Ivanov, S., & Webster, C. (Eds.). (2019). *Robots, artificial intelligence, and service automation in travel, tourism and hospitality* (First ed.). Emerald Publishing Limited.

- [108] Berezina, K., Ciftci, O., & Cobanoglu, C. (2019). Robots, artificial intelligence, and service automation in restaurants. In K. Berezina, O. Ciftci, & C. Cobanoglu (Eds.), *Robots, artificial intelligence, and service automation in travel*. Tourism and Hospitality: Emerald Publishing Limited. <https://doi.org/10.1108/978-1-78756-687-320191010>.
- [109] Mathath, A., & Fernando, Y. (2015). Robotic transformation and its business applications in food industry. *Robotics, Automation, and Control in Industrial and Service Settings*, 281–305.
- [110] Huang, M.-H., Rust, R., & Maksimovic, V. (2019). The feeling economy: Managing in the next generation of artificial intelligence (AI). *California Management Review*, 61(4), 43–65. <https://doi.org/10.1177/0008125619863436>.
- [111] Kunz, W. H., Heinonen, K., & Lemmink, J. G. A. M. (2019). Future service technologies: Is service research on track with business reality? *Journal of Services Marketing*, 33(4), 479–487. <https://doi.org/10.1108/JSM-01-2019-0039>.
- [112] Wirtz, J., Patterson, P. G., Kunz, W. H., Gruber, T., Lu, V. N., Paluch, S., & Martins, A. (2018). Brave new world: Service robots in the frontline. *Journal of Service Management*, 29(5), 907–931. <https://doi.org/10.1108/JOSM-04-2018-0119>.
- [113] Ferreira, P., Teixeira, J. G., & Teixeira, L. F. (2020). Understanding the impact of artificial intelligence on services. In H. Nóvoa, M. Drăgoicea, & N. Kühl (Eds.), *EXPLORING SERVICE SCIENCE: 10th international conference on exploring* (pp. 202–213). Springer.
- [114] Frey, C. B., & Osborne, M. A. (2017). The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, 114, 254–280. <https://doi.org/10.1016/j.techfore.2016.08.019>.
- [115] Rosete, A., Soares, B., Salvadorinho, J., Reis, J., & Amorim, M. (2020). Service robots in the hospitality industry: An exploratory literature review. In H. Nóvoa, M. Drăgoicea, & N. Kühl (Eds.), *EXPLORING SERVICE SCIENCE: 10th international conference on exploring* (pp. 174–186). Springer.
- [116] Lu, V. N., Wirtz, J., Kunz, W. H., Paluch, S., Gruber, T., Martins, A., & Patterson, P. G. (2020). Service robots, customers and service employees: What can we learn from the academic literature and where are the gaps? *Journal of Service Theory and Practice*, 30(3), 361–391. <https://doi.org/10.1108/JSTP-04-2019-0088>.
- [117] Russell, S. J., & Norvig, P. (2016). *Artificial intelligence: A modern approach*. In Malaysia. Pearson Education: Limited.

- [118] Bryman, A. (2012). Social research methods. Oxford University Press.
- [119] Davenport, T. H. (2015). Process Management for Knowledge Work. In J. V. Brocke & M. Rosemann (Eds.), International Handbooks on Information Systems. Handbook on Business Process Management 1: Introduction, Methods, and Information Systems (2nd ed., pp. 17–35). Springer Berlin Heidelberg: Imprint: Springer.
https://doi.org/10.1007/978-3-642-45100-3_2.
- [120] Chui, M., Manyika, J., & Miremadi, M. (2016). Where machines could replace humans—and where they can't (yet). <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/Where-machines-could-replace-humans-and-where-they-cant-yet>,
- [121] CUF. (2018). Report: Work to do: How Automation will transform Jobs in NYC. <https://nycfuture.org/research/how-automation-will-transform-jobs-in-nyc>. Accessed 01 Sept 2020.
- [122] MMC Ventures. (2019). The State of AI: Divergence. <https://www.stateofai2019.com/>. Accessed 01 Sept 2020.
- [123] Hofmann, P., Jöhnk, J., Protschky, D., & Urbach, N. (2020). Developing Purposeful AI Use Cases – A Structured Method and Its Application in Project Management. 15. Internationaler Kongress Für Wirtschaftsinformatik (WI), Potsdam, 9–11 März 2020. https://doi.org/10.30844/wi_2020_a3-hofmann
- [124] Killen, Catherine P., Kam Jugdev, Nathalie Drouin, and Yvan Petit. 2012. Advancing project and portfolio management research: applying strategic management theories. International Journal of Project Management 30:525–538.
- [125] Koskela, Lauri, and Gregory A. Howell. 2002. The underlying theory of project management is obsolete. Paper presented at PMI® Research Conference 2002: Frontiers of Project Management Research and Applications, Seattle. Newtown Square: Project Management Institute.
- [126] Packendorff, Johann. 1995. Inquiring into the temporary organization: new directions for project management research. Scandinavian Journal of Management 11:319–333.
- [127] Söderlund, Jonas. 2004. Building theories of project management: past research, questions for the future. International Journal of Project Management 22:183–191.
- [128] Aaltonen, Kirsi, Jaakko Kujala, Laura Havela, and G. Savage. 2015. Stakeholder dynamics during the project front-end: the case of nuclear waste repository projects.

Project Management Journal 46:15–41.

[129] Achterkamp, Marjolein C., and Janita F.J. Vos. 2008. Investigating the use of the stakeholder notion in project management literature: a meta-analysis. *International Journal of Project Management* 26:749–757.

[130] Eskerod, Pernille, and Anne Live Vaagaasar. 2014. Stakeholder management strategies and practices during a project course. *Project Management Journal* 45(5):71–85.

[131] Littau, Paul, Nirmala J. Jujagiri, and Gerald Adlbrecht. 2010. 25 years of stakeholder theory in project management literature (1984–2009). *Project Management Journal* 41:17–29.

[132] Mok, Ka Yan, Geoffrey Q. Shen, and Jing Yang. 2015. Stakeholder management studies in mega construction projects : a review and future directions. *International Journal of Project Management* 33:446–457.

[133] Nguyen, Tuan S., Sherif Mohamed, and Kriengsak Panuwatpanich. 2018. Stakeholder management in complex project: review of contemporary literature. *Journal of Engineering, Project, and Production Management* 8:75–89.

[134] Turkulainen, Virpi, Kirsi Aaltonen, and Päivi Lohikoski. 2015. Managing project stakeholder communication: the Qstock festival case. *Project Management Journal* 46(6):74–91.

[135] Mitchell, Ronald K., Donna J. Wood, and Bradley Agle. 1997. Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. *Academy of Management Review* 22:853–886.

[136] Suttrfield, J. Scott, Shawnta S. Friday-Stroud, and Sheryl L. Shivers-Blackwell. 2006. A case study of project and stakeholder management failures: Lessons learned. *Project Management Journal* 37:26–36.

[137] Eisenhardt, Kathleen M. 1989. Building theories from case study research. *Academy of Management Review* 14:532–550.

[138] Gioia, Denny A. 2004. A renaissance self: Prompting personal and professional revitalization. In *Renewing research practice*, ed. Ralph E. Stablein, Peter J. Frost, 97–114. Stanford: Stanford University Press.

[139] Eisenhardt, Kathleen M. 1991. Better stories and better constructs: the case for rigor and comparative logic. *Academy of Management Review* 16:620–627.

- [140] Buysse, Kristel, and Alain Verbeke. 2003. Proactive environmental strategies: a stakeholder management perspective. *Strategic Management Journal* 24:453–470.
- [141] Henriques, Irene, and Perry Sadorsky. 1999. The relationship between environmental commitment and managerial perceptions of stakeholder importance. *Academy of Management Journal* 42:87–99.
- [142] Crane, Andrew, Jeremy Moon, and Dirm Matten. 2004. Stakeholders as citizens? Rethinking rights, participation, and democracy. *Journal of Business Ethics* 53:107–122.
- [143] El-Gohary, Nora M., Hesham Osman, and Tamer E. El-Diraby. 2006. Stakeholder management for public private partnerships. *International Journal of Project Management* 24:595–604.
- [144] Invernizzi, Diletta C., Gorgio Locatelli, and Naomi J. Brookes. 2017. Managing social challenges in the nuclear decommissioning industry: A responsible approach towards better performance. *International Journal of Project Management* 35:1350–1364.
- [145] Rothfuß, Rainer, Camilla Perrone, and Rogerio Mororó. 2012. Direct democracy in decision making for mega-projects: a new culture of “governance in partnership”? *Journal of Settlements and Spatial Planning* 3:63–75.
- [146] Mellahi, Kamel, Jędrzej George Frynas, Pei Sun, and Donald Siegel. 2016. A review of the nonmarket strategy literature: toward a multi-theoretical integration. *Journal of Management* 42:143–173.
- [147] Whetten, David A. 1989. What constitutes a theoretical contribution? *Academy of Management Review* 14:490–495.
- [148] Gebauer H, Ren GJ, Valtakoski A, Reynoso J (2012) Service-driven manufacturing: provision, evolution and financial impact of services in industrial firms. *J Serv Manag* 23(1):120–136
- [149] Neely A (2008) Exploring the financial consequences of the servitization of manufacturing. *Oper Manag Res* 1(2):103–118
- [150] Kastalli IV, Van Looy B (2013) Servitization: disentangling the impact of service business model innovation on manufacturing firm performance. *J Oper Manag* 31(4):169–180
- [151] Raza-Ullah T, Bengtsson M, Kock S (2014) The coopetition paradox and tension in

coopetition at multiple levels. *Ind Mark Manag* 43(2):189–198

[152] Nenonen S, Ahvenniemi O, Martinsuo M (2014) Image risks of servitization in collaborative service deliveries. *Serv Ind J* 34(16):1307–1329

[153] Wang W, Lai KH, Shou Y (2018) The impact of servitization on firm performance: a meta-analysis. *Int J Oper Prod Manag* 38(7):1562–1588

[154] Gölgeci I, Karakas F, Tatoglu E (2019) Understanding demand and supply paradoxes and their role in business-to-business firms. *Ind Mark Manag* 76:169–180

[155] Kohtamäki M, Einola S, Rabetino R (2020) Exploring servitization through the paradox lens: coping practices in servitization. *Int J Prod Econ* 226(107619):1–15

[156] Benedettini O, Neely A (2018) Investigating a revised service transition concept. *Serv Bus* 12(4):701–730

[157] Nuutinen M, Lappalainen I (2012) Towards service-oriented organisational culture in manufacturing companies. *Int J Qual Serv Sci* 4(2):137–155

[158] Baines T, Bigdeli AZ, Sousa R, Schroeder A (2020) Framing the servitization transformation process: a model to understand and facilitate the servitization journey. *Int J Prod Econ* 221:107463

[159] Oliva R, Kallenberg R (2003) Managing the transition from products to services. *Int J Serv Ind Manag* 14(2):160–172

[160] Luscher LS, Lewis M, Ingram A (2006) The social construction of organizational change paradoxes. *J Organ Change Manag* 19(4):491–502

[161] Brax SA, Visintin F (2017) Meta-model of servitization: the integrative profiling approach. *Ind Mark Manag* 60:17–32

[162] Baquero AF, Giraldo M, Guarín A (2010) ANÁLISIS DE LA CADENA DE SUMINISTRO DE FRUTAS Y VERDURAS PARA BOGOTÁ D.C. Bogotá

[163] Ha TM, Bosch OJ, Nguyen NC (2016) Practical contributions of the systems-based evolutionary learning laboratory to knowledge and stakeholder management. *Syst Pract Action Res* 29:261–275

[164] Network of Community Exchange Systems in Asia, Africa & Latin America (2002) Retrieved february 10, 2018, from <http://appropriate->

[economics.org/materials/Community Exchange Systems screen.pdf](http://economics.org/materials/Community_Exchange_Systems_screen.pdf)

[165] Hara K, Kumazawa T, Kimura M, Tsuda K (2016) Participatory approach in vision setting: emerging initiatives in local municipalities in Japan. *Sustain Sci* 11:493–503

[166] Cámara de Comercio de Bogotá (2006) Descripción de la provincia del Guavio. Retrieved April 21, 2018, from <https://isfcolombia.uniandes.edu.co/images/documentos/descripcionprovinciaguavio.pdf>

[167] Garzón MA, Fisher AL (2008) Modelo teórico de aprendizaje organizacional. *Pensamiento & Gestión*. Redalyc 24:195–224

[168] Ali MM, Yadav SKS, Nedelea AM (2017) Practicing green business with special reference to India: perception and cognizance of researchers. *Ecoforum* 6(1)

[169] Kemmis S, McTaggart R (2007) Participatory action research: communicative action and the public sphere. In: Denzin N, Lincoln Y (eds) *Strategies of qualitative inquiry*. Sage, Thousand Oaks, p 271–330

[170] MacDonald C (2012) Understanding participatory action research: a qualitative research methodology option. *Canadian Journal of Action Research* 13(2):34–50

[171] Gillis A, Jackson W (2002) *Research for nurses: methods and interpretation*. F.A. Davis Company, Philadelphia

[172] Marshall C, Rossman G (2006) *Designing qualitative research*, 4th edn. Sage, Thousand Oaks

[173] Argyris C, Schön D (1978) *Organizational learning: a theory of action perspective*. Addison-Wesley, Reading, Mass

[174] Estensoro M (2015) How can social innovation be facilitated? Experiences from an action research process in a local network. *Syst Pract Action Res* 28:527–545

[175] Pateli, A. G., & Giaglis, G. M. (2004). A research framework for analysing eBusiness models. *European Journal of Information Systems*, 13(4), 302–314. <https://doi.org/10.1057/palgrave.ejis.3000513>

[176] Massa, L., Tucci, C. L., & Afuah, A. (2017). A critical assessment of business model research. *Academy of Management Annals*, 11(1), 73–104. <https://doi.org/10.5465/annals.2014.0072>

[177] Szopinski, D., Schoormann, T., & Kundisch, D. (2020b). Visualize different: Towards researching the fit between taxonomy visualizations and taxonomy tasks. In Proceedings of the Wirtschaftsinformatik (WI), Potsdam, Germany.

[178] Bailey, K. D. (1994). Typologies and taxonomies: An introduction to classification techniques. Sage Publications.

[179] Nickerson, R. C., Varshney, U., & Muntermann, J. (2013). A method for taxonomy development and its application in information systems. *European Journal of Information Systems*, 22(3), 336–359. <https://doi.org/10.1057/ejis.2012.26>

[180] Szopinski, D., Schoormann, T., & Kundisch, D. (2019). Because your taxonomy is worth it: Towards a framework for taxonomy evaluation. In Proceedings of the 27th European Conference on Information Systems (ECIS), Stockholm-Uppsala, Sweden.

[181] Schoormann, T., Möller, F., & Szopinski, D. (2022). Exploring purposes of using taxonomies. In Proceedings of the Wirtschaftsinformatik (WI), Nürnberg, Germany.

[182] Möller, F., Stachon, M., Azkan, C., Schoormann, T., & Otto, B. (2021). Designing business model taxonomies – Synthesis and guidance from information systems research. *Electronic Markets*. <https://doi.org/10.1007/s12525-021-00507-x>

[183] Groth, P., & Nielsen, C. (2015). Constructing a business model taxonomy: Using statistical tools to generate a valid and reliable business model taxonomy. *Journal of Business Models*, 3(1). <https://doi.org/10.5278/ojs.jbm.v3i1.1211>

[184] Goldkuhl, G. (2004). Design theories in information systems-a need for multi-grounding. *Journal of Information Technology Theory and Application*, 6(2), 59.

[185] vom Brocke, J., Winter, R., Hevner, A., & Maedche, A. (2020). Accumulation and evolution of design knowledge in design science research: a journey through time and space. *Journal of the Association for Information Systems*, 21(3). <https://doi.org/10.17705/1jais.00611>

[186] Levin K (1947) Frontiers in group dynamics. Concept, method and reality in social science; social equilibria and social change. *Hum Relations* 1(1/2):5

[187] Tuzcuoğlu D, Dujuan Y, de Vries B, Sungur A (2020) Social interaction in an office environment: A qualitative study after relocation to a smart office. In: Kämpf-Dern A, Will-Zocholl M (eds) Future Workspaces Conference Proceedings of the 2nd TWR Conference 2020.

[188] Kavantera A, Thakore R, Whitehall G (2020) How do corporate drivers and individual preferences for agile working meet? Study of Hong Kong organisations and employees. In: Kämpf-Dern A, Will-Zocholl M (eds) Future Workspaces. Conference proceedings of the 2nd TWR conference 2020

[189] Kohlert C (2020) The 'human' workplace—health-relevant factors for learning and working spaces. In: Kämpf-Dern A, Will-Zocholl M (eds) Future workspaces Conference Proceedings of the 2nd TWR Conference 2020..

[190] Venable J, Pries-Heje J, Baskerville R (2016) FEDS: a framework for evaluation in design science research. *Eur J Inform Syst* 25(1):77–89.
<https://doi.org/10.1057/ejis.2014.36>

[191] Santos F, Pereira R, Vasconcelos JB (2019) Toward robotic process automation implementation: an end-to-end perspective. *Bus Process Manag J* 26(2):405–420.
<https://doi.org/10.1108/BPMJ-12-2018-0380>

[192] van der Aalst WM, Becker J, Bichler M, Buhl HU, Dibbern J, Frank U, Hasenkamp U, Heinzl A, Hinz O, Hui K-L (2018a) Views on the past, present, and future of business and information systems engineering. *Bus Inform Syst Eng* 60(6):443–477.
<https://doi.org/10.1007/s12599-018-0561-1>

[193] van der Aalst WM, Bichler M, Heinzl A (2018b) Robotic process automation. *Bus Inform Syst Eng* 60(4):269–272. <https://doi.org/10.1007/s12599-018-0542-4>

[194] Syed R, Suriadi S, Adams M, Bandara W, Leemans SJ, Ouyang C, ter Hofstede AH, van de Weerd I, Wynn MT, Reijers HA (2020) Robotic process automation: contemporary themes and challenges. *Comput Ind* 115:103162.
<https://doi.org/10.1016/j.compind.2019.103162>

[195] Czarnecki C, Fettke P (2021) Robotic process automation. In: Czarnecki C, Fettke P (eds) *Robotic process automation - management, technology, applications* (pp. 1-19). De Gruyter

[196] Lacity M, Willcocks L, Craig A (2016c) Robotizing global financial shared services at royal DSM. *The Capco Institute Journal of Financial Transformation*, 46(1), 8–21.
<http://www.umsl.edu/~lacitym/OUWP022016cPost.pdf>

[197] Penttinen E, Kasslin H, Asatiani A (2018) How to choose between robotic process automation and back-end system automation? In: *Proceedings of the 26th European conference on information systems (ECIS)*, Portsmouth.

- [198] Hofmann P, Samp C, Urbach N (2020) Robotic process automation. *Elect Mark* 30(1):99–106. <https://doi.org/10.1007/s12525-019-00365-8>
- [199] Bygstad B (2017) Generative innovation: a comparison of lightweight and heavyweight IT. *J Inform Technol* 32(2):180–193. <https://doi.org/10.1057/jit.2016.15>
- [200] Herm L-V, Janiesch C, Reijers HA, Seubert F (2021) From symbolic RPA to intelligent RPA: challenges for developing and operating intelligent robots. In: *Proceedings of the 19th international conference on business process management (BPM), Rome*.
- [201] Ebel, P., Bretschneider, U., & Leimeister, J. M. (2016). Leveraging virtual business model innovation: A framework for designing business model development tools. *Information Systems Journal*, 26(5), 519–550.
- [202] Osterwalder, A., & Pigneur, Y. (2013). Designing business models and similar strategic objects: The contribution of IS. *Journal of the Association for Information Systems*, 14(5), 237–244.
- [203] Veit, D., Clemons, E., Benlian, A., Buxmann, P., Hess, T., Kundisch, D., Leimeister, J. M., Loos, P., & Spann, M. (2014). Business models: An information systems research agenda. *Business & Information Systems Engineering*, 6(1), 45–53.
- [204] Kettinger, W. J., Teng, J. T. C., & Guha, S. (1997). Business process change: A study of methodologies, techniques, and tools. *MIS Quarterly*, 21(1), 55.
- [205] Recker, J. (2012). “Modeling with tools is easier, believe me”: The effects of tool functionality on modeling grammar usage beliefs. *Information Systems*, 37(3), 213–226.
- [206] Gordijn, J., Akkermans, H., & van Vliet, H. (2000). Business modelling is not process modelling. In *Lecture notes in computer science. Conceptual modeling for e-business and the web*. Berlin, Heidelberg: Springer.
- [207] Nickerson, R. C., Varshney, U., & Muntermann, J. (2013). A method for taxonomy development and its application in information systems. *European Journal of Information Systems*, 22(3), 336–359.
- [208] Gimpel, H., Rau, D., & Röglinger, M. (2017). Understanding FinTech start-ups – A taxonomy of consumer-oriented service offerings. *Electronic Markets*, 22(4), 1–20.
- [209] Blank, S. (2013). Why the lean start-up changes everything. *Harvard Business Review*, 91(5), 63–72.

- [210] Schwaber, K., & Beedle, M. (2002). Agile software development with scrum. Upper Saddle River, New Jersey. USA: Prentice Hall.
- [211] De Reyck B, Grushka-Cockayne Y, Lockett M, Calderini SR, Moura M, Sloper A (2005) The impact of project portfolio management on information technology projects. *Int J Proj Manag* 23(7):524–537
- [212] Frey T, Buxmann P (2012) IT project portfolio management-a structured literature review. In: European conference on information systems (ECIS), p 167
- [213] Bouraad F (2010) IT project portfolio governance: the emerging operation manager. *Proj Manag J* 41(5):74–86
- [214] ISACA (2012) COBIT 5: a business framework for the governance and management of enterprise IT. ISACA, Rolling Meadows
- [215] Saaty TL (1996) Decision making with dependence and feedback: the analytic network process. RWS Publications, Pittsburgh
- [216] Yoon K, Hwang C-L (1981) Multiple attribute decision making: methods and applications. Springer, Berlin
- [217] Shih H-S, Shyur H-J, Lee ES (2007) An extension of TOPSIS for group decision making. *MComM* 45(7):801–813
- [218] Nielsen, S. (2022). Management accounting and the concepts of exploratory data analysis and unsupervised machine learning: A literature study and future directions. *Journal of Accounting & Organizational Change*, 11(1), 20.
- [219] Arnaboldi, M., Busco, C., & Cuganesan, S. (2017). Accounting, accountability, social media and big data: Revolution or hype? *Accounting, Auditing & Accountability Journal*, 30(4), 762–776.
- [220] Knudsen, D.-R. (2020). Elusive boundaries, power relations, and knowledge production: A systematic review of the literature on digitalization in accounting. *International Journal of Accounting Information Systems*, 36(1), 100441.
- [221] Payne, R. (2014). Discussion of ‘Digitisation, “Big Data” and the transformation of accounting information’ by Alnoor Bhimani and Leslie Willcocks (2014). *Accounting and Business Research*, 44(4), 491–495.
- [222] Guenther, T. W. (2013). Conceptualisations of ‘controlling’ in German-speaking

countries: Analysis and comparison with Anglo-American management control frameworks. *Journal of Management Control*, 23(4), 269–290.

[223] Bhimani, A., & Willcocks, L. (2014). Digitisation, 'Big Data' and the transformation of accounting information. *Accounting and Business Research*, 44(4), 469–490.

[224] Malmi, T. (2016). Managerialist studies in management accounting: 1990–2014. *Management Accounting Research*, 31, 31–44.

[225] Oesterreich, T. D., Teuteberg, F., Bensberg, F., & Buscher, G. (2019). The controlling profession in the digital age: Understanding the impact of digitisation on the controller's job roles, skills and competences. *International Journal of Accounting Information Systems*, 35, 100432.

[226] Yazdifar, H., & Tsamenyi, M. (2005). Management accounting change and the changing roles of management accountants: A comparative analysis between dependent and independent organizations. *Journal of Accounting & Organizational Change*, 1(2), 180–198.

[227] Oesterreich, T. D., & Teuteberg, F. (2019). The role of business analytics in the controllers and management accountants' competence profiles: An exploratory study on individual-level data. *Journal of Accounting & Organizational Change*, 15, 330–356.

[228] Kruachottikul, Pravee; Dumrongvute, Poomsiri; Tea-makorn, Pinnaree; Kittikowit, Santhaya; Amrapala, Arisara New product development process and case studies for deep-tech academic research to commercialization. *Journal of Innovation and Entrepreneurship* (2023). doi: 10.1186/s13731-023-00311-1

[229] Ries, Lena; Beckmann, Markus; Wehnert, Peter Sustainable smart product-service systems: a causal logic framework for impact design. *Journal of Business Economics* (2023). doi: 10.1007/s11573-023-01154-8

[230] Crişan, Emil Lucian; Marincean, Adrian The digital transformation of management consulting companies: a review. *Information Systems and e-Business Management* (2023). doi: 10.1007/s10257-023-00624-4

[231] Guerola-Navarro, Vicente; Gil-Gomez, Hermenegildo; Oltra-Badenes, Raul; Soto-Acosta, Pedro Customer relationship management and its impact on entrepreneurial marketing: a literature review. *International Entrepreneurship and Management Journal* (2022). doi: 10.1007/s11365-022-00800-x

[232] Mikelsone, Elina; Uvarova, Inga; Segers, Jean-Pierre Four-step approach to idea management sequencing: redefining or reinventing values in a business model. *Journal of*

Innovation and Entrepreneurship (2022). doi: 10.1186/s13731-022-00236-1

[233] Tessmann, Ruben; Elbert, Ralf Multi-sided platforms in competitive B2B networks with varying governmental influence – a taxonomy of Port and Cargo Community System business models. *Electronic Markets* (2022). doi: 10.1007/s12525-022-00529-z

[234] Van Veldhoven, Ziboud; Vanthienen, Jan Digital transformation as an interaction-driven perspective between business, society, and technology. *Electronic Markets* (2021). doi: 10.1007/s12525-021-00464-5

[235] Blomster, Miikka; Koivumäki, Timo Exploring the resources, competencies, and capabilities needed for successful machine learning projects in digital marketing. *Information Systems and e-Business Management* (2021). doi: 10.1007/s10257-021-00547-y

[236] Friedrich, Kevin A systematic literature review concerning the different interpretations of the role of sustainability in project management. *Management Review Quarterly* (2021). doi: 10.1007/s11301-021-00230-z

[237] Athanasopoulou, Alexia; De Reuver, Mark How do business model tools facilitate business model exploration? Evidence from action research. *Electronic Markets* (2020). doi: 10.1007/s12525-020-00418-3

[238] Ubaid, Alaa M.; Dweiri, Fikri T. Business process management (BPM): terminologies and methodologies unified. *International Journal of System Assurance Engineering and Management* (2020). doi: 10.1007/s13198-020-00959-y

[239] Urbaniec, Maria; Żur, Agnieszka Business model innovation in corporate entrepreneurship: exploratory insights from corporate accelerators. *International Entrepreneurship and Management Journal* (2020). doi: 10.1007/s11365-020-00646-1

[240] Lambrou, Maria; Watanabe, Daisuke; Iida, Junya Shipping digitalization management: conceptualization, typology and antecedents. *Journal of Shipping and Trade* (2019). doi: 10.1186/s41072-019-0052-7

[241] Blöcher, Katharina; Alt, Rainer AI and robotics in the European restaurant sector: Assessing potentials for process innovation in a high-contact service industry. *Electronic Markets* (2020). doi: 10.1007/s12525-020-00443-2

[242] Joos, Hannah Charlotte; zu Knyphausen-Aufseß, Dodo; Pidun, Ulrich Project Stakeholder Management as the Integration of Stakeholder Salience, Public Participation, and Nonmarket Strategies. *Schmalenbach Business Review* (2020). doi:

10.1007/s41464-020-00092-0

[243] Zighan, Saad; Abualqumboz, Moheeb Dual focus: service-product orientation to manage the change paradox following servitization strategy. *Service Business* (2022). doi: 10.1007/s11628-022-00483-y

[244] Ramírez, María Catalina; Navas Castaño, Libia Alejandra; Delgado, Ángela; González, Miguel Angel; Caicedo, Luis Camilo; Peralta, Mauricio Promoting Entrepreneurship through a Community Learning Model – Case Study: Green Businesses. *Systemic Practice and Action Research* (2019). doi: 10.1007/s11213-019-9477-z

[245] Schoormann, Thorsten; Schweihoff, Julia; Jussen, Ilka; Möller, Frederik Classification tools for business models: Status quo, comparison, and agenda. *Electronic Markets* (2023). doi: 10.1007/s12525-023-00639-2

[246] Kämpf-Dern, Annette; Will-Zocholl, Mascha Transforming workplaces into performing workspaces—Holistic evaluation concept for managing workspace change projects. *Zeitschrift für Immobilienökonomie* (2022). doi: 10.1365/s41056-022-00058-y

[247] Herm, Lukas-Valentin; Janiesch, Christian; Helm, Alexander; Imgrund, Florian; Hofmann, Adrian; Winkelmann, Axel A framework for implementing robotic process automation projects. *Information Systems and e-Business Management* (2022). doi: 10.1007/s10257-022-00553-8

[248] Szopinski, Daniel; Schoormann, Thorsten; John, Thomas; Knackstedt, Ralf; Kundisch, Dennis Software tools for business model innovation: current state and future challenges. *Electronic Markets* (2019). doi: 10.1007/s12525-018-0326-1

[249] Alaeddini, Morteza; Mir-Amini, Masoud Integrating COBIT with a hybrid group decision-making approach for a business-aligned IT roadmap formulation. *Information Technology and Management* (2019). doi: 10.1007/s10799-019-00305-0

[250] Fähndrich, Jochen A literature review on the impact of digitalisation on management control. *Journal of Management Control* (2022). doi: 10.1007/s00187-022-00349-4

Reading List for PM4P Book - Strang & Vajjhala (2024), UK:Springer

1. Project Management, Global Best Practices

Publications:

- Online technological STEM education project management [161] | doi.org

- A hybrid decision support system with golden cut and bipolar q-ROFSs for evaluating the risk-based strategic priorities of fintech lending for clean energy projects [162] | [doi.org](#)
- The influence factors of students' transferable skills development in Blended-Project-Based Learning environment: a new 3P model [163] | [doi.org](#)
- Hedging against demand ambiguity in new product development: a two-stage distributionally robust approach [164] | [doi.org](#)
- The using effect of fuzzy analytic hierarchy process in project engineering risk management [165] | [doi.org](#)
- Impact of effective construction planning in project performance improvement [166] | [doi.org](#)
- The role of project management in the success of green building projects: Egypt as a case study [167] | [doi.org](#)
- Leveraging the industry 4.0 technologies for improving agility of project procurement management processes [168] | [doi.org](#)
- Business process management (BPM): terminologies and methodologies unified [169] | [doi.org](#)
- Critical success factors of construction projects in Jordan: an empirical investigation [170] | [doi.org](#)
- Business, Organisational and governance modalities of collaborative cybersecurity networks [171] | [doi.org](#)
- Application of Axiomatic Design and Design Structure Matrix for Early Identification of Changes in Construction Projects [172] | [doi.org](#)
- A hybrid multi criteria decision making approach for consultant selection problem in ERP project [173] | [doi.org](#)
- A Heuristic-Based Genetic Algorithm for Scheduling of Multiple Projects Subjected to Resource Constraints and Environmental Responsibility Commitments [174] | [doi.org](#)
- A hybrid decision-making framework to manage occupational stress in project-based organizations [175] | [doi.org](#)
- Shaping the creative landscape through the role of digital and computer technologies in advancing art product design and industry applications [176] | [doi.org](#)
- Prioritizing Management Success Factors in Offshore Software Development [177] | [doi.org](#)
- A comprehensive overview of software product management challenges [178] | [doi.org](#)
- Reconciliation of scrum and the project management process of the ISO/IEC 29110 standard-Entry profile—an experimental evaluation through usability measures [179] | [doi.org](#)
- Extending the Project Management Body of Knowledge (PMBOK) for Data Visualization

in Software Project Management [180] | [doi.org](#)

- Characterizing industry-academia collaborations in software engineering: evidence from 101 projects [181] | [doi.org](#)

2. Cross-Continental Collaborations, Diversity and Inclusion

Publications:

- Structured software development versus agile software development: a comparative analysis [78] | [doi.org](#)
- Relationship between diversity of collaborative group members' race and ethnicity and the frequency of their collaborative contributions in GitHub [79] | [doi.org](#)
- Design and evaluation of a high– fidelity virtual reality manufacturing planning system [80] | [doi.org](#)
- Using structured ethical techniques to facilitate reasoning in technology ethics [81] | [doi.org](#)
- The use of QCA in science, technology and innovation studies: a review of the literature and an empirical application to knowledge transfer [82] | [doi.org](#)
- Perceived diversity in software engineering: a systematic literature review [83] | [doi.org](#)
- Being a Mentor in open source projects [84] | [doi.org](#)
- Spearheading agile: the role of the scrum master in agile projects [85] | [doi.org](#)

3. Real-world Case Studies, Socio-cultural Dynamics, Communication Strategies, Multi-Regional Projects

Publications:

- Effects of reliability indicators on usage, acceptance and preference of predictive process management decision support systems [52] | [doi.org](#)
- D-WASPAS: Addressing Social Cognition in Uncertain Decision-Making with an Application to a Sustainable Project Portfolio Problem [53] | [doi.org](#)
- Power transmission project: a framework to align project success with organization goal [54] | [doi.org](#)
- IIAG: a data-driven and theory-inspired approach for advising how to interact with new remote collaborators in OSS teams [55] | [doi.org](#)
- Using the IDEAL model for the construction of a deployment framework of IT Service Desks at the Brazilian Federal Institutes of Education [56] | [doi.org](#)
- AT-d8sign: methodology to support development of assistive devices focused on user-centered design and 3D technologies [57] | [doi.org](#)

- An innovative interval type-2 fuzzy approach for multi-scenario multi-project cash flow evaluation considering TODIM and critical chain with an application to energy sector [58] | [doi.org](#)
- “Why couldn’t we do this more often?”: exploring the feasibility of virtual and distributed work in product design engineering [59] | [doi.org](#)
- Synergetic Order Parameter Identification of Prefabricated Building Projects Based on Main Theme Analysis [60] | [doi.org](#)
- Image search system and industrial product design based on CPU parallel computing [61] | [doi.org](#)

1. Project Management, Global Best Practices

Machine generated summaries

Machine generated keywords: construction, project management, software, business, construction project, learning, agile, product, software project, software development, procurement, projectbase, academic, learn, csfs

Online technological STEM education project management [161]

This is a machine-generated summary of:

Shen, Fangyang; Roccasalvo, Janine; Zhang, Jun; Tian, Yun; Yi, Yang: Online technological STEM education project management [161]

Published in: Education and Information Technologies (2023)

Link to original: <https://doi.org/10.1007/s10639-022-11521-7>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2023

Copyright comment: Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"With a strong demand for online education and project management in deeper scope and larger scale to better fit COVID-19 pandemic situation, exploring new knowledge of online education to make it more effective became vital with the new challenges of STEM education."

"To resolve the above problem, this paper focuses on various aspects of online STEM education project management where the Enhanced Noyce Explorers, Scholars, Teachers (E-NEST) three-tiered structure was implemented during the COVID-19 period."

"Built upon the theories of engagement, capacity and continuity (ECC) and team-based learning (TBL), this remote learning model and infrastructure had a positive impact on STEM education and project management."

"This indicated that the E-NEST model greatly supported student success and faculty in online learning and project management meetings."

"The E-NEST STEM education project was compared to two other project management models along with the previous NEST curriculum."

"The comparisons attest that the E-NEST project developed excellent and innovative online platforms for student learning with project management and ECC and TBL applications."

"This research can be used to constructively develop more online STEM education learning models and platforms and integrate new practice and technology globally."

Introduction

"How will we constructively develop project management and STEM education learning in educational computer systems throughout the duration of the pandemic period?"

"We present an online STEM education project management strategy using the Enhanced Noyce Explorers, Scholars, Teachers (E-NEST) three-tiered structure (Shen and others, 3) during the pandemic period."

"The results from all of the above qualitative data demonstrated that the STEM education remote learning and project management model was beneficial in teaching and learning for students and faculty."

"The project evaluation and survey data indicated that the E-NEST three-tiered structure supported student and faculty success by using modified project management and distance learning approaches in STEM education."

"This study investigates the students' observations of the impact of the three-tiered infrastructure of project management and E-NEST programs using the enhanced theories of team-based learning and engagement, capacity and continuity in online learning."

Methods

"Noyce explorers and scholars participated in 2021 summer workshops with team-based learning (TBL) activities where the following research tools were utilized by the program evaluator: remote focus group interviews, one-to-one student interviews and anonymous surveys to collectively assess E-NEST remote learning."

"The external evaluation was guided by five broad questions, each of which cuts across both the three tiers (Explorer, Scholar and Teacher) and foundations of project delivery (capacity, engagement and continuity and team-based learning): (1) To what extent, and with what quality, does the project team implement the strategies and develop outputs proposed for the project? (2) To what extent are diverse STEM students recruited to the teacher education program? (3) How effectively are those students prepared to be STEM teachers, considering student teaching, degree completion and teacher certification? (4) To what extent are students retained through educator preparation and induction processes? (5) To what extent do program graduates demonstrate effectiveness in terms of both teaching practices and impact on K-12 student learning?"

Results and Discussion

"The project evaluation and data validates that the remote three-tiered infrastructure of project management and E-NEST program using the enhanced theories of team-based learning and engagement, capacity and continuity have effectively supported students and their academic achievement."

"The E-NEST project management team successfully adapted to remote learning content wholly online."

"Students successfully motivated students in STEM education using culturally responsive teaching and modified engagement, capacity and continuity and team-based learning

applications of theories remotely."

"The overall findings from project evaluation and online survey and focus group interview data significantly demonstrated that Noyce explorers and scholars highly approved of the E-NEST remote learning platforms and project management."

"The data confirms that project faculty developed effective online platforms for student learning."

"The E-NEST's project management allowed students to constructively learn in remote environments with best practices of classroom and time management consistent with PMBOK and PCM guidelines (Crisan, Muresan & Ilies, 2)."

Conclusions

"The E-NEST project applied teaching and project management strategies remotely based on the modifications of the theories of team-based learning (Ruder, Maier & Simkins, 4) and engagement, capacity and continuity (Artis & Washington, 5)."

"The E-NEST STEM education project management model was also compared to (Delisle, Jugdev & Thomas, 1) and (Crisan, Muresan & Ilies, 2) along with the NEST curriculum (Shen and others, 3)."

"The implications of this study's findings from qualitative data illustrate that a successful remote learning and project management model was developed to teach STEM education."

"This new E-NEST remote learning infrastructure can be useful as a role model for many other online educational platforms and contribute to research in STEM education in higher education institutions internationally."

[A hybrid decision support system with golden cut and bipolar q-ROFSs for evaluating the risk-based strategic priorities of fintech lending for clean energy projects \[162\]](#)

This is a machine-generated summary of:

Wan, Qilong; Miao, Xiaodong; Wang, Chenguang; Dinçer, Hasan; Yüksel, Serhat: A hybrid decision support system with golden cut and bipolar q-ROFSs for evaluating the risk-based

strategic priorities of fintech lending for clean energy projects [162]

Published in: Financial Innovation (2023)

Link to original: <https://doi.org/10.1186/s40854-022-00406-w>

Copyright of the summarized publication:

The Author(s) 2023

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The risk evaluation and the investment decision are among the most prominent issues of efficient project management."

"It is important to uncover the risk factors of fintech investments and investigate the possible impacts with an integrated approach to the strategic priorities of fintech lending."

"This study aims to analyze a unique risk set and the strategic priorities of fintech lending for clean energy projects."

"The most important contributions to the literature can be listed as to construct an impact-direction map of risk-based strategic priorities for fintech lending in clean energy projects and to measure the possible influences by using a hybrid decision making system with

golden cut and bipolar q-rung orthopair fuzzy sets."

"The extension of multi stepwise weight assessment ratio analysis (M-SWARA) is applied for weighting the risk factors of fintech lending."

"The extension of elimination and choice translating reality (ELECTRE) is employed for constructing and ranking the risk-based strategic priorities for clean energy projects."

"The findings demonstrate that security is the most critical risk factor for fintech lending system."

"Volume is found as the most critical risk-based strategy for fintech lending."

"Fintech companies need to take some precautions to effectively manage the security risk."

"It has been determined that the most appropriate strategy to increase the success of the fintech lending system is to increase the number of financiers integrated into the system."

Introduction

"This study aims to evaluate significant risks and identify the strategic priorities of fintech lending for clean energy projects."

"This study develops a model to analyze a unique risk set and the strategic priorities of fintech lending for clean energy projects."

"This study's most important contributions to the literature are to construct an impact-direction map of risk-based strategic priorities for fintech lending in clean energy projects and to measure the possible influences using a hybrid decision-making system with golden cut and bipolar q-ROFSs."

"Complex and crucial is the issue of evaluating the risk-based strategic priorities of fintech lending for clean energy projects."

"Numerous complexities are involved in evaluating the risk-based strategic priorities of fintech lending for clean energy projects."

"The effectiveness of the fintech lending system for clean energy projects is reliant on the identification of more crucial risks."

Literature for risks in fintech lending

"This section contains a literature review on the risks associated with fintech lending systems."

"Information systems security risk is an important type of risk that has an impact on the effectiveness of the fintech lending process."

"The fintech platform conducts all operations via the internet, which increases the platform's information security risks (Hwang and others 6)."

"Technology risk is another important type of risk for the efficient development of fintech lending processes."

"Financial risk is another type of risk that must be considered to improve the performance of the fintech lending system."

"Regulation risk should also be considered for a fintech lending system to be effective."

"The results of the literature review indicate that the fintech lending system is subject to a variety of risks."

"Only a few studies in the literature have focused on the analysis with respect to the risks in the fintech lending system."

Methodology

"Bipolar q-ROFSs, SWARA and ELECTRE are detailed in this part."

"Zhang (7) generated bipolar fuzzy sets to better reflect uncertainties."

"Keršulienė and others (8) developed SWARA to compute the weights of the factors."

"Score functions and bipolar fuzzy sets are created."

Analysis

"The purpose of this study is to analyze a distinct risk set and the strategic priorities of fintech lending for clean energy projects."

"In order to analyze a unique risk set and the strategic priorities of fintech lending for clean energy projects, a model is developed in this study."

"The investor risks associated with fintech lending for clean energy projects are quantified."

"The risk-based strategic priorities of fintech lending for clean energy projects are ranked."

"Stage 1 Weighting the investors' risks for the fintech lending in clean energy projects."

"Step 1 Determine the investor risks for the fintech lending."

"Stage 2 Ranking the risk-based strategic priorities of fintech lending for clean energy projects."

"Of the proposed model, the risk-based strategic priorities of fintech lending for clean energy projects are ranked based on their strategic importance."

Discussions

"Investors primarily take measures to mitigate the risk of unauthorized access to the IT systems of the fintech platform."

"Unavoidable IT risks will negatively impact the financing and functionality of fintech companies."

"Fintech companies will be accountable for any security issues that arise on this platform."

"Fintech companies must take certain precautions to manage the security risk effectively."

"Iqbal and others (9), Ryu (10), and Jagtiani and John (11) concurred that fintech firms should take the necessary steps to effectively manage security risks."

"With the assistance of this issue, the risk management process can be conducted more efficiently, which positively impacts the companies' profitability."

"Katsiampa and others stated that the effectiveness of the fintech lending system should primarily take financial performance risks into account."

"The fintech lending company must enter contracts with additional financiers."

Conclusions

"This study evaluates significant risks and identifies the strategic priorities of fintech

lending for clean energy projects."

"It developed a model to analyze a distinct set of risks and the strategic priorities of fintech lending for clean energy projects."

"M-SWARA methodology is used to analyze the risk factors of fintech lending."

"Findings reveal that three additional risk factors affect security."

"Security is identified as the greatest risk factor for fintech lending systems, followed by financial."

"Volume is found as the most critical risk-based strategy for fintech lending."

"Constructing an impact-direction map of risk-based strategic priorities for fintech lending in clean energy projects and measuring the possible influences using a hybrid decision-making system with golden cut and bipolar q-ROFS are the most significant contributions to the literature."

"All risks associated with the fintech platform are included in the scope of the review."

The influence factors of students' transferable skills development in Blended-Project-Based Learning environment: a new 3P model [163]

This is a machine-generated summary of:

Li, Xiaoxia; Zhu, Wanxia: The influence factors of students' transferable skills development in Blended-Project-Based Learning environment: a new 3P model [163]

Published in: Education and Information Technologies (2023)

Link to original: <https://doi.org/10.1007/s10639-023-11892-5>

Copyright of the summarized publication:

The Author(s) 2023

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The results showed that the presage variables of academic motivation and course design positively affect the process variables of blended learning experience and learning engagement, respectively."

"The presage variable of academic motivation and the process variable of learning engagement positively affect the product variable of transferable skill development, respectively."

"In blended-project-based learning, it is necessary to enhance students' sense of experience and engagement by improving their academic motivation and optimizing course design, thereby promoting the development of students' transferable skills."

Introduction

"Researchers explore different new teaching models to promote the development of students' 21st century skills."

"Research has shown that project-based or problem-based inquiry teaching is well consistent with the development of the 21st century skills (Odell & Kennedy, 12)."

"Through quasi-experimental research on traditional and blended learning classes, it is found that students in blended learning classes have significantly improved their 21st

century skills development (Hadiyanto and others, 13)."

"The integration of project-based learning and blended learning provides a unique intersection for developing 21st century skills in the classroom (Alamri, 14)."

"What factors in blended-project-based learning (BPBL) activities will affect students' acquisition of transferable skills?"

"Based on the 3P model and combined with the BPBL environment, this study constructs a new 3P model to explore the relationship between students' personal factors, perceived teaching quality, learning experience and learning engagement factors and the development of students' transferable skills from the perspective of students."

Theoretical Framework and Hypothesis

"Speaking, students with positive academic motivation will have a better impression of the course and experience the course learning activities more actively (Lepper and others, 15)."

"H1: Academic motivation positively affects students' blended learning experience."

"Course design is one of the important factors that affect students' blended learning experience (Kaushal and others, 16)."

"H3: Course design positively affects students' blended learning experience."

"Learning experience and student engagement are regarded as learning process variables and are affected by academic motivation and course design."

"Academic motivation is one of the student factors that affect students' learning outcomes as a presage variable (Barattucci and others, 17)."

"Research has shown that course design can affect students' learning outcomes (Wang, 18)."

"H7: Blended learning experience positively affects students' transferable skill development."

"H8: Learning engagement positively affects students' transferable skills development."

Methods

"The teaching method of the course mainly adopts blended-project-based learning."

"The online learning platform used in the course is the Fanya online teaching platform developed by China Chaoxing Corporation."

"With the help of this online teaching platform, teachers can build courses and publish courseware, learning videos, test questions, discussion topics, and project activities according to the teaching progress."

"Students use the online learning platform to preliminarily learn the relevant theoretical knowledge of this course and answer relevant test questions."

"For practical content, the teacher publishes project topics and project requirements on the Fanya online learning platform, allowing students to plan, manage, and implement projects according to project requirements."

"The course design scale has been adjusted based on the course design and online learning platform functions of this study, such as adding the sentence "In teaching based on the Fanya platform"."

Empirical Results

"Cronbach's alpha assumes that all items are equally reliable; therefore, it tends to severely underestimate the internal consistency reliability of latent variables in PLS structural equation models (Urbach & Ahlemann, 19)."

"An AVE value of at least 0.500 indicates that a latent variable is on average able to explain more than half of the variance of its items and, thus, demonstrates sufficient convergent validity."

"The Structural model was assessed from endogenous variables' explanatory power (i.e., R^2), the PLS goodness-of-fit proposal by Tenenhaus and others (2005), and the estimates for path coefficients."

"The value of global goodness-of-fit is the geometric mean of the average AVEs and the average R^2 of endogenous latent variables, whereas higher value represents better path model estimations."

"The algebraic sign, magnitude, and significance of the path coefficients between the model's latent variables were assessed."

Discussion

"From the path analysis, students' academic motivation and course design have a significant direct impact on their blended learning experience."

"From the path analysis, students' academic motivation and course design have a significant direct impact on their learning engagement."

"Our results show that learning engagement as a process variable in the 3P model can be improved, and students' own academic motivation and different course design can have an impact."

"Educators can improve students' learning engagement by enhancing their academic motivation and improving course design."

"Of our research, it is found that students' own academic motivation and engagement in learning are key influencing factors for the development of their own transferable skills."

"The blended-project-based learning course design in this study cannot directly affect the development of students' transferable skills, but it will affect the degree of students' engagement in this course."

Conclusion and limitation

"Our research builds a new 3P model in BPBL environment based on existing 3P models, with academic motivation and course design as presage variables, blended learning experience and learning engagement as process variables, and transferable skill development as product variables."

"Decades of researches have integrated and proven that new learning models, such as project-based learning and blended learning, can promote the development of students' 21st century core competencies or transferable skills, but efforts to study the process and understand intermediate factors are limited."

"Our research explores the impact of BPBL on the development of students' transferable skills from the perspectives of students' own factors, course design, and student learning processes (learning experience and learning engagement), and identifies the intermediate factors."

"The results show that students' own academic motivation and learning engagement can improve the development of students' transferable skills; The students' academic motivation and course design quality affect their blended learning experience and learning

engagement."

Hedging against demand ambiguity in new product development: a two-stage distributionally robust approach [164]

This is a machine-generated summary of:

Li, Yuanbo; Lin, Meiyan; Shen, Houcai; Zhang, Lianmin: Hedging against demand ambiguity in new product development: a two-stage distributionally robust approach [164]

Published in: Annals of Operations Research (2023)

Link to original: <https://doi.org/10.1007/s10479-023-05644-4>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2023

Copyright comment: Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"In the globalization era, many manufacturing companies face great uncertainties, as most components in new product development (NPD) are outsourced to external and internal suppliers worldwide."

"Some key components must be reserved in advance to control risks considering the suppliers' production plans and uncertain lead time."

"We propose a key components reservation model for NPD concerning component commonality and substitution."

"Based on a demand unsatisfied index (DUI), we establish a two-stage distributionally robust optimization (DRO) model, which is reformulated to a linear programming (LP) model by duality analysis and solved by a proposed column and constraints generation (CCG) algorithm."

"The proposed DRO model with DUI has a lower probability and magnitude for demand shortage."

"The scenario-wise ambiguity set also outperforms the single-scenario and deterministic models, especially when product demand varies inconsistently in different scenarios."

Introduction

"Product shortage risk can be reduced by aggregating demand across the product family via common or substitutable components, and the managers can achieve demand pooling and improve fulfillment rates."

"Component commonality or substitution among multi-products is critical to hedge against demand uncertainties in NPD."

"Mirchandani and Mishra (20) considered a two-stage assemble-to-order system with two products having uniformly distributed demand, one common component, and product-specific components."

"This paper considers a key components reservation problem with a worst-case fulfillment risk index while commonality and substitution are considered among multi-new products."

"Freeman and others (21) only considered downward component substitution with deterministic demand or known distribution; we are concerned with both component commonality and substitution for products with uncertain demand and unknown distribution."

"The contributions of this paper are as follows: A two-stage distributionally robust optimization (DRO) model is proposed to formulate the key components reservation problem with commonality and substitution when managing multiple NPD projects."

Model analysis

"There are I components that need to be reserved in advance to make sure there are enough spot products to meet demand after launching."

"For a MacBook, we consider the screen and chip as key components."

"The decision-maker asks the manufacturer to produce the products with reserved key components (the second stage)."

"For NPD projects, key components are reserved in the design stage, and demand realizes after launching."

"Approximation, we now define the demand unsatisfied index(DUI) to evaluate the demand shortage risk in multiple products."

"After launching, the demand realizes for multiple products."

"A production decision is made according to the realized demand information."

"The second stage decision is to minimize the maximum demand shortage level."

"In our paper, we choose the min-max objective, which aims to control the worst-case demand shortage risk in practice."

Reformulation of the DRO model

"We introduce how to reformulate the constraints to solvable forms by duality theory."

"We only consider the left hand of this constraint."

"By variable substitution, we can transform problem (DRO-Dual-1) into an equivalent lifted adaptive optimization problem on a higher dimensional probability space and show that it can be formulated as problem (DRO-Dual-2)."

"By lifting the ambiguity set in problem (DRO-Dual-1), it can be formulated as follows:where, It is easy to verify the equivalence of the two models."

Column and constraint generation algorithm

"We consider starting with a relaxed problem and adding an active extreme point by

solving the subproblem iteratively, based on which, column and constraint generation (CCG) algorithm was proposed by Zeng and Zhao (22) to solve the two-stage DRO problem."

"The master problem is to derive the optimal solution in the first stage."

"Taking the optimal solution in the first stage as inputs, CCG algorithm finds the worst-case extreme point in the sub-problem and returns to the master problem to add binding constraints."

"By solving the master problem and sub-problem alternatively, optimality can be achieved, and CCG algorithm can converge in finite steps due to the finite of extreme points."

"The experimental study we have done shows that to solve problem (SP-bilinear) is much more efficient than that of problem (SP-MILP)."

"We take problem (SP-bilinear) as the sub-problem in CCG algorithm."

Computational study

"We present experimental results of the DRO model for key components reservation problems with unknown demand distribution information, and compare it with the deterministic model, expectation minimization model and the single scenario model."

"The excess components are wasted, and the demand uncertainties for different products have no effects on each other in the DM model."

"Making a decision with the mean demand value is enough and two-stage DRO model can not reduce the demand shortage risk without commonality and substitution."

"Considering that the mean value of demand in different scenarios is proportional to the neutral situation, the optimal solution derived from the EXP/NS model can still outperform the results from the DM model."

"Because the DRO model can capture the inconsistency of demand variance by scenario-wise ambiguity set, when taking uncertainties into account, reservation/production decisions can be more flexible."

Conclusion

"Integrating key components reservation of multi-products can greatly reduce the demand

shortage risk."

"We investigate the effect of the commonality and substitution level and find that moderate commonality and substitution is enough to hedge against demand shortage risk, which is in line with commercial practice that balances the cost saving and product differentiation."

"Future research may include but is not limited to: (1) demand correlation between different products: although we apply scenario-wise ambiguity set to characterize demand uncertainties in this paper, we don't consider the direct correlations."

"Some factor-based models may help us to characterize demand correlation. (2) data-driven optimization with wasserstein distance: if we have some historical data, then we can construct ambiguity set by data-driven approaches. (3) emergency procurement: we only consider a key components reservation problem in this paper to examine the effects of commonality and substitution for multi-NPD projects."

The using effect of fuzzy analytic hierarchy process in project engineering risk management [165]

This is a machine-generated summary of:

Dong, Tao; Li, Haiyan; Zhang, Ziqiong: The using effect of fuzzy analytic hierarchy process in project engineering risk management [165]

Published in: Neural Computing and Applications (2023)

Link to original: <https://doi.org/10.1007/s00521-023-09046-2>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer-Verlag London Ltd., part of Springer Nature 2023

Copyright comment: Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"This work aims to explore the effectiveness of the fuzzy analytic hierarchy process (FAHP) in project engineering risk management and comprehensively investigate the application of genetic algorithm (GA) and neuro-fuzzy system in this field."

"Experimental research methods are employed, and three different types of projects, namely construction engineering, information technology projects, and manufacturing projects, are selected for risk evaluation."

"In the research process, an evaluation index system is established by identifying and analyzing the risk factors of each project, and a FAHP model is constructed."

"To more accurately assess the mutual influences and weights of the factors, fuzzy mathematics, and fuzzy logic methods are applied to fuzzify the parameters during the risk factor stratification and model construction stages."

"The use of FAHP can improve the accuracy of risk management control."

"This work provides a new and effective approach for project engineering risk evaluation, which can assist project managers in more accurately evaluating and managing risks, thereby enhancing the efficiency and quality of project management."

Introduction

"Traditional risk management methods face multiple challenges, such as the inability of a simple analytic hierarchy process (AHP) to handle the interdependencies, uncertainties, and fuzziness among numerous decision factors."

"To resolve the challenges of traditional risk management methods, such as the limitations of a simple analytic hierarchy process (AHP), adopting an integrated approach with advanced techniques like fuzzy logic, genetic algorithms, and data-driven decision support systems can enhance risk assessment accuracy and mitigate uncertainties effectively."

"This work aims to explore a new comprehensive assessment method based on FAHP, GA, and neuro-fuzzy systems to further improve the efficiency and accuracy of engineering project risk management."

"The use of hierarchical models and intelligent analysis tools based on data enables more accurate evaluation and management of different risk factors by taking into account interdependencies, uncertainties, and historical data, leading to tailored risk assessments that address the unique characteristics and complexities of each project, resulting in more effective risk mitigation strategies and improved project outcomes."

Recent relevant studies

"Yu and others (2018) [23] employed intuitive FAHP to assess and rank risk factors in multinational public-private partnership projects."

"Koulinas and others (2019) [24] used FAHP and quantitative techniques to assess risks in Greek construction sites and proposed a risk assessment model based on a fuzzy comprehensive evaluation method."

"They determined the project's risk level by ranking different risk factors and calculating the weight proportions."

"The application of FAHP in engineering project risk management has shown significant effectiveness, enabling project teams and decision-makers to thoroughly assess the importance of various risk factors and develop more comprehensive, scientific, and effective risk management strategies."

"This work has reviewed the research achievements of different authors using FAHP for risk assessment and management in different fields and analyzes the weights and importance of different factors."

Research on the project risk management system based on fuzzy logic evaluation and decision support

"By identifying and classifying project risk factors, the project management team can better assess the likelihood and impact degree of these risks, enabling them to develop appropriate risk response strategies and measures, thus reducing the impact of project risks on project objectives [25, 26]."

"In engineering management, the analysis of identification and classification of project risk factors is applied by assessing potential risks related to technical aspects, resources, stakeholders, and external influences."

"The project management team needs to screen the identified risk factors to determine the ones with high impact and likelihood, following a standardized approach to avoid duplicative calculations of similar factors while ensuring the comprehensiveness and accuracy of the indexes."

"The purpose of analyzing the role of risk factor assessment in project engineering risk management is to identify, evaluate, and address potential risks to improve project success and mitigate negative impacts on cost, schedule, and quality."

Results and discussion

"This section aims to compare the performance of different project engineering management algorithms in engineering risk management and analyze them from three aspects: prediction accuracy, reliability, and data transmission sensitivity."

"This indicates that the GA-FAHP algorithm improves accuracy for engineering risk prediction compared to the GA."

"Both the GA and GA-FAHP algorithms exhibit an upward trend in decision-making benefit scores, indicating a positive impact on project management decisions within a certain range of iteration counts."

"The changing trend highlights the significant impact of choosing different project management algorithms on actual return rates, with the GA-FAHP algorithm demonstrating a clear advantage in terms of actual return rates."

"The GA-FAHP algorithm generally outperforms GA in terms of risk loss, indicating its superior performance in practical project engineering risk management."

"Compared to the traditional GA, the GA-FAHP algorithm is more suitable for project engineering risk management."

Conclusion

"As the number of engineering projects increases and their management issues become more complex, traditional risk assessment methods struggle to meet practical demands."

"This work aims to explore the application effectiveness of FAHP in project engineering risk management and further investigate the application of GA and neuro-fuzzy systems in this field."

"This provides a new effective method for project engineering risk assessment, enabling

project managers to evaluate and manage risks more accurately, thereby enhancing project management efficiency and quality."

"Research, it is essential to incorporate optimization methods such as fuzzy neural networks and Bayesian networks to further improve project engineering risk management's accuracy, efficiency, and reliability."

Impact of effective construction planning in project performance improvement [166]

This is a machine-generated summary of:

Majumder, Soumi; Majumder, Soumyajit; Biswas, Debasish: Impact of effective construction planning in project performance improvement [166]

Published in: Quality & Quantity (2021)

Link to original: <https://doi.org/10.1007/s11135-021-01224-5>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Nature B.V. 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Project performance of the construction sector can be significantly improved by proper project planning and scheduling."

"A divergence opinion is included in this area which implies the amount of effort that is required or should be invested in construction planning and scheduling activity to make the project management effective."

"A lot of work has been already reported in the literature which clearly shows that the project performance can be enhanced by raising the efforts invested in project planning, scheduling, and controlling activities."

"The organizational characteristics of the construction firms and the project environment have a great influence on planning and scheduling efforts."

"When it comes to the economic development of the country and a large labour force are engaged in this sector, definitely a high work effort we can consider from appropriate project planning activity."

"To keep in mind the importance of project management in the construction sector, our study is focusing on the relationship between construction planning efforts and their effectiveness in the field of project performance."

"Software used for Construction Project Management (CPM) is also discussed."

Introduction

"In the area of management and execution of construction projects, construction planning is a fundamental and challenging activity (Hinze 27; Neale and Neale 28)."

"A good construction plan develops the budget and schedules the work (Peurifoy and others 29; Petroutsatou and others 30)."

"In the area of construction management, the development of a construction plan is one of the critical tasks."

"The construction project plan acts as a map that guides the team to complete the steps of a project."

"The process of creating a construction plan is very large."

"The construction project managers create a proper plan for the project."

"The construction industry contributes a large share to the economic growth of the nation."

"The main motivation of this study is to highlight the construction project planning and its effectiveness in the area of construction project performance when the industry is showing a significant growth in India."

Literature review

"The construction project planning is the integration for on-site safety induction."

"Under the area of project planning and management, construction project complexity is one of the key components."

"The impact of integration management on project performance is evaluated in the construction industry and generates its significance."

"It has been said that construction project performance is based on different dimensions of project management."

"This study identified the influence of different components under integration management on the performance of construction projects and also established the relationship between those components with integration management (Demirkesen and Ozorhon 31)."

"Poor planning of road construction with Work Breakdown Structure (WBS) can affect the quality of the project."

"For large-size construction projects, a dynamic facility of the planning model should be incorporated."

"Project performance has also a relation with the risk management of project planning (Butt and others 32)."

Construction project planning and types of planning

"It is established that under-construction project management, project planning is the process of increasing project efficiency by generating the master plan."

"The construction and project managers with help of key team members prepare the master plan of the project."

"They are focusing on some of the domains of construction before making the operational plan for the project."

"The operational plan is associated with the strategic plan, it helps to meet the target action of the strategic plan in a project."

"Under operational planning, the team is meeting the project objectives by the availability

of sufficient construction resources and services."

"The team is establishing of project concept and design that helps to start the construction, checking the validity of the plan, using of fast-track scheduling approach that would be more economical, and so on."

"To meet the strategic goals operational plans are delivered by construction teams."

Steps to create a construction project plan

"Most of the time it has been seen that the shareholders are not understood the project plans to their full extent."

"Few topics are discussed in this kick-off meeting, such as ground rules, team commitments, roles and responsibilities of the team, how to make decisions on the project plan, and many more."

"WBS works as an effective cornerstone of the project planning, execution, controlling, monitoring, and reporting."

"Team members utilize this schedule plan for formulating the projects."

"Project schedules (Yuliana and others 33) allow the team members to break the whole plan into smaller ones."

"In an organized way, the construction project planning and scheduling help the team to keep them on track and work effectively."

"CPM always helps to focus attention on those jobs that are critical to the project time."

"CPM assumes that all resources are available for the project at all times (an optimal planning tool)."

Significance of project planning under project management

"Planning recognizes different risks associated with the project and reduces those risks."

"Proper planning ensures the team members that the risk can be mitigated and the smaller tasks help to achieve the larger goals of the project."

"Under the project management planning is the second phase."

"There are few benefits of project planning and the reasons for making a solid project plan is necessary for project management are explained here, (i) plan helps to minimize the stress of the project team, (ii) plan provides confidence among team members, (iii) plan makes the team in unity, (iv) plan generates accountability, (v) it can prevent team overloads, (vi) it reduces the risk factors of the project, (vii) plan enhances the level of profitability, (viii) it creates effective communication and (ix) plan helps to meet deadlines in the project work."

Construction project management software

"Construction Project Management Software helps to specify project objectives, planning, budget, scheduling, performance requirements set, and project participants' selection."

"GanttPRO is an online project planning tool having Gantt charts features, team management features, and resource management features."

"GanttPRO helps to set roles, assign team members tasks, track the progress of the project, etc BIM 360 (online project management system) can track construction, acquire real-time data, manage field data, etc Acculynx ensures team connectivity and working in synchronization mode."

Discussion

"Construction management uses some specialized project management techniques to create the planning, design, and scheduling of a project from its start to end (Allahar 34)."

"Project planning now a day's using different modern management techniques and can achieve predetermined objectives of scope that lead to qualitative satisfaction."

"Project planning is the most effective coordinator to project success (Zhang and others 35; Jünge and others 36)."

"Project planning makes the objectives achieved by satisfying the clients in the market."

Conclusion

"A systematic project planning under the construction industry helps to make detailed activities that need to be accomplished."

"Projects progress in steps is very incremental stages."

"A rapid and interactive project management system is also widely used in different phases of project planning under the construction sector."

"We can assume that if the project planning stage is done in the best way it will create high impacts on project completion."

"Effective and appropriate construction project planning brings organizational success."

The role of project management in the success of green building projects: Egypt as a case study [167]

This is a machine-generated summary of:

Abdelkhalik, Heba Farouk; Azmy, Hisham Hussein: The role of project management in the success of green building projects: Egypt as a case study [167]

Published in: Journal of Engineering and Applied Science (2022)

Link to original: <https://doi.org/10.1186/s44147-022-00112-5>

Copyright of the summarized publication:

The Author(s) 2022

License: OpenAccess CC BY + CC0 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/> . The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the

data made available in this article, unless otherwise stated in a credit line to the data.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Sustainability and project management are two trends that have taken global interest in the last decades due to their significant role in various fields of life."

"Some of these obstacles have been addressed in recent studies with suggested solutions, but the role of project management in overcoming or even mitigating the risk of these obstacles was almost absent in most of these studies."

"This paper attempts to observe the most important obstacles facing the application of sustainability in the construction field and taking the green construction situation in Egypt as a case study."

"This paper aims to investigate the role of project management in green building projects' success, through project management best practices' applications to overcome the main reasons that obstruct the green building projects movement."

"The results showed that there is a lack of management methods that address sustainable construction projects."

"Some defined obstructions could be overcome by project management's best practices and methods."

Introduction

"Green building applications at the project level were considered."

"The lack of green buildings in developing countries and the gap between the percentage of the registered projects and the certified projects from green building rating systems in countries like Egypt indicates that there are some obstacles facing this kind of project in all project phases."

"This paper aims to investigate the obstacles that face green building applications in developing countries due to the size of the challenges that face these projects there and

takes Egypt as a case study."

"The study observed challenges facing project managers or green building administrators in this project through a questionnaire and online interviews with them."

"The study attempted to find solutions through project management best practices to overcome the main reasons that impede the green building movement in developing countries like Egypt."

Literature review

"A few studies realized the role of project management in sustainability and green building's success; however, the existing studies are still insufficient [37]."

"It is noticed that most previous studies care about studying sustainable management and environmental management, but few of them address project management and its great role in sustainable and green architecture."

"Green buildings must be viewed as a comprehensive solution that integrates sustainable principles throughout the project life cycle, from project planning to design, construction, and operation, rather than simply as a collection of green materials, technologies, and other environmentally friendly innovations [38]."

"There is the methodology of (Project Integrating Sustainable Methods (PRISM)) which was introduced in 2013 by the international organization of green project management (GPM)."

"Another important aspect in addressing the integration between project management and sustainability or green buildings is the contribution of the project managers to the success of sustainable projects."

Methods

"Following the SLR, an online questionnaire and interviews with project managers and sustainability consultants were conducted to determine how green project buildings are managed in Egypt, a more specific ranking for the most affective challenges that obstruct green buildings in Egypt from the challenges identified previously in previous studies, and finally to determine how the green building situation in Egypt could be improved."

"The questionnaire consists of 18 questions with two types of questions, open questions, and multiple-choice questions aiming to benefit from the experience of project managers and to define obstacles they faced in managing green building projects in Egypt, the main aims need to be elicited from the questionnaire as follows: 1."

"The main obstacles that project managers face when managing green buildings in Egypt."

Results and discussion

"From the systematic literature review, the research reached an important hypothesis, which is that green building situation in Egypt could be improved and go faster in steady steps by developing and improving the project management methods used in implementing the green building projects."

"To experiment research hypothesis, it is needed to know how green building projects are managed in Egypt and study the management methods used in these projects."

"This section of the study aims to investigate how green-building projects are managed in Egypt."

"Discover if the way of managing these buildings affects project success in achieving the sustainability goals and whether it is among the factors leading to the obstruction of the construction of green buildings in Egypt."

"An online questionnaire and interviews were conducted with Egyptian project managers and green building administrators (with experience of 3 to 20 years in green buildings) who worked in green buildings in Egypt, whether registered or certified buildings, under LEED or GPRS."

Conclusions

"The roles of project managers and green building consultants are unclear."

"As, the concept of a green project manager is missing, the person who has the project management knowledge, including management methodologies, methods, tools, and techniques, and has leadership skills to lead the entire project team and organize all project processes in an integrative manner holistically in the context of sustainability."

"There should be a distinction between the roles and responsibilities of project managers and green building consultants."

"Research on green building project management should be encouraged, especially at the local level, due to its important role in the success of the project, overcoming the obstacles that may face this type of construction, and the ability to organize the process and coordinate between several of its elements."

Leveraging the industry 4.0 technologies for improving agility of project procurement management processes [168]

This is a machine-generated summary of:

Rane, Santosh B.; Narvel, Yahya A. M.: Leveraging the industry 4.0 technologies for improving agility of project procurement management processes [168]

Published in: International Journal of System Assurance Engineering and Management (2021)

Link to original: <https://doi.org/10.1007/s13198-021-01331-4>

Copyright of the summarized publication:

The Society for Reliability Engineering, Quality and Operations Management (SREQOM), India and The Division of Operation and Maintenance, Lulea University of Technology, Sweden 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"This article aims to developing strategies for executing the PPM processes with more agility by leveraging the capabilities and merits of industry 4.0 technologies along with selective Critical Success Factors (CSFs)."

"An agile project implementation plan was developed based on the findings of TISM and FuzzyMICMAC, which provides a systematic approach for strategically achieving the CSFs."

"Strategies were developed to improve agility in key processes of PPM by utilizing the new-age technologies Industry 4.0 like Internet of Things (IOT), Mobility, Business Intelligence, Blockchain, Chatbot, Robotic Process Automation (RPA) and other technologies."

"The strategies and the agile project implementation plan thus developed as an outcome of this research can be leveraged by industries of various domains for improving agility in any of their business processes."

Introduction

"Project Procurement Management (PPM) includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team (PMBOK 39)."

"The engine that drives that adaptability is agile procurement (Denali-A WNS Company & JAGGAER 40)."

"According to Denali-A WNS Company & JAGGAER (40) procurement organizations need to have the knowledge and ability to move quickly."

"Company's procurement group must have deep understanding of the market and should collaborate with marketing on promotions."

"A procurement team is agile when they exhibit certain behaviors, including being forward-thinking, collaborative, data-driven and action-oriented."

"In order to improve agility of PPM process, CSFs needs to be identified that will act as input to project management practice for achieving success (Alias and others 41)."

Literature survey

"Due to excessive competitive and less predictable market, exponential growth in innovation and technology, the existing PPM becomes very unstable which marks the requirement of an agile model to manage procurement projects effectively."

"In order to become agile, the project procurement management in an organization will have to align its capabilities (People, Process, and Technology) with its needs and priorities (Braunscheidel and Suresh 42; Mike and others 43)."

"IIOT that can enable to capture real-time data and requirements (Ahuett-Garza and Kurfess 44; Lynn and others 45; Aazam and others 46) enabled via Wireless Sensor Networks (WSNs)-based networking to transfer from traditional industry to digital industry (Alrashidi and others 47; Rathee and others 48; Lee and others 49); mobility can provide ease of accessibility and visualization from anywhere; blockchain can provide a trustless, tamperproof, traceable and decentralized network which can be established between the internal/external stakeholders for all kinds of transactions including exchanging information, payments, status updates, maintaining documents and records, etc

in real-time (Pandya 50; Khan and Salah 51; Iansiti and Lakhania 52); RPA intends to offload repetitive, non-intellect, high volume mundane tasks done by humans; Artificial Intelligence and Machine Learning learn from the human operating patterns, failure trends, ordering trends versus the needs and requirements to provide autonomous decision making (Bordel and Alcarria 53; Sharma and others 54); big data analytics can utilize the real-time generated data for predictions; all of these technologies are capable of generating huge insights that can provide sufficient business intelligence to the procurement managers to perform and act with more agility."

"This research tries leverages these new age Industry 4.0 (Saucedo-Martínez and others 55; Rejeb and Keogh 56; Bougdira et al 57; Pasi and others 58) technologies to enable business intelligence for improving agility in PPM."

Research gaps based on literature survey

"From the literature, Project procurement management is key process for enabling successful outcomes to projects, improve agility of PPM can fetch significant business results."

"Few of the recent studies describes the CSFs that can enable improvement of agility in PPM."

"There was barely any work that utilizes the new age technologies to enable business intelligence for improving agility in various individual sub-processes of PPM."

"There is thus a need to improve the agility in PPM by developing strategies based on effective utilization of business intelligence enabled using latest technologies, to achieve the CSFs for improving agility in PPM."

"All these factors waste a lot of time, money and efforts, making the entire PPM process lag which marks the need for agility improvement."

Key contributions of this research

"As identified from the literature gaps there is need to analyze the identified CSFs and develops strategies to successfully achieve these CSFs."

"Following are the key contributions of this research: a. This research identifies 18 CSFs from the literature later validating with experts."

"c. It develops interactions and relationships among CSFs by using TISM and Fuzzy MICMAC analysis d. It develops an agile project implementation plan for achieving the CSFs and successfully improve of agility of PPM e. It identifies potential areas in PPM lifecycle for

improving agility by leveraging new-age technologies"

Aim and research questions

"The aim of this research is to explore the CSFs for improving agility in PPM, develop interactions among CSFs and model an agile implementation plan to strategically and systematically achieve the CSFs."

"This research tries to address the following research questions: a. What are the CSFs for improving agility in PPM?"

"c. How can these CSFs be achieved in an organization to improve agility?"

Research methodology flow chart

"Based on experts' inputs the top ten key CSFs were short-listed which had high impact on the agility improvement drive."

"The short-listed CSFs then were analyzed for the interactions and relationships among themselves by using TISM and Fuzzy MICMAC."

"Based on the analysis an agile project implementation plan was developed that provides a plan to systematically achieve the CSFs."

Exploring the CSFs for improving agility in PPM

"CSF 2: Clear vision and strategic alignment To improve agility, there has to be a clear vision and strategic alignment for digitally transforming and upgrading the organization with new technology competency."

"CSF 6: Technical capability To eliminate lack of new technology competency barrier while implementing agility, an organization should have sufficient technical capabilities which shows the organizational strength in terms of tools and technology (Dawson and Van Belle 59)."

"CSF 10: Performance measurement Performance measurement is crucial for eliminating lack of new technology competency barrier while implementing agility and achieving sustainable improvement (Trkman and McCormack 60; Lee and Ahn 61; Leem and others 62; Ray and others 63; Hoque 64)."

"CSF 11: Use of steering committee Use of steering committee for monitoring activities and to ensure if things are aligned to the set vision is very key for eliminating issues in change

management while implementing agility in PPM (Somers and Nelson 65)."

"This CSF plays a vital role at the Technology; Capacity and capability level."

Obtaining the relationship of CSF on agility implementation in PPM

"After identifying the CSFs from the literature and validating with experts as a first round of Delphi, a second round of Delphi was conducted to find the strength of relationship of each CSF on implementing agility in PPM."

"The data was collected from the interaction with 15 experts working in the field of agile project management, procurement management, digital transformation and other domains which were directly or indirectly related to the context of this research. ""

"Inputs received from the experts were rated as; very strong relationship (9), strong relationship (7), moderate relationship (5), low (3) and no relationship (1)."

Classification of CSFs: fuzzy MICMAC analysis

"This research further utilizes Fuzzy MICMAC analysis to further categorize the CSFs."

"MICMAC analysis is to sort the variables according to their driving power and dependence."

"Higher driving power indicates that the particular CSF highly influences other CSFs and higher dependence indicates that the CSF is highly influenced by other CSFs."

"Fuzzy MICMAC analysis also captures the strength of relationship between two factors."

Discussions on the TISM and fuzzy MICMAC analysis

"The CSFs of cluster IV have a very high driving power with a very less dependence on other factors."

"b. Cluster III i.e. Linkage CSFs which have a high driving power to influence CSFs in lower clusters and dependence power on cluster IV CSFs."

"The success of these CSFs highly depends on the success of CSFs in Cluster III and Cluster IV."

"It can be concluded that once the CSFs in cluster III and IV are achieved, these CSFs will

then enable the organizations will have to establish an innovative culture, proactive and forward-thinking mindset of people, increase interdepartmental cooperation which will ease the change management drive and, the success of all these CSFs will finally enable successful Implementation of proposed changes."

Development of agile project implementation plan for improving agility in PPM

"sprint of sprints) backlogs with individual teams and scrum master."

"Each sprint will have a daily standup meeting discussing the achievements and updating the backlog in case new items are identified."

"Each of these 8 items have further multiple activities that can be seen in the sprint backlog."

"The entire backlog is divided in four parallel sprints based on the dependencies of the activities in the backlogs."

"c. Sprint C and Team 3: Team 3 will be constantly involved in defining the Key Performance Indicators and Parameters, predictive insights and intelligence that will be required to give end-t-end visibility of the activities."

"The scrum masters of all the teams will have weekly meetings with the initiative head and group of experts to update on the achievements, reviewing the progress, addressing the challenges faced, updating the individual backlogs based on the response during the initiative and other activities."

Potentials areas of agility improvement in PPM process

"Information flow for improvement of agility Requirements from the project team Vs Real-time repository available resources (IIoT) > predictive analytics and Business intelligence insights extended on mobile/portal > Enablement of appropriate make/buy decisions quickly."

"Business intelligence can utilize the real-time generated data and the historical data for providing visibility on selecting the right supplier in much shorter time, improving the agility of this process."

"Having such a condition, both the parties try to prove themselves right by initiating blame game, conflicts, suing each other, tampering records, etc These non-productive activities lead to huge losses to both the parties (buyer and supplier) in terms of time, money, reputation, relations, etc Agility improvement of the process Blockchain is the trending

technology which can solve the issues."

Implications of research

"This research provides PPM practitioners with an agile implementation plan, areas where agility in PPM can be improved and strategies around achieving the CSFs for improving agility in PPM for an organization."

"New skills would be required, and practitioners will have to upgrade them self for being technologically competent to deal with the transformation."

"This research will also off-load practitioners from doing conventional cumbersome non-intellect tasks, due to which practitioners can focus on tasks which require human intelligence, invest more time in research and development which can be utilized for expanding the business."

"This research will also encourage more industry academic relationship where industries will try to include new age technology requirements in the academics and, research institutes will produce researchers which will be aligned with the needs of the industrial transformations."

Conclusions

"To improve the agility of PPM processes, this article leverages the capabilities and merits of industry 4.0 technologies along with selective CSF in the order of significance as per the TISM and Fuzzy MICMAC analysis."

"In order to improve agility in PPM this research receives valuable inputs from the experts working in the domain of project management, procurement and other relevant domains."

"Contribution, it identifies various CSFs that will enable successful agile PPM model implementation."

"Contribution, it prioritizes the top ten CSFs to improving agility in PPM."

"Contribution, it develops an agile implementation plan for successfully executing PPM agility improvement drive, strategies to improve agility in PPM."

"Fifth contribution, it identifies potentials areas in various phases of PPM where agility can be improved and also describes the means to leverage the new age technologies along with the influence of CSFs as per the TISM model."

Limitations and future research directions

"This article develops plan and strategies for improving agility in PPM which considers inputs from experts and literature making it robust, however since this is not yet implemented and there could arise a few un-foreseen challenges during actual implantation which are not considered as a part of this research."

"Practitioners and researchers can utilize the findings of this research for actual implementation of agility improvement in PPM in their organization and can also extend it to bring agility in other project management knowledge areas in industry."

"This research provides guidelines and a roadmap for practitioners and researchers working in this domain."

Business process management (BPM): terminologies and methodologies unified [169]

This is a machine-generated summary of:

Ubaid, Alaa M.; Dweiri, Fikri T.: Business process management (BPM): terminologies and methodologies unified [169]

Published in: International Journal of System Assurance Engineering and Management (2020)

Link to original: <https://doi.org/10.1007/s13198-020-00959-y>

Copyright of the summarized publication:

The Society for Reliability Engineering, Quality and Operations Management (SREQOM), India and The Division of Operation and Maintenance, Lulea University of Technology, Sweden 2020

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming

from.

Abstract-Summary

"Business process management (BPM) is one of the effective performance management methodologies used in managing process-oriented organizations."

"Having a unified list of the BPM critical success factors (CSFs) and BPM principles considered one of the important research areas."

"The literature review showed that despite the majority of BPM principles and CSFs are the same or there are minor differences between them, different terminologies were used to describe them."

"The main objectives of this research are building insights about BPM's most recent developments, unifying BPM principles and CSFs and proposing a comprehensive BPM."

"The mapping process was used to propose a unified list of BPM CSFs and BPM principles."

"A comprehensive BPM methodology was proposed, the proposed methodology combining the steps of generic BPM methodologies and BPMS methodologies and it is unifying the terminologies used in the reviewed methodologies."

"The proposed CSPs can be further analyzed to find the relationship between CSPs and how each one of them can affect BPM implementation."

"The proposed BPM methodology can be tested by applying it to the different business sectors and measure organizations' performance during implementation stages."

"For the practical side, the proposed methodology can provide a guide for managers and organization leaders about the right steps to be followed during implementing BPM and conducting BPM projects."

"CSPs can guide BPM project managers, organization leaders, and business excellence units to focus their efforts on the significant improvement areas and actions to be taken on strategic and operational levels."

Introduction

"Viewing organization as a set of cross-functional processes at different levels and through organization's boundaries is one of the recent and effective approaches for managing

organizations' business (Škrinjar and Trkman 68; Looy 69; Mäkinen 70)."

"Business process management (BPM) is one of the effective methodologies used for improving the efficiency and performance of the process-oriented organizations (Ongena and Ravesteyn 66; Suša Vugec and others 67)."

"BPM developed gradually from merging the quality approach and business process reengineering (BPR) approach (Rosemann and Brocke 71)."

"BPM defined as a management discipline that considers business processes as the main contributor to achieving the organization's objectives by improving, continuously managing performance of essential business processes, and govern it (Jeston 72)."

"Taking the aforementioned BPM issues into consideration, the main objectives of this research are building insights about BPM's most recent developments, unifying the similarities in the BPM principles and CSFs and proposing a comprehensive BPM methodology that able to integrate the generic BPM methodologies and the Business Process Management Systems (BPMS) methodologies."

Literature review

"In 2018, BPM defined by John Jeston, as a management discipline that considers business processes as the main contributor to achieving the organization's objectives by improving, continuously managing performance of essential business processes, and govern it (Jeston 72)."

"In the enablement phase, an organization should work to develop the necessary capabilities to drive four main components namely people, process, technology, and BPM project management which represent business success components, i.e. it is mandatory for BPM project success."

"Launchpad Three major actions need to be taken that includes; (1) deciding location where to start next or new BPM activity, i.e. location of process to be improved; (2) define the goals of process under improvement which should be aligned with organization strategy; (3) establishing activities need to be taken to improve process and achieve process goals."

Research methodology

"The methodology used in the current research encompasses analyzing the literature on three parallel lines."

"In the first line, the literature will be analyzed to extract the BPM developments and

discuss them in the results discussion section."

"In the second line, the literature related to BPM CSFs and BPM principles will be analyzed, summarized and then mapping process will be used to find the similarities between CSFs and principles and the unique CSFs and principles."

"In the third line, the literature related to BPM methodologies will be analyzed to identify the pros and cons of each methodology, highlight the gaps in each methodology and then propose a comprehensive BPM methodology that able to fill the gaps of the previous methodologies."

Unifying CSFs and BPM principles

"BPM principles defined as a set of best practices any organization implementing BPM should follow to sustain competitive advantage and ensure BPM projects success (Hung 73)."

"Institutionalization The implemented BPM project or approach should be embedded and integrated with organization systems and plans, i.e. it shouldn't add another layer to organizational structure."

"Organizational structure change BPM implementation should change organization structure to ensure horizontal linkages, cross-functional nature of processes, and make processes focused on delivering value to customers."

"BPM implementation An effective BPM implementation process that characterized by its simplicity, i.e. resources used by BPM should be economical, and contextual awareness, i.e. while implementing BPM, organization setting factors such as size, strategy, business scope, BPM objectives, available resources, and types of processes should be considered."

"Collaborative working environment in BPM, due to the cross-functional nature of processes, employees' participation and contribution to processes analysis and improvement from across organizations should be emphasized."

Comprehensive BPM methodology

"Only two methodologies were found as generic methodologies, i.e. it considers the common steps or phases followed during BPM implementation."

"The analysis conducted on both methodologies and mapping the Elzinga and others methodology to the Jeston framework showed that those methodologies have a common logic and the stated steps or phases for implementing BPM are almost the same but

terminologies used were different."

"Develop and implement phases from the Jeston framework can be mapped to the implementation step from Elzinga and others methodology."

"“realize the value and sustainable performance” phases from the Jeston framework can be mapped to the continuous improvement cycle step from Elzinga and others methodology."

"The proposed methodology combines the steps of generic BPM methodologies (Elzinga and others 74; Jeston 72) and BPMS methodologies (Ko and others 75; van der Aalst 76) and unify the terminologies used in reviewed methodologies."

"If BPM project goals achieved, the improved processes, by using diagnosis standards from BPMS, will be analyzed and monitored."

Results discussion

"BPM developed over the years from merely systematic and structured approach used for improving and managing organization performance to management discipline that, in addition to what mentioned before, start using methods, techniques, and software for improving and managing organization performance, i.e. BPM approaches start to combine knowledge from information technology and management sciences for improving business processes."

"In 2018, BPM major activities were classified to four major activities that represent the walls of BPM house and it includes alignment with organization strategy, identification of the essential business processes that should be enhanced first, Business process improvement and people change, and the activities related to benefits realization and performance management."

"The analysis conducted on the BPM CSFs and BPM principles literature reveals that when organizations, during implementing BPM, reach to CSFs development stage, they should refer to the BPM principles and adapt it to fit for their business by focusing on the principles that will gain more weight in term of fulfilling organizations' goals and objectives and delivering the desired value to the customers and stakeholders."

Conclusions and future research agenda

"Business process management (BPM) is one of the effective performance management methodologies used in managing process-oriented organizations."

"The proposed methodology starts with the preparation process by analyzing organization vision, mission, goals, strategy, and CSPs to identify CSFs and work on needed culture

change to prepare the organization for implementing BPM."

"The pros of the proposed methodology may include but not limited to explaining what BPMS standards to be used during BPM methodology implementation, in which stage it should be used and how it will interact with human factors within the organization."

"The proposed BPM methodology can be tested by applying it to different business sectors and measure organizations' performance during the implementation stages."

"From the practical side, the proposed methodology can provide a guide for managers and organizations leaders about the right steps to be followed during implementing BPM and conducting BPM projects."

Critical success factors of construction projects in Jordan: an empirical investigation [170]

This is a machine-generated summary of:

Albtoush, A. M. Faten; Doh, S. I.; Rahman, R. A.; Al-Momani, A. H.: Critical success factors of construction projects in Jordan: an empirical investigation [170]

Published in: Asian Journal of Civil Engineering (2022)

Link to original: <https://doi.org/10.1007/s42107-022-00470-8>

Copyright of the summarized publication:

The Author(s) 2022

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain

permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"In the construction industry, project success is crucial, because it reflects positively on the growth of the national economy, in partnership with other sectors related to it directly and indirectly."

"The aim of this study is to determine the factors that affect the success of construction projects, based on realistic project data."

"The result illustrates that the most significant and vital factors for the success of the construction project are: quality-related factors, cost-related factors, time-related factors, contract-related factors, and related external factors."

"Results help project stakeholders improve construction project performance by identifying factors that have affected project success."

"This study contributes to the current body of knowledge by being one of the few studies that analyze project data to identify critical success factors for construction projects in developing countries."

Introduction

"The success of the project plays an important role in developing the economy by achieving the main three measures of project success (time, cost, and quality)."

"Many researchers considered cost, time, and quality compliance as a parameter to measure project success (Barclay & Osei-Bryson, 78; Meredith, and others, 79)."

"The study of project success and critical success factors is, therefore, timely as it is one of the vital ways to improve the effectiveness of project delivery (Chan and others, 80)."

"This study goes to conduit the gap by re-evaluating the critical success factors of Jordanian construction projects to facilitate an updated understanding of the current conditions of the local industry, by analyzing the data gathered from the final reports of a number of

construction projects."

"Identifying these factors provides project managers to develop plans to improve the performance of existing and future construction projects in the region."

Literature review

"According to several studies, cost, scope, and time are the three success criteria for a construction project (the triple constraint)."

"A study by Chan and Chan (81) presented two types of success criteria for construction projects: objective and subjective measures."

"Another study by Liyanage and Villalba-Romero (82) presented six success criteria in construction projects: time, cost, quality, contract, process and results, and stakeholders' satisfaction."

"There is a difference between the concept of project success factors and project success criteria."

"There are various success factors in construction projects considered by several number of researchers."

"There are limited studies addressing success factors in construction projects in Jordan."

"The current study seeks to realistically define critical success factors in construction projects, based on realistic data collected from the final reports of construction projects that have been implemented in Jordan."

Methodology

"The first part focused on an in-depth review of several research studies into the success factors of construction projects."

"The second part focused on collecting real data from construction projects implemented in Jordan."

"While the third part was related to assessing success factors based on the data collected in the first two parts."

Data collection

"The first part in current study includes extracting information from 42 construction projects carried out in Jordan."

"While there were more projects during that period, only projects containing details about their costs, time, and quality were selected for extraction."

"This information is necessary to evaluate the success of the construction project in terms of completing the project within the required time, cost, and quality."

Data analysis

"The data were analyzed using the SPSS software, statistical mean, and standard deviation, in addition to the normalization values determined for each success factor."

"After computing the normalization values, the criticality of each factor was evaluated (Adabre & Chan, 83)."

"Factors with normalization value ≥ 0.50 are considered as critical factors (Osei-Kyei & Chan, 84)."

"Normalization value was used to determine the criticalities of factors for public-private partnership projects in the study by (Osei-Kyei & Chan, 84)."

"The normalization value for each factor was calculated using the following equation as used by (Adabre & Chan, 83): Factor analysis is a quantitative multivariate method in which the interrelationships between a set of continuously measured variables are defined through a variety of underlying linearly independent reference variables (Hardcastle and others, 85)."

Results and analysis

"This study considers these factors as the critical success factors for construction projects."

"Conformance to codes and standards in the construction projects is one of the critical success factors in this study."

"The accuracy of the preliminary estimated time of the construction project is considered to be an important factor in the success of the project; where the accuracy and realistic project time estimate reduce the delay rate for completion of the project."

"The selective tendering is indicated as a success factor in construction projects, because

the owner invited contractors with high efficiency and capability to implement the project."

"This study agreed with current study in identifying the quality and finance as critical success factors in construction projects."

"The results of this study are consistent with those studies (Lim & Mohamed, 86; Sadeh and others, 87; Shenhar and others, 88) in identifying cost, time, and quality as critical factors for the success of construction projects."

Conclusion

"The present study uses an alternative data set to identify the critical success factors affecting the local construction industry by analyzing data from documents of some construction projects in the region."

"The significant findings of this study are: The top critical success factors for construction projects in Jordan are no disputes in the project, the value of bid bond, location of company, no defects in the project, conformance to codes and standards; and accurate bill of quantities."

"The results of this study encourage future researchers to verify the application and reliability of these critical success factors by conducting a similar survey of a sample of other projects."

"The implications of this research study can be summarized as follows: Determining the most prominent factors for the success of construction projects in this study will encourage other researchers to search for other causes."

Business, Organisational and governance modalities of collaborative cybersecurity networks [171]

This is a machine-generated summary of:

Tagarev, Todor; Davis, Bríd Á.; Cooke, Michael: Business, Organisational and governance modalities of collaborative cybersecurity networks [171]

Published in: Multimedia Tools and Applications (2021)

Link to original: <https://doi.org/10.1007/s11042-021-11109-2>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Novel organisational solutions are needed to deliver advantages vis-à-vis both threat actors and competitors."

"The European Union sees one potential solution in the establishment of a network of cybersecurity competence centres."

"The major challenge in creating networked organisations is to provide long-term, effective collaboration through adequate governance and management."

"To support the elaboration of a solid governance model of a cybersecurity competence network in a Horizon 2020 research project, this article presents the results of a study of 92 existing network organisations working in cybersecurity and closely related fields."

Introduction

"It will present and discuss the results of the ECHO governance-related research activities, and in particular 1) the study of the range of current business models, 2) the identification of organisational models for collaborative networked organisations (CNOs) with a higher degree of complexity, i.e., incorporating various thematic activities and national or regional units, with a particular interest in CNOs serving as a "Virtual Breeding Environment" [89], and 3) their current governance models."

"Section 4 focuses on identifying organisational models of CNOs with a higher degree of complexity, i.e., incorporating various thematic activities and national or regional units, with a particular interest in CNOs serving as a "Virtual Breeding Environment," while

Section 5 presents the findings on governance models, i.e., the primary considerations or 'dimensions' for presenting the governance model of a networked organisation and identified clusters."

Methodological approach

"The first phase involved examining project documentation, the literature on governance, and the gathering of consortium expertise on the range of issues linked with network governance, business models, and CNO coordination and management."

"This resulted in a final template containing 17 governance issues and questions and the main parameters of business and governance models to be discussed with the networks in subsequent phases."

"Excluded from the analysis were networks identified as being part of a larger hierarchical organisation, although they may have possessed specific expertise or capabilities in cybersecurity."

"We focus on the results of the secondary analysis of the data gathered through the preliminary analysis of existing networked organisations."

Business models and patterns

"The business models used by existing networked organisations can be presented in a two-dimensional space, with the degree of coordination of member organizations' operational and development activities in one dimension and a combination of their profit (or non-profit) orientation and primary funding streams in the other."

"But not to the same degree, 19% of the analysed CNOs used one designated point of contact for every main service/product (n = 9), while 17% of the sample positioned each CNO member to contract network products and services (n = 8)."

"There were examples, although few (n = 2 at 29%), of for-profit CNOs, utilising a balanced funding stream with a somewhat equal mix of public and commercial sources."

"It was determined that regarding the 'degree of coordination' classification, most of the existing networks were not-for-profit, relying solely on public funding (n = 11; 23%), or on a balanced funding stream (n = 6; 13%) operationalised under the constraints of a single process-single centralised point."

Organisational modalities of collaborative networked Organisations

"The analysis of existing collaborative networks allowed the exploration of more complex organisational modalities, where the CNO involves one or more types of legal entities of a different type."

"They are formed as a 'programme' or an initiative of an existing organisation or function on the basis of an agreement, often an international agreement, designating an organisation serving as the legal entity representing the network."

"Of higher interest for the future evolution of the ECHO network, and the European network of cybersecurity competence centres more generally, are existing organisational collaborations where the CNO includes or is related to one or more types of constituent legal entities."

"Of highest interest in creating a new collaborative networked organisation in the field of cybersecurity is when the CNO serves as a Virtual organisation Breeding Environment (VBE) and CNO governance bodies decide to create a new Virtual Organisation (VO)."

Prevailing governance models

"A simple majority, requiring just over half of the weighted votes of members; 2."

"A qualified majority, e.g., over two-thirds of the weighted votes of CNO members; 3."

"A simple majority (i.e., over half of the votes cast), with each vote carrying equal weight; 4."

"A qualified majority (e.g., two-thirds of the votes), with each vote carrying equal weight; 5."

"The most common means of making decisions employed by all CNOs (regardless of profit orientation) was by a simple majority (i.e., over half of votes cast), with each vote carrying equal weight, at 30% (n = 18)."

"15% of the sample worked on the basis that All participating CNO members are represented, with an equal vote for each CNO member (n = 9), followed in turn by CNOs employing a Broad representation approach at 10% (n = 6)."

Conclusions and way ahead

"By analysing existing CNO networks, with their publicly acknowledged governance objectives, practices, and requirements and the information related to their business and

governance models, we can gain a good understanding of the prevailing practice."

"This means identifying best-practices in terms of elaborating and implementing governance models of CNOs; collating and clustering examples of good business and governance models of current well-functioning networks in order to propose potential alternatives in the context of the developing ECHO research; and guiding the prioritisation of governance needs and objectives [90]."

"What has been presented here in terms of findings related to best practice, governance model clustering, and relevant organisational models, is intended to guide and steer the development and evaluation of new, alternative governance models consistent with the needs and characteristics of the ECHO network, that can form the foundation for a robust, adaptable, and sustainable governance model."

Application of Axiomatic Design and Design Structure Matrix for Early Identification of Changes in Construction Projects [172]

This is a machine-generated summary of:

Padala, S. P. Sreenivas: Application of Axiomatic Design and Design Structure Matrix for Early Identification of Changes in Construction Projects [172]

Published in: Journal of The Institution of Engineers (India): Series A (2022)

Link to original: <https://doi.org/10.1007/s40030-021-00612-2>

Copyright of the summarized publication:

The Institution of Engineers (India) 2022

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Changes are inevitable in construction projects."

"Changes can be better understood through modeling parameters relationships."

"Axiomatic Design (AD) and Design Structure Matrix (DSM) are two popular matrix-based modeling concepts that can model changes from a parameter perspective."

"AD guides the designers to examine changes by modeling requirements and parameters relationships in a structured manner from early design stages."

"DSM provides a methodology for analyzing changes through modeling interactions among the parameters."

"In spite of potential benefits of matrix-based approaches, previous studies have not dealt with combining AD and DSM for project change management research."

"The objective of this study is to conduct an in-depth investigation of these matrix-based design concepts to understand their applicability for better control on changes in construction projects."

"The novelty and unique contribution of this research work is development of AD-DSM framework to identify changes and its propagations due to functional and information couplings at conceptual design phase of construction projects."

"The present study models the relationship of design parameters for accurate identification of changes."

Introduction

"An initiated change can occur from the inadequate briefing of requirements in the early design stages, whereas an emergent change is caused by problems in the design process or errors."

"Literature review revealed that integrating AD and DSM in the conceptual design stage can eliminate unnecessary changes or rework at later stages of the project."

"AD and DSM are the potential to analyze changes from a parameter perspective."

"DSM [92] provides a structured methodology to examine changes that occurred due to the

iterative nature of the design process."

"AD can aid to identify changes early in DSM."

"This paper represents an initial effort to apply the principles of the AD and DSM in construction projects for change management."

"The objective of this study is to apply AD and DSM concepts to understand their applicability for better control of changes in construction projects."

Research Methodology

"Framework application consists of six steps: (1) data collection on underground metro projects—requirements, design information, construction methodology, (2) development of AD methodology during requirements identification stage, (3) identification of changes arising due to requirements conflicts in AD, (4) development of DSM methodology during the design of structures, (5) identification of additional changes due to iterations of DPs in DSM, and (6) feedback from design and construction teams."

"The proposed AD-DSM framework is applied in the conceptual design phase of the underground metro project."

"To apply AD, the data such as functional requirements (FRs) and design parameters (DPs) of underground metro project and their relationships are collected from seven industry experts using semi-structured interviews."

"To apply DSM, information relationships of DPs of components of the underground metro project are captured from the same experts using semi-structured interviews."

Case Study

"The contractor is responsible only for the design and construction of civil works."

"The concourse slab should be able to withstand passenger movement load, service equipment, and room structural dead loads."

"The platform slab is designed to allow onboarding and off-boarding trains, resist passengers waiting, track loads, facilitate smoke ventilation during any emergency, and structurally integrate with the tunnel."

"During the conceptual design stage, lack of adequate briefing on the following requirements—smoke ventilation, environmental control system, passenger entrance,

plant room foundation, erection of diesel generator (DG) and chiller (CH) equipment—leads to significant changes at the detailed design stage."

"As per the revised design, the HVAC plant room has to build in between the entrance structure and the existing building, leaving less space."

"To meet the project deadlines, few design activities of the plant room and entrance structure are carried out in parallel without considering their information dependencies which further triggered redesigns."

Analysis and Results

"The changed FRs and DPs associated with the proposed design are identified for the plant room."

"It means, due to the inherent complexity and iterative nature of the design process, the FRs which are not part of coupled FRs are also get affected and initiated additional changes in components of the underground metro project."

"A single change in IFR7-support cable trench erection affects three DPs: DP2-plant room layout, DP15-entrance design, and DP6-station wall width of the underground metro project."

"These additional repetitive changes in DPs—DP13-pile foundation area and DP2-plant room layout—can be originated due to errors in the finalization of DPs during the design of the underground metro."

"Project requirements FRs and IFRs and design solutions DPs of FRs and IFRs need to be finalized in the conceptual design phase itself so that all possible changes can be identified and resolved with a minimum effort."

Discussions

"The proposed AD-DSM framework can identify and track different types of changes such as a change in project requirements—FRs and IFRs, changes in solutions in terms of DPs, and change propagations in FRs and DPs."

"Additional changes in FRs and DPs due to iterations can also be identified using a proposed framework in a structured manner."

"Although the proposed integrated AD and DSM framework can provide a structured methodology to address change handling issues, it has certain limitations in terms of

applicability."

"When the scale of the design matrix gets very large, the effort required to build AD and DSM also increases."

"When the number of FRs increases, the number of combinations will grow in a geometric progression, and the rearrangement of the design matrix in both AD and DSM will be extremely time-consuming."

Conclusions

"The novelty and unique contribution of this research work is development of AD-DSM-based framework to identify changes and its propagations due to functional and information couplings at conceptual design phase of construction projects."

"Using the proposed framework, changes that arises at construction stage of project can be avoided and negative impacts can be minimized."

"AD provides a structured methodology to identify changes by modeling dependencies of FRs and DPs."

"DSM further enables teams to identify changes by capturing information dependencies among DPs."

"Due to the complementary benefits of AD and DSM concepts, changes arising due to both functional and information couplings can be identified in an integrated manner."

"Further, the proposed framework can also aid to identify necessary and unnecessary changes in any construction project."

"The findings from the case study indicate that changes can arise due to both functional and informational couplings."

Scope for Future Research

"Failure to understand critical couplings will delay the process of identifying and implementing critical changes."

"Tearing process is not explored as the scope of the study is to identify unavoidable changes."

"The tearing process will help to remove feedbacks above the diagonal of the DSM matrix

as a result unnecessary or avoidable changes can be eliminated in the project."

A hybrid multi criteria decision making approach for consultant selection problem in ERP project [173]

This is a machine-generated summary of:

Avikal, Shwetank; Nigam, Mukesh; Ram, Mangey: A hybrid multi criteria decision making approach for consultant selection problem in ERP project [173]

Published in: International Journal of System Assurance Engineering and Management (2021)

Link to original: <https://doi.org/10.1007/s13198-021-01505-0>

Copyright of the summarized publication:

The Author(s) under exclusive licence to The Society for Reliability Engineering, Quality and Operations Management (SREQOM), India and The Division of Operation and Maintenance, Lulea University of Technology, Sweden 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Proper selection of ERP consultant is challenging task for any top management of organization because consultant fees accounts a major portion of project cost and this problem may be considered as Multi criteria decision-making problem."

"This article presents the hybrid approach of Fuzzy Analytical hierarchy process (F-AHP) and COPRAS-G in selection process of ERP consultants."

"F-AHP is used to obtain the weight of selection criteria and COPRAS-G is used to get the final ranking of consultants based on utility degree."

"The result of F- AHP highlights that reputation, ERP project experience and partner of ERP vendor and cost is an important selection criterion for selecting consultant and rank reversal problem has been greatly reduced by COPRAS-G. This proposed hybrid technique is quite flexible and provides efficient decision making in the selection of an ERP consultant."

Introduction

"Shadi and others (93) has defined ERP is an Information Technology (IT) business solution which enables Organizations and their Stakeholders for management of project effectively & efficiently throughout the lifecycle of project."

"Aloini and others (94) highlighted the issue of ineffective consulting services in ERP project; hence, proper strategies/methodologies towards selection of consultant may be required."

"Consultant's industry experience, project management capabilities and experience in previous project in similar type industry and communication ability has been seen as desirable attributes in the selection of ERP consultant (Hung and others 95)."

"The main aim of this work is to propose a MCDM Approach for solving the problem of consultant selection in ERP projects."

"In presented work, various criteria have been considered for Decision- Making (DM) process in selection of suitable ERP consultant; hence a hybrid MCDM approach based on F-AHP & COPRAS-G has been applied."

Literature review

"Hiring a suitable consultant to implement ERP system is a customary approach to procure expertise that is not available in client organization."

"ERP consultant provides various services such as providing technical upgrades and business expertise, enhancing learning capabilities of client, helping in preparing technical specification of ERP software requirement, offering technical knowledge on the software, on the job training of users, streamlining procedures and protocols of the organization with system modules, providing assistance in customization and configuration of the system and suggesting appropriate solutions to adoptive customers (Nah and others 96; Wang and others 97)."

"Chang and others (98) have explored the control mechanisms that are utilized in ERP projects for ensuring that the ERP consultant is working to fulfil the client's business needs."

"Kumar and others (99) have proposed eight selection criteria for ERP consultant by respondents."

"Tsai and others (100) have applied an AHP technique to select the suitable consultant based on three attributes namely ERP approaches."

"Ozalp and others (101) have proposed the ERP Consultant selection problem by AHP, ANP and F-AHP methodology."

Methodology used in research

"In COPRAS, criterion weighs and ranking of alternative used the crisp numerical data."

"Zavadskas and others (102) have proposed COPRAS-G, in which the attributes are reflected in periodic values, most suited for real-world DM and in the implementation of the grey theory."

"Zavadskas and others (103) have proposed COPRAS-G for selection of construction project managers."

"Zavadskas and others (104) have used COPRAS-G and TOPSIS grey for risk assessment problem in construction projects and compare the ranking of projects."

"Maity and others (105) have applied COPRAS-G to rank alternatives on the basis of their importance and usefulness."

"Nguyen and others (106) have used the hybrid methodology of Fuzzy ANP and COPRAS-G for selection of suitable machine tool."

"COPRAS-G is suitable for problem with uncertainty, subjective and imprecise data."

"The steps of COPRAS-G are given as following (Nguyen and others 106; Zavadskas and others 104): Step 1: Find out the important criteria to define alternatives."

Problem formulation

"The selection as well as implementation of ERP system is still a significant challenge for

most of the organizations, though vendors and customers have acquired more experience and expertise in establishing the system."

"Based on literature review, it is utmost important to hire a consultant for achieving the project objective set by organization but no suitable methodology is available in literature for selection of consultant in ERP project."

"Suitable decision-making methodology may select the best consultant who can enhance the quality of system and achieve the targeted goals of organizations."

Proposed research methodology

"Consultant selection is most important activity in ERP Project."

"In presented article, a hybrid approach based on F-AHP and COPRAS-G is proposed."

"F-AHP evaluates the weights of criteria and COPRAS-G is applied to get the final ranking of consultants."

"The following steps of this methodology are as follows: Step 1: Formation of a team of expert and selection of criteria In this step, choose the decision makers who have knowledge and experience in ERP project and involved in consultant selection."

"These matrices are utilized by the F-AHP which is used to evaluate the weights of the criteria."

Case study on ERP consultant selection problem

"Step 1: Formation of a team of expert and selection of criteria To demonstrate the application of this model in ERP consultant selection problem, five decision makers from 4 different Indian organizations were asked a set of questions pertaining to selection of ERP consultant."

"These decision makers were involved in choosing ERP consultants."

"The reputed consultants who were involved in ERP project of various organizations in India were selected as Decision makers."

"Step 2: Determine the weight of criteria Weight of criteria has been evaluated by Fuzzy AHP method."

"Step 3: Determine the final rank of ERP consultant In this step, COPRAS-G approach is

used for final ranking of ERP consultant."

Sensitivity analysis

"To ascertain the robustness of the process and reduce the problem of rank reversal, this analysis has been performed for COPRAS-G. For the determination of the effect of the weights of criteria on decision making, this method has been used to create various scenarios by exchanging different criteria weights that may change the rank of alternatives (Senthil and others 107)."

"In SA, different names are given in experiments such as QQ12 indicates that the weights of the attributes one and two are exchanged."

"QQ13 means the weight of attributes 1 and 3 are exchanged."

Discussion and conclusions

"Appropriate hybrid methodology of Fuzzy AHP and COPRAS-G has been proven useful to provide effective decision during selection of consultants in ERP project."

"The result shows that top four important criteria for consultant selection in ERP project are reputation, ERP project experience, partner of ERP vendor and cost."

"The results from SA show that hybrid model of F-AHP and COPRAS-G for selection of consultants in ERP project is very robust and manageable."

"For future study, other MCDM approaches have been applied to solve the similar problem and develop the expert system for selection of consultants in ERP project."

"The main limitation of the study is implementation of proposed approach on the consultant selection in ERP project of Indian fertilizer industries only."

"Some other MCDM approaches could also be applied to solve the same and similar types of problem and to develop the expert system for selection of consultants in ERP project."

This is a machine-generated summary of:

Gholizadeh-Tayyar, Shadan; Okongwu, Uche; Lamothe, Jacques: A Heuristic-Based Genetic Algorithm for Scheduling of Multiple Projects Subjected to Resource Constraints and Environmental Responsibility Commitments [174]

Published in: Process Integration and Optimization for Sustainability (2021)

Link to original: <https://doi.org/10.1007/s41660-020-00150-7>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Nature Singapore Pte Ltd. part of Springer Nature 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Resource-constrained project scheduling problems have been abundantly presented in extant literature."

"These challenges include environmental commitments and constraints related to the procurement of resources (as regards procurement commitment)."

"This calls for the integration of the project planning and forward-reverse supply chain planning systems."

"To achieve this goal, this paper contributes to the existing literature by presenting a model that incorporates the two issues in the integrated planning system: (1) the procurement commitment objective is met through the just-in-time delivery of non-renewable resources to the project sites while considering the limited supply capacity of suppliers, and (2) the environmental commitment is satisfied by collecting and recycling the waste generated at project sites."

"Since the model is NP-hard (non-deterministic polynomial time-hard), the paper develops

a new heuristic-based genetic algorithm to solve the problem instances."

"The integrated planning model that is proposed in this paper and its novel resolution method would help managers to make more responsive and efficient decisions."

Introduction

"The consideration of these issues leads to asking the following questions: What modelling framework can be used to optimally plan and schedule activities in multiple projects that are subjected to the just-in-time delivery of non-renewable resources by suppliers with limited supply capacity, while taking into consideration the environmental concerns related to the collection and recycling of the wastes generated at the project worksites?"

"The main specificities of the implementation and accomplishment of the thermal renovation projects in the CRIBA context are as follows: Just-in-time supply of the prefabricated isolation panels with the aim of reducing the inventory levels of high-value materials on the worksites while also protecting the panels from different hazards that can damage them; Regular collection and shipment of wastes from the worksites to appropriate recycling centres in order to meet environmental responsibility objectives; Limited transportation, production and recycling capacities of the supply chain actors, coupled with the due dates and time windows that are imposed for the execution of renovation activities."

Literature Review

"In "Background of the Research", we outlined three aspects of this paper that constitute its main contribution: (1) project scheduling with the integration of issues related to material (non-renewable resource) procurement; (2) project scheduling considering environmental responsibility commitments, with specific attention to the collection, transportation and recycling of wastes generated on project sites; and (3) resolution methods, with particular emphasis on metaheuristics and genetic algorithms."

"Develop a planning system that integrates project scheduling and supply chain planning in order to create a model that considers supply chain constraints in the scheduling of the project activities and at the same time considers project planning constraints in the planning of the supply chain operations, while meeting procurement commitments (just-in-time delivery through the limited procurement capacity of the suppliers) as well as environmental commitments (recycling of waste)."

Model Development

"In our formulation mode, the determination of index $f(o,d,p)$ that represents all the potential material flows, which exist between the actors (transporting an item p from

origin o to destination d) as well as the decision variables related to this index (decision variable $TQ_{f(o,d,p),t}$ related to the quantity of the transported items between the actors) makes the presentation and application of the model not limited to the problems with a fixed number of layers in the supply chain network."

"It reduces the flexibility in the planning and does not let the model to plan to optimality the supply operations as well as the operations related to the collection and recycling of the wastes. (2) It can lead to more unnecessary transportations (to supply the non-renewable resources to project worksites or to ship the generated wastes to the project worksites), and consequently it can increase the cost in the system, whereas, by excluding these activities from the activity-on-node diagram, the demands for the non-renewable resources in the project sites as well as the quantities of the wastes that should be transported to the recycling centres can be regrouped."

Solution Method

"The modified earliest and latest start dates enhance the main phase of the resolution method by generating the feasible candidates for the start time of activities."

"The main intention of our search procedure is to determine the feasible start date for the activities of projects by considering the interactions between the project scheduling constraints and forward supply chain planning constrains, and then to propagate the impact of the constructed solutions on the reverse supply chain to generate optimized solutions for its variables."

"Using the following principles, it schedules the activities at the precedence and resource-feasible start time: i. Each activity should be started at a time point between its modified earliest start time and latest start time."

"Considering the activities that start at different time points, the total demand for non-renewable resources at every time point t is calculated."

Computational Experiments

"The RPD results are used to conduct the S/N analysis and to determine the robust values of the parameters of the genetic algorithm in each size category of the instances."

"The resolution time by the Cplex solver in the small-and medium-size instances is respectively 4 and 1265 s. In the large case, the solver ends up after 17,940 s (4 h and 59 min) without returning any solutions."

"The resolution time for solving the same instances by the proposed algorithm is 16 s, 699

s and 4442 s respectively in small, medium and large sizes."

"Since the resolution of the model by the Cplex solver is traceable for small and medium instances, the results of the application of the proposed algorithm on 50 instances of these sizes are used to calculate the Gap indicator."

Conclusion

"This paper aims to study an optimization model for planning a set of multiple projects considering material procurement and environmental commitments."

"The material procurement commitments are satisfied thanks to the just-in-time delivery of the non-renewable resources to the project worksites, subject to the limited transportation and production capacities of suppliers."

"These commitments are obtained by proposing a modelling framework that enables to integrate the project planning and forward-reverse supply chain systems."

"The idea for this integration stems from the fact that the project planning constraints impact the planning of the supply chain operations (production, transportation and recycling), and reciprocally the forward-reverse supply chain constraints (as well as the just-in-time delivery of non-renewable resources) affect the scheduling of activities in projects."

"For future research works, uncertainty can be integrated in different parameters of the model such as the duration of the activities, the transportation and production capacities or the demand of the activities for different renewable and non-renewable resources."

A hybrid decision-making framework to manage occupational stress in project-based organizations [175]

This is a machine-generated summary of:

Sazvar, Zeinab; Nayeri, Sina; Mirbagheri, Reza; Tanhaeean, Mehrab; Fallahpour, Alireza; Wong, Kuan Yew: A hybrid decision-making framework to manage occupational stress in project-based organizations [175]

Published in: Soft Computing (2022)

Link to original: <https://doi.org/10.1007/s00500-022-07143-3>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature 2022

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"According to recent studies in the field of human resource management (HRM), especially in project-based organizations (PBOs), stress is recognized as a factor that has a paramount significance on the performance of staff."

"Previous studies in organizational stress management have mainly focused on identifying job stressors and their effects on organizations."

"Contrary to the previous studies, this paper aims to propose a comprehensive decision-support system that includes identifying stressors, assessing organizational stress levels, and providing solutions to improve the performance of the organization."

"A questionnaire is designed and distributed among 170 senior managers of a major project-based organization in the field of the energy industry in Iran to determine organizational stressors."

"Some main advantages of the proposed hybrid decision-support model include (i) achieving high-reliable results by not-so-time-consuming computational volume and (ii) maintaining flexibility in adding new criteria to assess the occupational stress levels in PBOs."

"Some main recommendations are proposed to manage occupational stresses at the optimum level in the considered sector."

Introduction

"One of the main challenges of chief executives and HR managers in PBOs is to answer the following questions: (i) what are the major stressors that negatively impact the performance of the projects or organizations? (ii) what are the high-priority stressors? (iii) how can the level of occupational stress be assessed in an organization? (iv) is the employees' level of job stress desirable enough? (v) if not, what corrective actions should be taken?"

"To determine right answers to the above questions, decision-making models provide useful tools to identify effective organizational stressors, as well as the level of occupational stress."

"An integrated BWM-FIS model, welcomed by HR managers and chief executive officers (CEOs) of the PBO understudy, is proposed that has several advantages such as: i) While maintaining simplicity and comprehensibility, the practitioners can assess the level of organizational stress quantitatively."

Literature review

"Task stressors refer to work overload, role conflict, and role ambiguity, which are experienced by project managers (PMs) all the time along with their tasks."

"Role ambiguity occurs when there is no clarity about the expectations of the work and employees are uncertain about everyday tasks (Beehr 108; Katz & Kahn 109)."

"Numerous studies indicate that work overload, role conflict, and role ambiguity lead to stressful situations (Eatough and others 110; Lambert and others 111)."

"Organizational stressors originate from the organizational environment, such as bureaucracy, high level of formalities, non-participation in the decision-making process, and job insecurity."

"Lack of cooperation between project managers and their subordinates can also lead to low job satisfaction and hence, a high perception of stress."

"Physical stressors include poor work/home environments."

"Poor work environment refers to situations with inappropriate temperature, insufficient lighting, lack of privacy, noise, congestion in the office, etc , that can create stressful situations (McDonald & Ronayne 112; Taap Manshor and others 113)."

Research gap analysis

"This paper is among the first attempts to develop a decision-support system to assess the level of organizational stress and manage it through a hybrid BWM-FIS framework."

"The current interdisciplinary study starts to address the above research gap that lies at the intersection of three main organizational issues: Project Management (PM), Stress Management (SM), and Decision Support Systems (DSS)."

"This study is among the first studies that address the vital issue of assessing and determining the level of stress in an organization."

"There seems to be little or no research evidence on the issue of assessing the stress level in an organization or team."

Methodology

"The best worst method (BWM) is applied to calculate the weight of stressors."

"The best worst method is a multi-criteria decision-making methodology based on pairwise comparisons and mathematical modeling."

"The weights of stressors are calculated, using the best worst method (BWM)."

"Based on Rezaei and others (114), the main advantages of BWM are as follows: (i) this method obtains highly reliable and consistent results because it applies a very structured pairwise comparison (ii) in this method, just two comparison vectors exist, which implies less effort for data gathering process (iii) the reliability of this method is high, because the collection and analysis of data for two vectors are more structured than a full matrix, and (iv) BWM can easily be integrated with other MADM methods."

Implementation of the proposed BWM-FIS model

"This questionnaire is distributed among more than 170 experienced experts of an industrial major corporation's project management office (PMO)."

"The corporation also hires experienced project managers, specialists, and experts."

"These stressors are work overload, job incongruity, poor organizational structure, poor project environment, poor job promotion, and type A behavior."

"The proposed solutions can be into three categories: long-term/strategic, mid-term, and short-term solutions."

"Considering the categorization above, it can be inferred that job redesign and enhancing employees' participation are the strategic solutions."

"Workshop designing to deal with role clarity (especially for each project team), role analysis, and health and wellness programs can be seen as short-term solutions."

"When the level of stress in the organization is very low, job redesign, developing self-conducted teams, and encouraging supportive leadership style are considered strategic solutions, while using motivational techniques and designing competition programs for teams/projects are respectively mid-term and short-term actions."

Validation and sensitivity analysis

"Three validation methods are performed to show the robustness of the proposed hybrid BWM-FIS in assessing the occupational stress level in PBOs: 1) analyzing the consistency ratio of BWM, 2) comparing the performance of the applied decision-making approach with traditional ones, and 3) analyzing the obtained results of the proposed FIS by applying various defuzzification techniques such as COA (Center Of Area), MOM (Mean Of Maximum), BOA (Bisector Of Area), SOM (Smallest Of Maximum), and LOM (Largest Of Maximum) (Amindoust & Saghafinia 115)."

"To show the validation and verification of the developed method, the BWM results are compared with those obtained by a traditional method, i.e., the AHP."

"Changing the defuzzification method is an appropriate way to verify the robustness of a FIS-based model."

"Regarding this table, changing the defuzzification method does not affect the final result, and the level of occupational stress is still in the high-risk situation."

Discussion and managerial implications

"Job redesign: Based on the senior executives' opinions, job redesign, as a long-term and strategic solution, has a high priority for implementation."

"It implies that employees are responsible for carrying out, organizing, and controlling their assigned tasks concurrently (Kopelman 116)."

"Workshops designed to address these issues help employees have a solid understanding

of their role, responsibility, and accountability, and reduce role conflicts stemming from different incompatible interfering expectations (Verma 117)."

"The counseling office addresses the person-related problems by directly meeting with the employees and playing a mediator role in balancing their lives."

"It is noteworthy to say that these three solutions have a great impact on conflict resolution at the organizational level, interpersonal level, and personal level."

"Based on the experts' opinion, "improvement of interpersonal behavior", which serves as an organizational solutions, is of less importance in the organization under study."

Conclusion

"The current study has proposed a hybrid BWM-FIS framework to introduce a stress assessment model in project-based organizations."

"Although occupational stress influences employees' performance directly, there is a lack of attention to developing decision-making frameworks for the research problem literally."

"Using BWM, the weights of the identified criteria were determined."

"The stress level of the organization was assessed via proposing a FIS."

"The results obtained from the FIS model showed that the stress level of the organization was at a high-risk level."

"On, through conducting brainstorming sessions and interviews in the presence of executive managers, HR, and PM managers, three main corrective measures (job redesign, holding workshops to deal with role clarity and role analysis, establishing a counseling office) were selected to improve the stress level and, consequently, the performance level of employees, especially project managers, would heighten."

Shaping the creative landscape through the role of digital and computer technologies in advancing art product design and industry applications [176]

This is a machine-generated summary of:

Zhao, Jianxia; Cai, Xiangyu: Shaping the creative landscape through the role of digital and computer technologies in advancing art product design and industry applications [176]

Published in: The International Journal of Advanced Manufacturing Technology (2023)

Link to original: <https://doi.org/10.1007/s00170-023-11844-w>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer-Verlag London Ltd., part of Springer Nature 2023

Copyright comment: Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The rapid evolution of digital and computer technologies has transformed the creative landscape, influencing art product design and industry applications."

"This study aims to explore the impact of these technologies in shaping contemporary art product design and identifying the key trends driving industry growth."

"The study concludes that embracing digital and computer technologies is vital for continued innovation in the creative sector and highlights potential future developments that can further advance art product design and industry applications."

Introduction

"The creative landscape has undergone significant transformation in recent years due to the widespread adoption of digital and computer technologies [118]."

"This technology has been employed in a wide range of applications, from product design [119] and jewelry [120] to biomedical devices [121] and automotive components [122]."

"The adoption of digital and computer technologies has also fostered a more global, interconnected creative landscape [123]."

"The environmental impact of digital technologies [124] and the digital divide [125] must be considered when assessing the benefits and drawbacks of these advancements."

"In light of these developments, this study aims to provide a comprehensive analysis of the role of digital and computer technologies in shaping the creative landscape, with particular emphasis on their applications in art product design and industry."

"2 reviews and summarizes the literature related to the role of digital and computer technologies in advancing art product design and industry applications."

"5 examines the integration of advanced software, hardware, and innovative techniques in the art and design process."

Related works

"This research delves at the possibilities of 3D printing for use in the hands of creatives to make one-of-a-kind works that push the boundaries of conventional craftsmanship. ""

"Several other works, some of which are linked to this one, have also investigated the use of VR/AR in the creative industries."

"Virtual and augmented reality (VR/AR) have the potential to enrich the educational experience in the fields of art and design, as discussed in "Virtual and Augmented Reality: From Entertainment to Education" [126]."

"The authors argue that students might benefit from a more thorough comprehension of art and design principles because to the immersive and interactive experiences made possible by these technologies. ""

Proposed architecture

"The proposed architecture for implementing the study "Shaping the Creative Landscape through the Role of Digital and Computer Technologies in Advancing Art Product Design and Industry Applications" involves a combination of hardware and software components to enable data collection, analysis, and visualization."

"The data collection component involves gathering data from a variety of sources, including online surveys, interviews with artists and designers, and analysis of industry reports and publications."

"The data collection process requires the use of specialized hardware and software tools, such as web scrapers, survey software, and online analytics tools, to gather and store data in a central repository."

"The data analysis component requires the use of specialized software tools, such as statistical analysis software, data visualization tools, and dashboarding software."

"The data collection, processing, analysis, and visualization components require specialized hardware and software tools, as well as skilled personnel with expertise in data management, statistical analysis, and data visualization."

Discussion

"As designers and contractors suggest new materials and methods, the specification may be utilized to ensure they are up to par. Project managers and contractors benefit from having access to up-to-date information in digital format for the purposes of planning and managing workloads, which enhances supervision and guarantees the use of best practices."

"Software developed for a particular workflow should be able to share data with the other tools involved in the process, accept design data, and classify objects as needed."

"GIS gains a new level with the addition of geo design tools, which may dictate the scale, materials, and placement of proposed build types within a landscape setting."

"One of the biggest breakthroughs that has increased designers' capacity to prototype and experiment with responsive technologies is the availability of technical tools, access to software development, and hardware prototyping in the previous decade."

"Both the technologies employed in their production and the rapidly developing technological landscape that is influencing environmental design are discussed in the case studies."

Results

"In order to disclose the observable geometries and 3D features of a site, students may now evaluate the spatial compositions of landscapes at an early stage of the design process using very basic modelling approaches thanks to recent advancements in 3D digital

modelling."

"To help the student focus on the spaces that the elements within the designed landscape will create in terms of "rooms," or spatial sequencing, the landforms, paths, buildings, and canopy trees in this example are constructed as measured abstract forms and then intentionally rendered with a limited color palette."

"Complex phenomena at a site may be simulated with the use of modelling software, allowing for better decision-making in dynamic environments."

"Extracted data is used to create a simulation model of the physical environment."

"A "selective reality" emerges when this logic produces a model or simulation, which is then fine-tuned through observations of the physical world and utilized to alter, measure, and quantify particular parts of reality."

Conclusion

"The purpose of this research is to examine how these technological developments have affected the evolution of modern art product design and to pinpoint the most important themes."

"The conventional limits of the sector have also been dramatically altered as a result of the incorporation of technology, which has opened up new channels for cooperation, resource sharing, and worldwide communication."

"The research finds that the creative sector must fully embrace digital and computer technology in order to maintain a culture of innovation, and it indicates promising directions for future research that might have far-reaching effects on the fields of art product design and industrial applications where the extracted data is used to create a simulation model of the physical environment."

Prioritizing Management Success Factors in Offshore Software Development [177]

This is a machine-generated summary of:

Akbar, Muhammad Azeem; Mahmood, Sajjad; Khan, Arif Ali; AlSanad, Ahmed; Gumaei,

Abdu: Prioritizing Management Success Factors in Offshore Software Development [177]

Published in: Arabian Journal for Science and Engineering (2020)

Link to original: <https://doi.org/10.1007/s13369-020-04607-2>

Copyright of the summarized publication:

King Fahd University of Petroleum & Minerals 2020

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"There is a lack of understandings of the factors associated with successful management of OSD projects."

"The objective of this study is to identify and prioritize the factors that contribute to successful management of OSD projects."

"We conducted a systematic literature review (SLR) to identify a set of factors that influence successful management of OSD projects."

"Findings of the study indicate that standards and procedures, change management engineering and trust building between distributed teams are key factors for the successful execution OSD projects."

Introduction

"Despite the importance of project management in OSD, few research studies have been conducted that investigate the problems faced by the offshore software organizations."

"We believe that the understanding of the factors associated with successful project management in the context of OSD can assist the software firms to improve their project management strategies and execution."

"This research study aims to (i) identify the success factors of software project management in the context of OSD by using a systematic literature review (SLR); (ii) collect feedback about the SLR findings from real-world practitioners by using a questionnaire survey; and (iii) prioritize the identified success factors using analytic hierarchy process (AHP)."

"RQ1: What are the success factors that influence offshore software project management, as reported in the literature?"

"RQ2: What are the success factors that influence offshore software project management, as identified in real-world practices?"

Background and Motivation

"Sabherwal [127] also reported that lack of sharing of knowledge between client and vendor organizations leads to OSD project failures."

"There is no systematic study that identifies success factors of OSD projects and prioritizes these factors for the practitioners."

"We believe that such a study is important for both scholars and practitioners to better understand factors that influence successful management of OSD projects."

"There is no study that prioritizes success factors of OSD project management."

"We believe that findings of this study will assist the practitioners to the strategies for the successful execution of project management activities in the context of OSD."

Research Methodology

"We followed the five main steps of SLR: (1) identify research questions for overall objectives of the study; (2) search strategy; (3) study selection process; (4) quality assessment; and (5) data extraction and analysis."

"For SLR, we developed the following research question: RQ1: What are the success factors of offshore software project management, as reported in the literature?"

"In this study, we use analytic hierarchy process to prioritize management success factors for offshore software development project."

"The objective of the questionnaire survey was to collect feedback from industry

practitioners about the identified success factors and how they perceive each factor's influence on the management of offshore software development projects."

"Section-3 (Open ended), the purpose of this section is to allow participants to provide new success factors based on individual experience during management of offshore software development projects."

Study Findings

"SF5 (standard and procedure) was found as the most significant success factor for the successful implementation of project management in offshore software development outsourcing."

"The study indicates that SF23 (clearly defined role and responsibilities of overseas teams) as an important success factor for deploying the effective project management activities in geographically distributed development environment."

"The results also indicate that SF33 (encouraging communication and collaboration, 91%) is the second most significant success factor for the successful implementation of project management activities in offshore software development environment."

"SF4 (common communication infrastructure between offshore sites, 89%) was the third most significant coated success factor of project management in the domain of offshore software development environment."

"This indicated that out of thirty-six reported success factors, SF5 is the most significant success factor for the successful implementation of software project management activities in OSD."

Discussion

"The findings of this study will contribute to the body of knowledge for researcher and practitioner for the success and progress in of software project management activities in offshore software development context."

"We incorporate two well-established empirical software engineering techniques (i.e., systematic literature review and questionnaire survey) for the study of factors that contribute to successful management of offshore software development projects."

"The study provides a body of knowledge for practitioners by prioritizing success factors for managing offshore software development projects."

"The taxonomy of prioritized success factors developed by AHP process will help practitioners focus on six core aspects of managing offshore software development projects."

"In a nutshell, the study results serve a knowledge base for practitioners that can potentially help them in successful management of offshore software development projects."

Comparison with Existing Similar Studies

"Another systematic literature review study conducted by Silva and others [128] identified 23 factors that can negatively impact the global software project management activities."

"They identify the best practices that might be useful to address the critical challenging factor of global software project management activities."

"They also identified the factors that are most critical to address for the success and progression of global software project management activities."

"No studies have been conducted to identify and prioritize the factors that contribute to successful management of OSD projects."

"Presented in this paper, we have performed the systematic literature review with an extensive set of literature and explore 36 success factors that could positively influence the offshore software project management activities."

"We have applied the analytical hierarchy process to prioritize the identified factors with respect to their significant to offshore software project management activities."

Conclusion and Future work

"The importance of software project management in OSD motivated us to investigate and prioritize the success factors which are vital for improving the activities of project management in OSD, though, by using SLR approach, we identified a total of 36 success factors."

"According to the responses of the survey participants, all the investigated success factors have positive effect on software project management activities in OSD."

"The findings of the study provided a framework which is helpful for practitioners in order to assess and improve their software project management activities in geographically

distributed development environment."

"In future, we planned to conduct a multivocal literature review study in order to investigate the additional success factors of software project management in the context of offshore software development outsourcing."

"We plan to conduct a study to identify the challenging factors and the best practices of software project management in geographically distributed development environment."

A comprehensive overview of software product management challenges [178]

This is a machine-generated summary of:

Springer, Olga; Miler, Jakub: A comprehensive overview of software product management challenges [178]

Published in: Empirical Software Engineering (2022)

Link to original: <https://doi.org/10.1007/s10664-022-10134-5>

Copyright of the summarized publication:

The Author(s) 2022

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Software product managers play an important role in the software development organization while being responsible for the strategy, business case, product roadmap, high-level requirements, product deployment (release-management), and retirement plan."

"This article explores the problems that affect the software product management process, their perceived frequency and perceived severity."

"The data were collected by a systematic literature review (5 main databases were analyzed), interviews (10 software product managers from IT companies), and surveys (89 participants)."

"95 software product management problems assigned nonexclusively to 7 areas were identified."

"27 commonly mentioned software product management problems were evaluated for their perceived frequency and perceived severity."

"Some of the identified problems spanned beyond the software product management process itself, but they all affect the work of software product managers."

Introduction

"It is closely related to other areas of software engineering such as: strategy development, requirements engineering, project management, agile software development, product marketing, and business analysis (International Institute of Business Analysis 129; Project Management Institute (PMI) 130)."

"This indicates that the research in the topic of the problems of software product management is still open, as the understanding of the specific problems and the evaluation of their frequency and severity require further study (Maglyas and others 131; Ebert and Brinkkemper 132; Maglyas and others 133; Jantunen and others 134; Bekkers and others 135)."

"The goal of this research is to identify and evaluate the problems of software product

management from the perspective of software product managers."

"The research questions are as follows: RQ1: What problems are recognized by Software Product Managers?"

"RQ2: What is the perceived frequency of software product management problems by software product managers?"

"RQ3: What is the perceived severity of software product management problems by software product managers?"

Background

"The framework also defines the activities that happen when a product is already on the market: commercialization and manufacturing operations, and problems related to software product management may occur throughout the entire product lifecycle."

"Software product managers also orchestrate the activities related to development, marketing, sales and distribution, and service and support."

"This is why the problems from the perspective of the Software Product Managers may be related to a wide range of processes, activities and responsibilities of other teams/departments/roles."

"The role of the Software Product Manager and the responsibilities attached to this role differ between companies."

"Given the range of the software product manager's activities and responsibilities defined in the software product management frameworks, it can be assumed that problems may relate to many more aspects of product development and its lifecycle."

Research method

"Our research comprized three steps: (1) identification of the problem areas related to software product management, (2) identification of the problems related to software product management in particular problem areas, (3) evaluation of the perceived frequency and perceived severity of the problems."

"Because of that, we extracted a list of topics mentioned in the context of software product management problems from each selected paper and categorized them into problem areas using keyword analysis, ground knowledge and our industry experience."

"A list of software product management problems was extracted separately from each interview preserving the original interviewees' statements."

"In the third part of the survey, we asked the respondents if they had experienced any other problems in software product management together with the evaluation of their severity, and provided the opportunity to leave an email address to receive the research results."

Results

"Full-text analysis of the selected papers showed that the majority of the mentioned problems were not directly related to the software product management process and the perspective of the software product manager."

"We found out that the reviewed papers named many areas and topics where software product management problems might occur."

"The same problems (codes) that were indicated in different interviews were merged, resulting in a list of 163 software product management problems."

"We observed only one statistically significant difference ($p = 0.028$ for perceived frequency and $p = 0.041$ for perceived severity, $\alpha = 0.05$) for problem P19 "Teams are not Agile, they just follow rules and do not use experimentation and a learning process," which was evaluated as more frequent and severe by non-Product Owners than by Product Owners."

"These two problems might indicate that the sheer size and complex internal structure of a large company makes software product management more problematic."

Discussion

"The evaluation of the frequency and severity shows that the problems related to non-core SPM activities that we recognized (i.e. P9, P82, P6) have a significant influence on the work of software product managers, however to check who can solve these problems and how, what the software product manager can do in such a situation, requires separate research."

"We also recognized 18 new problems in our research that we could not be matched with any of the problems of Maglyas and others Technology-related problems (P9, P85, P6, P12) were not mentioned in 2012, as probably at that time companies were not suffering from technical debt just yet and the techniques such as automated testing and continuous integration were not yet recognized by software product managers to improve product development and reduce time-to-market."

Threats to validity

"The threats of inappropriate inclusion & exclusion criteria, as well as inappropriate research questions, were mitigated by the fact that the criteria were defined by two researchers, both experienced in the field of software product management."

"The threats of bias in data extraction and subjective interpretation of the extracted data were mitigated, as the extraction of the problems and the problem areas from the final papers was carried out independently by both authors and merged into the final list following a discussion."

"We had to ask about the evaluation of the software product management problems in a fixed order due to limitations of the dedicated survey tool of the Gdansk University of Technology (Ankiety 136)."

"It must be noted that the survey results represent the subjective view of the respondents and reflect the perceived frequency and severity of the software product management problems instead of the objectively measurable ones."

Conclusions

"The main contribution of this article is the list of 95 problems related to software product management assigned to 7 problem areas together with the evaluation of the perceived frequency and perceived severity of the selected 27 problems, which answers all research questions (RQ1, RQ2, RQ3)."

"We conducted an online survey from which we obtained an evaluation of the perceived frequency and perceived severity of the selected 27 software product management problems mentioned in at least 3 interviews (RQ2, RQ3)."

"We have provided an evaluation of the perceived frequency and severity of the 27 software product management problems, both known and new."

"The resulting list of 27 unique software product management problems should be further researched, especially in terms of how companies, top managers, product managers and other stakeholders can reduce their frequency and impact on software product management."

Reconciliation of scrum and the project management process of the ISO/IEC 29110 standard-Entry profile—an experimental evaluation through usability measures [179]

This is a machine-generated summary of:

Galvan-Cruz, Sergio; Mora, Manuel; Laporte, Claude Y.; Duran-Limon, Hector:
Reconciliation of scrum and the project management process of the ISO/IEC 29110
standard-Entry profile—an experimental evaluation through usability measures [179]

Published in: Software Quality Journal (2021)

Link to original: <https://doi.org/10.1007/s11219-021-09552-3>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Software process standards and models are used in large- and medium-sized organizations to reach the Iron Triangle."

"Agile software development practices are usually used by small and very small organizations."

"The ISO/IEC 29110 series of standards and guides are now available for very small organizations, but their utilization with agile practices represents an agility-rigor reconciliation problem."

"We report the experimental evaluation of Scrum + EPG (a reconciled agile-rigorous software Project Management process from Scrum, and the Project Management process of the ISO/IEC 29110 series-Entry profile, documented in an Electronic Process Guide)."

"The statistical results support the claim that the Scrum + EPG was considered a high-quality conciliated agile-rigorous software Project Management process for the Entry profile."

"Given the scarcity of similar studies and the need for reconciling agile-rigorous software development practices, this study contributes to a plausible solution for very small organizations."

Introduction

"The correct implementation and utilization of these software process standards and models have generated relevant benefits for the organization, the customers and users, the development team and software development process, and lately for the released software product/service (Ebert, 138; Humphrey, 139; Pai and others, 140; Unterkalmsteiner and others, 141)."

"Initial studies (Laporte & O'Connor, 142; Larrucea & Fernandez-Gauna, 143; Majchrowski and others, 144) have collected evidence of positive impacts for the organization, the customers and users, the development team and process, and lately for the software product/service released in very small organizations, similar to the received for large- and medium-sized ones by using the heavier process standards and models."

"Ahimbisibwe and others (145) found in a survey of 471 agile projects that the project size is negatively associated with software process success, and thus small size projects, given that are usually sold by small and very small software development organizations, use agile practices."

Background and related work

"This ISO/IEC 29110 series for software developers has, as its foundation, two processes for the four software profiles: Project Management Software Implementation This ISO/IEC 29110 standard claims to provide a disciplined Project Management process to VSEs for pursuing essential project control and visibility issues, and a systematic Software Implementation process for pursuing the satisfaction of the consumer needs through the delivery of high-quality software products/services (ISO/IEC, 146)."

"The Software Implementation process includes six activities and uses the same three roles of the Project Management process: Customer Project Manager Work Team Hence, the Project Management and Software Implementation processes of the ISO/IEC 29110 standard-Entry profile provide a set of roles, activities-tasks, and work products (i.e., artifacts) useful for implementing a disciplined software development process targeted for VSEs."

"Pasini and others (147) proposed a new Q-Scrum process that adds roles, well-defined work products, and a fusion of the Scrum activities with the Project Management and Software Implementation ones with those of the ISO/IEC 29110 Basic profile."

Description of the experiment

"We can report the structured goal template as follows: Analyze < two Scrum processes packaged in two EPGs > for the purpose of < evaluating them > with respect to their < six usability metrics > from the point of view of the < dual academic-professional perspective > in the context of < international academic-professional participants in an off-line experimental mode > ."

"Based on the structured goal template, we formulated six statistical null hypotheses to evaluate whether the reconciled Scrum + process contained in the Scrum + EPG was identified with better score metrics than the original Scrum process contained in the Scrum EPG, from the experiment participants."

"The Attitude metric refers to the degree of the favorable or unfavorable evaluation of the expected behavior of using the evaluated artifact (i.e., in this study the two EPGs), and it was measured with three statements."

Experiment execution, results, and discussion

"These descriptive results show—before any statistical test—that the 32 international evaluators assigned higher scores, summarized in the median and mean values for the six usability metrics, for the Scrum + EPG than for the Scrum EPG."

"If the medians for the Usefulness metric for Scrum + EPG and Scrum EPG were respectively 2.00 and 1.00, then the statistical test could provide support to consider the Usefulness of the Scrum + EGP better than that of the Scrum EGP, but both would be practically low scored, and thus, this result would be not relevant."

"The six null hypotheses were rejected (i.e., the P-values obtained were less than the fixed α -value), and thus, the scores received for the Scrum + EPG usability metrics can be considered better ones than the received for the Scrum EPG for this group of 32 international evaluators."

Discussion

"This group was also classified as experts versus novices in agile practices and/or the Project Management process of ISO/IEC 29110 standard-Entry profile."

"We focused on investigating the effectiveness (measured on the six usability metrics) of a recent designed Scrum + EPG aligned to the Project Management process of the ISO/IEC 29110 standard-Entry profile."

"Thus, we consider this research can also contribute to very small software development organizations using agile practices that are interested in combining them with the best practices derived from rigor-oriented software process from standards and models, with the following issues: (1) to have available an online and free-access EPG of a Scrum process reconciled with a relevant ISO/IEC software process standard designed specifically for very small organizations, (2) to provide digital access to the reconciled Scrum process through an EPG for very small organizations, and (3) to help to disseminate the best practices provided by the ISO/IEC 29110 standard in very small organizations to reduce training costs."

Threats to validity

"Construct validity (Jedlitschka and others, 148) refers to the extent to which the instruments used for measuring the observed variables correspond really to the theoretical variables (called constructs)."

"Conclusion validity (Jedlitschka and others, 148; Wohlin and others, 149) refers to the extent to which the results can be supported with the correct statistical tests applied to the experimental data."

"External validity ((Jedlitschka and others, 148; Wohlin and others 149) refers to the extent to which the conclusions can be generalized to other similar populations."

Conclusion and future work

"We consider that this research provides contributions to the software engineering domain and practice and provides a high-quality reconciliation of Scrum and the Project Management process of the ISO/IEC 29110 standard-Entry profile."

"As future work, we recommend the following research avenues: (1) to replicate the experimental comparative evaluation of the two EPGs for obtaining more definitory results; (2) to conduct a comparative analysis blocking the four groups (i.e., expert-academic, novice-academic, expert-professional, and novice-professional) to identify characteristics associated with their usability metrics; (3) to refine and polish the Scrum + EPG for producing an ISO/IEC 29110 technical report and a complimentary guide document for very small organizations; (4) to investigate the utilization of the Means-Ends Analysis for producing customized new software process; and (5) to investigate the automatization of the Means-Ends Analysis for assisting software process design teams in

the elaboration of a customized reconciled agile-rigorous software process."

Extending the Project Management Body of Knowledge (PMBOK) for Data Visualization in Software Project Management [180]

This is a machine-generated summary of:

Couto, Julia Colleoni; Kroll, Josiane; Ruiz, Duncan Dubugras; Prikladnicki, Rafael: Extending the Project Management Body of Knowledge (PMBOK) for Data Visualization in Software Project Management [180]

Published in: SN Computer Science (2022)

Link to original: <https://doi.org/10.1007/s42979-022-01168-z>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Nature Singapore Pte Ltd 2022

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Most of the tools adopted for software project management are based on textual reports."

"The implementation of data visualization using techniques and tools for project management can help identify and prevent project issues such as unexpected budget increases, unrealistic deadlines, lack of clear goals, and success criteria."

"The results from the evaluation show that our proposal adds support to visual project management and helps to identify the status and progress of the project quickly and prevent future issues related to communication."

"Our proposal was also found to be helpful for less experienced software project managers."

Introduction

"There are several known challenges for DV in software project management (SPM) such as different processes adopted for SPM, diversity of software development teams and DV techniques, and management of data sources and code repositories."

"In the project management field, the use of DV techniques and tools allows the mapping of large amounts of data to visual patterns that aid human information processing [150] and help in reducing cognitive bias."

"Visual project management can bring many benefits to Software Project Management (SPM), enabling managers to view and understand large amounts of data quickly and efficiently."

"Data visualization can help managers obtain insights from project issues, as well as discover a new point of view of the data."

"In Couto and others [151] we proposed an extension for the PMBOK Guide consisting of the addition of two new processes named 10.4 Plan Data Visualization and 10.5 Implement Data Visualization."

Software Project Management

"This study focuses on the Communications KA because data visualizations are inserted in its context for visualizing project information."

"PMBOK Project Communications Management is currently composed of three processes."

"10.2 Manage Communications - a process that certifies that project information will be collected, created, distributed, stored, retrieved, managed, monitored, and arranged in a timely and appropriate manner."

"10.3 Monitoring Communications - a process that ensures the project and stakeholders meets its information needs."

"The PMBOK guide points out that because each project is unique, processes need to be adapted according to some factors such as physical location, stakeholders, language, communication technologies used, and how knowledge is managed in the project."

"Project documents can present data visualization techniques, and PMBOK lists 33 documents as the most commonly used project management communication models."

"Our study further investigates project management and the usage of data visualization."

Visualization Techniques and Tools for Software Project Management

"We conducted a Systematic Mapping Study (SMS) to identify which visual management techniques and tools are generally used for project management and which ones are applied in project management in the Software Engineering field."

"We asked the participants to select the provided techniques or tools they would use for each processes group."

"The majority of tools and techniques (50%) reported in studies were developed to support DV for Engineering, Architecture, or Construction projects, followed by Software Engineering (SE) projects (42%)."

"Regarding the PMBOK, we found that practitioners use the following DV techniques and tools in all project process groups: kanban, bar chart or columns, line chart, and dashboard."

"The maximum score that a technique or tool could have in each question would be 26 points, i.e., when all the participants and all sessions informed that they would use the technique or tool in a specific group of processes."

Development of an Extension for the PMBOK Guide

"Of this process, the communication management plan and project documents must be updated to include DV techniques and tools."

"EEF that may influence the Plan Data Visualization process include: Published material, including papers about applicable DV techniques; Academic studies; Benchmarking results; Global, regional, or local trends, practices, or habits; Organizational governance structure; Organizational, stakeholder, and client structure and culture; Geographic distribution of facilities and resources; Specific project document standards; Guidelines and criteria for defining the set of visualization techniques and tools to be used; Established channels, tools, and communication systems; Project management information systems."

"The following topics related to the project should be considered to plan the project DV: Knowledge of SPM; Knowledge of tools and visualization techniques that can be used to support the communication of information; Data interpretation and contextualization;

Organization communication technologies; Organization policies and procedures on legal requirements for corporate communications; Communications with the public, community, media, and in a global environment - between virtual groups; Project and communications management systems."

Evaluation of the Extension Proposal

"To validate our proposal, we conducted a user study to evaluate the proposed extension in terms of alignment with the PMBOK Guide and its applicability in SPM."

"We design our user study to evaluate the applicability and alignment of the proposed PMBOK extension for DV in SPM."

"The majority of the participants gave high scores to the proposal's applicability to SPM and its alignment to the PMBOK Guide."

"We also observe that some participants disagree with the proposal's applicability and alignment within the PMBOK Guide."

"Participant 8 highlighted how important our proposal is for the software industry: "it [our proposal] is important and 'super' [very] valid to have technical options in BoKs [PMBOK Guides], as they serve as a reference for using [applying it in SPM]. [...]"."

Conclusions and Future Work

"Prior to this study, extensive research was conducted in the project management area to understand how software project management can benefit from using data visualization to increase the projects' success."

"We evaluate our PMBOK extension proposal for data visualization in software project management that was built in our prior research."

"We conducted a user study to evaluate our proposal regarding its applicability in software project management and its alignment with the PMBOK Guide."

"Our results are also promising, and they show that our proposal is applicable for software project management and is aligned with the PMBOK Guide."

"The experts found that adding two new processes to the current PMBOK structure is relevant, and we believe that this result is important to show that our proposal can be incorporated to support project management activities in the software industry."

Characterizing industry-academia collaborations in software engineering: evidence from 101 projects [181]

This is a machine-generated summary of:

Garousi, Vahid; Pfahl, Dietmar; Fernandes, João M.; Felderer, Michael; Mäntylä, Mika V.; Shepherd, David; Arcuri, Andrea; Coşkunçay, Ahmet; Tekinerdoğan, Bedir: Characterizing industry-academia collaborations in software engineering: evidence from 101 projects [181]

Published in: Empirical Software Engineering (2019)

Link to original: <https://doi.org/10.1007/s10664-019-09711-y>

Copyright of the summarized publication:

The Author(s) 2019

License: OpenAccess CC BY 4.0

This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Many researchers and practitioners in the community believe that the level of joint industry-academia collaboration (IAC) projects in Software Engineering (SE) research is relatively low, creating a barrier between research and practice."

"The goal of the empirical study reported in this paper is to explore and characterize the state of IAC with respect to industrial needs, developed solutions, impacts of the projects and also a set of challenges, patterns and anti-patterns identified by a recent Systematic Literature Review (SLR) study."

"Our findings include: (1) the most popular topics of the IAC projects, in the dataset, are: software testing, quality, process, and project managements; (2) over 90% of IAC projects result in at least one publication; (3) almost 50% of IACs are initiated by industry, busting the myth that industry tends to avoid IACs; and (4) 61% of the IAC projects report having a positive impact on their industrial context, while 31% report no noticeable impacts or were "not sure"."

"To improve this situation, we present evidence-based recommendations to increase the success of IAC projects, such as the importance of testing pilot solutions before using them in industry."

"Using the data and evidence presented in this paper, they can conduct more successful IAC projects in SE by being aware of the challenges and how to overcome them, by applying best practices (patterns), and by preventing anti-patterns."

Introduction

"Unfortunately, a small ratio of SE practitioners and researchers collaborate with members of the other community, and the reality is that these two communities are largely disjoint (Glass 152; Garousi and others 153; Briand and others 154)."

"At an academic (industrial) SE conference, only a handful of practitioners (researchers) are usually present (if any), and vice versa."

"Since the inception of SE in the late 1960's, both communities have generally done little to bridge the "chasm" between them (Glass 152), and the ratio of collaborative projects is thus relatively small compared to the number of research projects in the research community and SE activities in the industry."

"This need comes as no surprise to the SE community, because, being an applied discipline, it has long seen industrial relevance and impact of research activities to be of utmost importance."

"An indicator for this importance to the SE research community is the ACM SIGSOFT Impact project (155; Osterweil and others 156), which was conducted in the years from 2002 to 2008."

Background and Related Work

"While the SLR shared insightful experience and evidence on the topic, we believe that the SE community still lacks the following two types of empirical evidence: (1) most of the experience is reported by focused (single) teams of researchers and practitioners and there is a need for evidence based on a larger, more distributed set of IAC projects to reduce the sampling bias; (2) challenges, success patterns, and anti-patterns in IAC projects have been reported rather sparsely and sporadically and there is a need for more systematic synthesis."

"The study focused on several research questions including: (1) how important are the seeds and needs for initiating IACs?; and (2) does matching based on efficiency criteria (the research capability of a partner and the good fit between industry and academic) result in a successful IAC?"

Initial Context and Process Models for Industry-Academia Collaborations in SE

"An IAC project may target improving software testing processes of a given company."

"An IAC project can take various forms, e.g., technology transfer and consultancy, but there should be some sort of research involved in it, to make it within the scope of our definition in this paper."

"The trigger for an IAC project is usually a real industrial "need" (or challenge), e.g., improving test automation practices in a company (Garousi and Herkiloğlu 157), or is based on academic research, e.g., assessing the benefits of software documentation using UML."

"That our model is not a collaboration model (like those discussed in (Petersen and others 158; Sandberg and others 159; Gorschek and others 160)) but a process model for IAC projects, including important factors of interest to our study (e.g., collaboration need, challenges and patterns)."

Research Goal and Method

"For data collection, we sent invitations by email to SE researchers and practitioners who were known in the community to be active in IAC projects and to the authors of the primary studies reviewed in the SLR (Garousi and others 153)."

"While using convenience sampling in our work (similar to many other survey studies in SE) the representativeness (and thus external validity) of our study results could be limited, we still ensured meeting the other two external validity aspects, i.e., relevance and

sample representativeness, since we sent the survey to researchers and practitioners who have been active in IAC projects and have first-hand experience of initiating and conducting IAC projects."

Demographics of the Dataset

"To understand the demographics of the IAC projects under study, we asked about the research methods used in each project."

"Observation 1: Industrial case studies and action-research are the most popular research methods used in IAC projects."

"Observation 2: Over 90% of IAC projects, in our dataset, resulted in at least one publication."

"In our dataset, the situation was quite balanced, i.e., the academic partners initiated 24 projects (22.4%) and the industry partners also initiated 24 projects."

"One could do further in-depth (correlation) analysis on collaborator type who initiated the project versus other variables in the dataset, e.g., country, and looking into a question such as: Are there differences between countries in terms of who initiates the IAC projects?"

"Observation 3: Industry is as motivated as academia to start IAC projects."

"Observation 4: More than 90% of the IAC projects in our dataset lasted from 4 months to 4 years."

Analysis and Results

"The challenge with the lowest negative impacts is "lack of research relevance" (LRR, average = 0.90 out of 4), which means that the IAC projects included in our study, in their vast majority, are indeed based in industrial problems that require a research-oriented approach."

"We show a few of those responses that we classified under our own ten challenge types below: Human and organizational challenges "Difficulty to introduce new tool in a strict process" (P3) "Restructuring of company leading to moved role for championing individual" (P82) "Mismatch between industry and academia" "Gap between research prototypes and industry projects (different key goals of project stakeholders)" (P4) "Keeping a long-term research focus while delivering (interesting enough) short-term results for the service and developing unit" (P43) "Publications are great, but for industry it is not the end-goal."

Bibliography

- [1] Delisle, C., Jugdev, K., & Thomas, J. (2001). Rethinking Project management – old Truths and New Insights. Schulich School of Engineering Research & Publications, 7(1), 36–43. <https://doi.org/10.11575/PRISM/30197> .
- [2] Crisan, E., Muresan, I., & Ilies, L. (2010). Best Practices in Project Management. Review of International Comparative Management, 11(1), 43–51. [https://www.academia.edu/20497918/Best Practices in Project Management](https://www.academia.edu/20497918/Best_Practices_in_Project_Management) .
- [3] Shen, F., Roccasalvo, J., Tian, Y., & Zhang, J. (2020). Creating Culturally Responsive Noyce Explorers, Scholars and Teachers. 17th International Conference on Information Technology: New Generations <https://doi.org/10.1007/978-3-030-43020-7>
- [4] Ruder, P., Maier, M., & Simkins, S. (2021). Getting started with Team-Based learning (TBL): an introduction. The Journal of Economic Education. <https://doi.org/10.1080/00220485.2021.1925187> .
- [5] Artis, S., & Washington, G. (2021). See It, Do It, Learn It: Integrating Experiential Learning into High School Engineering Outreach Programs. American Society for Engineering Education <https://www.jee.org/36119>
- [6] Hwang Y, Park S, Shin N (2021) Sustainable development of a mobile payment security environment using fintech solutions. Sustainability 13(15):8375
- [7] Zhang WR (1994) Bipolar fuzzy sets and relations: a computational framework for cognitive modeling and multiagent decision analysis. In: NAFIPS/IFIS/NASA'94. proceedings of the first international joint conference of the north american fuzzy information processing society biannual conference. The industrial fuzzy control and intelligence, IEEE, pp 305–309
- [8] Keršulienė V, Zavadskas EK, Turskis Z (2010) Selection of rational dispute resolution method by applying new step-wise weight assessment ratio analysis (SWARA). J Bus Econ Manag 11(2):243–258
- [9] Iqbal S, Hussain M, Munir MU, Hussain Z, Mehrban S, Ashraf MA (2021) Cryptocurrency: future of FinTech. In: Research anthology on blockchain technology in business,

healthcare, education, and government, IGI Global, pp 1915–1924

[10] Ryu HS (2018) What makes users willing or hesitant to use Fintech?: the moderating effect of user type. *Ind Manag Data Syst.* <https://doi.org/10.1108/IMDS-07-2017-0325>

[11] Jagtiani J, John K (2018) Fintech: the impact on consumers and regulatory responses. *J Econ Bus* 100:1–6

[12] Odell, M., & Kennedy, T. J. (2020). Inquiry-Based Pedagogy To Support Stem Learning And 21St Century Skills: Preparing New Teachers To Implement Project And Problem-Based Learning. In *INTED2020 Proceedings* (pp. 7398-7402). IATED.

[13] Hadiyanto, H., Failasofah, F., Armiwati, A., Abrar, M., & Thabran, Y. (2021). Students' Practices of 21st Century Skills between Conventional learning and Blended Learning. *Journal of University Teaching & Learning. Practice*, 18(3). <https://doi.org/10.53761/1.18.3.7>

[14] Alamri, M. M. (2021). Using blended project-based learning for students' behavioral intention to use and academic achievement in higher education. *Education Sciences*, 11(5). <https://doi.org/10.3390/educsci11050207>

[15] Lepper, M. R., Corpus, J. H., & Iyengar, S. S. (2005). Intrinsic and extrinsic motivational orientations in the classroom: Age differences and academic correlates. *Journal of Educational Psychology*, 97(2), 184–196.

[16] Kaushal, K.B., Chia-Hui Cheng, Indira Koneru, Fong Soon Fook, Chun-Yen Chang (2021). Students' Blended Learning Course Experience Scale (BLCES): development and validation. *Interactive Learning Environments*, 1-11. <https://doi.org/10.1080/10494820.2021.1946566> .

[17] Barattucci, M., Zakariya, Y. F., & Ramaci, T. (2021). Academic achievement and delay: A study with Italian post-graduate students in psychology. *International Journal of Instruction*, 14(4), 1–20. <https://doi.org/10.29333/iji.2021.1441a>

[18] Wang, F. H. (2017). An exploration of online behaviour engagement and achievement in flipped classroom supported by learning management system. *Computers & Education*, 114, 79–91. <https://doi.org/10.1016/j.compedu.2017.06.012>

[19] Urbach, N., & Ahlemann, F. (2010). Structural equation modeling in information systems research using partial least squares. *Journal of Information Technology Theory and Application (JITTA)*, 11(2), 2.

[20] Mirchandani, P., & Mishra, A. K. (2009). Component commonality: Models with

productspecific service constraints. *Production and Operations Management*, 11(2), 199–215.

[21] Freeman, N. K., Narayanan, A., & Keskin, B. B. (2021). Optimal use of downward substitution in a manufacturing operation subject to uncertainty. *Omega*, 103, 102372.

[22] Zeng, B., & Zhao, L. (2013). Solving two-stage robust optimization problems using a column-and-constraint generation method. *Operations Research Letters*, 41(5), 457–461.

[23] Yu Y, Darko A, Chan APC et al (2018) Evaluation and ranking of risk factors in transnational public-private partnerships projects: a case study based on the intuitionistic fuzzy analytic hierarchy process. *J Infrastruct Syst* 24(4):04018028

[24] Koulinas GK, Marhavidas PK, Demesouka OE et al (2019) Risk analysis and assessment in the worksites using the fuzzy-analytical hierarchy process and a quantitative technique—A case study for the Greek construction sector. *Saf Sci* 112:96–104

[25] Hamza M, Shahid S, Bin Hainin MR et al (2022) Construction labor productivity: a review of factors identified. *Int J Constr Manag* 22(3):413–425

[26] Guertler MR, Sick N (2021) Exploring the enabling effects of project management for SMEs in adopting open innovation—a framework for partner search and selection in open innovation projects. *Int J Project Manage* 39(2):102–114

[27] Hinze, J.: *Construction planning and scheduling*, vol. 228, p. 229. Pearson/Prentice Hall, Upper Saddle River NJ (2004)

[28] Neale, R.H., Neale, D.E.: *Construction Planning*. Thomas Telford, Westerkirk (1989)

[29] Peurifoy, R.L., Schexnayder, C.J., Schmitt, R.L., Shapira, A.: *Construction Planning, Equipment, And Methods*. McGraw-Hill Education, New York (2018)

[30] Petroutsatou, K., Apostolidis, N., Zarkada, A., Ntokou, A.: Dynamic planning of construction site for linear projects. *Infrastructures* 6(2), 21 (2021)

[31] Demirkesen, S., Ozorhon, B.: Impact of integration management on construction project management performance. *Int. J. Project Manage.* 35(8), 1639–1654 (2017)

[32] Butt, M.H., Iqbal, S., Saddique, M.A., Shahid, H.: The effect of risk management at project planning phase on performance of construction projects in Pakistan. *J. Bus. Soc. Rev. Emerg. Econ.* 7(1), 69–79 (2021)

[33] Yuliana, S., Muslih, M., Sim, J., Vidyanti, A.N., Brahmadhi, A., Tsai, H.T.: Development and validation of the World Health Organization disability Assessment Schedule 2.0 (WHODAS 2.0) Indonesian version in stroke survivors. *Disabil. Rehabil.* 1–8 (2021)

[34] Allahar, H.: A management innovation approach to project planning. *Technol. Innov. Manag. Rev.* 9(6) (2019)

[35] Zhang, J., Xie, H., Schmidt, K., Xia, B., Li, H., Skitmore, M.: Integrated experiential learning-based framework to facilitate project planning in civil engineering and construction management courses. *J. Prof. Issues Eng. Educ. Pract.* 145(4), 05019005 (2019)

[36] Jünge, G. H., Alfnes, E., Kjersem, K., Andersen, B.: Lean project planning and control: empirical investigation of ETO projects. *Int. J. Manag. Projects Bus.* (2019)

[37] Marcelino-Sádaba, S., González-Jaen, L.F., Pérez-Ezcurdia, A. (2015) Using project management as a way to sustainability. From a comprehensive review to a framework definition, *Journal of cleaner production*, 99:1–16.

[38] Wu, P., Low, S.P. (2010) Project management and green buildings: lessons from the rating systems, *Journal of professional issues in engineering education and practice*, Volume 136. [https://doi.org/10.1061/\(ASCE\)EI.1943-5541.0000006](https://doi.org/10.1061/(ASCE)EI.1943-5541.0000006).

[39] PMBOK (2013) A guide to the project management body of knowledge, PMI, ISBN 978-1-935589-67-9

[40] Denali-A WNS Company & JAGGAER (2017) Achieving agile procurement, simple steps for a complex world. Webinar

[41] Alias Z, Zawawi EMA, Yusof K, Aris NM (2014) Determining critical success factors of project management practice: a conceptual framework. *Procedia Soc Behav Sci* 153:61–69. <https://doi.org/10.1016/j.sbspro.2014.10.041>

[42] Braunscheidel MJ, Suresh NC (2009) The organizational antecedents of a firm's supply chain agility for risk mitigation and response. *J Oper Manag* 27(2):119–140. <https://doi.org/10.1016/j.jom.2008.09.006>

[43] Mike D, Venu N, Florian W (2012) Agile operations for volatile times. *McKinsey Q* 3:126–131

[44] Ahuett-Garza H, Kurfess T (2018) A brief discussion on the trends of habilitating technologies for Industry 4.0 and Smart manufacturing. *Manuf Lett* 15:60–63.

<https://doi.org/10.1016/j.mfglet.2018.02.011>

[45] Lynn R, Wescoat E, Han D, Kurfess T (2018) Embedded fog computing for high-frequency MTConnect data analytics. *Manuf Lett* 15:135–138.

<https://doi.org/10.1016/j.mfglet.2017.11.002>

[46] Aazam M, Zeadally S, Harras KA (2018) Deploying fog computing in industrial Internet of Things and Industry 4.0. *IEEE Trans Ind Inform* 1–1.

<https://doi.org/10.1109/TII.2018.2855198>

[47] Alrashidi M, Nasri N, Khediri S et al (2020) Energy-efficiency clustering and data collection for wireless sensor networks in Industry 4.0. *J Ambient Intell Human Comput*.

<https://doi.org/10.1007/s12652-020-02146-0>

[48] Rathee G, Balasaraswathi M, Chandran KP et al (2021) A secure IoT sensors communication in industry 4.0 using blockchain technology. *J Ambient Intell Human Comput* 12:533–545. <https://doi.org/10.1007/s12652-020-02017-8>

[49] Lee JK, Lee SW, Lee KH (2019) An implementation of convergence security solution for overcoming of security vulnerabilities in industrial control communication network.

Wireless Pers Commun 105:545–565. <https://doi.org/10.1007/s11277-018-5970-4>

[50] Pandya V (2018) Unchaining the BLOCKCHAIN. *The Times of India, Education Times*

[51] Khan MA, Salah K (2018) IoT security: review, blockchain solutions, and open challenges. *Futur Gener Comput Syst* 82:395–411.

<https://doi.org/10.1016/j.future.2017.11.022>

[52] Iansiti M, Lakhani KR (2017) The truth about blockchain. *Harvard Business Review*.

<https://hbr.org/2017/01/the-truth-about-blockchain>

[53] Bordel B, Alcarria R (2017) Assessment of human motivation through analysis of physiological and emotional signals in industry 4.0 scenarios. *J Ambient Intell Human Comput*. <https://doi.org/10.1007/s12652-017-0664-4>

[54] Sharma B, Nag R, Makkad M (2017) Process performance models in software engineering: a mathematical solution approach to problem using industry data. *Wireless Pers Commun* 97:5367–5384. <https://doi.org/10.1007/s11277-017-4783-1>

[55] Saucedo-Martínez JA, Pérez-Lara M, Marmolejo-Saucedo JA et al (2018) Industry 4.0 framework for management and operations: a review. *J Ambient Intell Human Comput* 9:789–801. <https://doi.org/10.1007/s12652-017-0533-1>

- [56] Rejeb A, Keogh JG (2021) 5G networks in the value chain. *Wireless Pers Commun* 117:1577–1599. <https://doi.org/10.1007/s11277-020-07936-5>
- [57] Bougdira A, Akharraz I, Ahaitouf A (2020) A traceability proposal for industry 4.0. *J Ambient Intell Human Comput* 11:3355–3369. <https://doi.org/10.1007/s12652-019-01532-7>
- [58] Pasi BN, Mahajan SK, Rane SB (2021) The current sustainability scenario of Industry 4.0 enabling technologies in Indian manufacturing industries. *Int J Product Perform Manag* 70(5):1017–1048. <https://doi.org/10.1108/IJPPM-04-2020-0196>
- [59] Dawson L, Van Belle J-P (2013) Critical success factors for business intelligence in the South African financial services sector, SA. *J Inf Manag* vol 15, Issue 1, Art. #545, 12 pages. <http://dx.doi.org/> <https://doi.org/10.4102/sajim.v15i1.545>
- [60] Trkman P, McCormack K (2010) Estimating the benefits and risks of implementing eprocurement. *IEEE Trans Eng Manag*, under review
- [61] Lee S, Ahn H (2008) Assessment of process improvement from organizational change. *Inf Manag* 45(5):270–280
- [62] Leem CS, Yoon CY, Park SK (2004) A process-centered IT ROI analysis with a case study. *Inf Syst Front* 6(4):369–383
- [63] Ray G, Muhanna W, Barney J (2007) Competing with IT: the role of shared IT-business understanding. *Commun ACM* 50(12):87–91
- [64] Hoque Z (2004) A contingency model of the association between strategy, environmental uncertainty and performance measurement: impact on organizational performance. *Int Bus Rev* 13(4):485–502
- [65] Somers TM, Nelson K (2001) The impact of CSFs across the stages of enterprise resource planning implementations. In: *Proc of the 34th Hawaii international conference on systems sciences*, vol 8, 8016, IEEE Computer Society, Washington, DC, USA
- [66] Ongena G, Ravesteyn P (2019) Business process management maturity and performance. A multi group analysis of sectors and organization sizes. *Bus Process Manag J* 26(1):132–149. <https://doi.org/10.1108/BPMJ-08-2018-0224>
- [67] Suša Vugec D, Ivancic L, Milanovic Glavan L (2019) Business process management and corporate performance management: does their alignment impact organizational performance. *Interdiscip Descr Complex Syst* 17(2):368–384.

<https://doi.org/10.7906/indecs.17.2.12>

[68] Škrinjar R, Trkman P (2013) Increasing process orientation with business process management: critical practices. *Int J Inf Manag* 33(1):48–60.

<https://doi.org/10.1016/j.ijinfomgt.2012.05.011>

[69] Van Looy A (2019) Capabilities for managing business processes: a measurement instrument. *Bus Process Manag J* 26(1):287–311.

<https://doi.org/10.1108/BPMJ-06-2018-0157>

[70] Mäkinen T (2019) Operational performance through business process management. Tampere University of Applied Sciences, Tampere

[71] Rosemann M, Brocke JV (2015) Handbook on business process management 1: introduction, methods, and information systems. Springer, Berlin.

<https://doi.org/10.1007/978-3-642-45100-3>

[72] Jeston J (2018) Business process management practical guidelines to successful implementations, 4th edn. Routledge, Abingdon

[73] Hung RY (2006) Business process management as competitive advantage: a review and empirical study. *Total Qual Manag Bus Excell* 17(1):21–40

[74] Elzinga DJ et al (1995) Business process management: survey and methodology. *IEEE Trans Eng Manag* 42(2):119–128. <https://doi.org/10.1109/17.387274>

[75] Ko RKL, Lee SSG, Wah Lee E (2009) Business process management (BPM) standards: a survey. *Bus Process Manag J* 15(5):744–791.

<https://doi.org/10.1108/14637150910987937>

[76] van der Aalst WMP (2013) Business process management: a comprehensive survey. *ISRN Softw Eng* 2013:1–37. <https://doi.org/10.1155/2013/507984>

[77] Halpin, D. W., Lucko, G., & Senior, B. A. (2017). *Construction management*: John Wiley & Sons.

[78] Barclay, C., & Osei-Bryson, K.-M. (2010). Project performance development framework: An approach for developing performance criteria & measures for information systems (IS) projects. *International Journal of Production Economics*, 124(1), 272–292.

[79] Meredith, J. R., Shafer, S. M., & Mantel Jr, S. J. (2017). *Project management: A strategic managerial approach*. John Wiley & Sons.

- [80] Chan, A. P., Scott, D., & Chan, A. P. (2004). Factors affecting the success of a construction project. *Journal of Construction Engineering and Management*, 130(1), 153–155.
- [81] Chan, A. P., & Chan, A. P. (2004). Key performance indicators for measuring construction success. *Benchmarking: An International Journal*, 11(2), 203–221.
- [82] Liyanage, C., & Villalba-Romero, F. (2015). Measuring success of PPP transport projects: A cross-case analysis of toll roads. *Transport Reviews*, 35(2), 140–161.
- [83] Adabre, M. A., & Chan, A. P. (2019). Critical success factors (CSFs) for sustainable affordable housing. *Building and Environment*, 156, 203–214.
- [84] Osei-Kyei, R., & Chan, A. P. (2017). Developing a project success index for public-private partnership projects in developing countries. *Journal of Infrastructure Systems*, 23(4), 04017028.
- [85] Hardcastle, C., Edwards, P., Akintoye, A., & Li, B. (2005). Critical success factors for PPP/PFI projects in the UK construction industry: A factor analysis approach. *Construction Management and Economics*, 23(5), 459–471.
- [86] Lim, C., & Mohamed, M. Z. (1999). Criteria of project success: An exploratory re-examination. *International Journal of Project Management*, 17(4), 243–248.
- [87] Sadeh, A., Dvir, D., & Shenhar, A. (2000). The role of contract type in the success of R&D defense projects under increasing uncertainty. *Project Management Journal*, 31(3), 14–22.
- [88] Shenhar, A. J., Dvir, D., Levy, O., & Maltz, A. C. (2001). Project success: A multidimensional strategic concept. *Long Range Planning*, 34(6), 699–725.
- [89] Camarinha-Matos LM, Afsarmanesh H, Galeano N, Molina A (2009) Collaborative networked organizations – concepts and practice in manufacturing enterprises. *Comput Ind Eng* 57(1):46–60
- [90] Tagarev T (2020) Towards the Design of a Collaborative Cybersecurity Networked Organisation: identification and prioritisation of governance needs and objectives. *Future Internet* 12(4):62. <https://doi.org/10.3390/fi12040062>
- [91] M. Ketokivi, T. Choi, Renaissance of case research as a scientific method. *Oper Manage* 32, 232–240 (2014)

- [92] D.V. Steward, Design Structure System: A Method for Managing the Design of Complex Systems. *IEEE Trans Eng Manage* 28, 71–74 (1981)
- [93] Shadi AA, Abdulaziz A, Al-Hashbol A (2019) Implementing Enterprise Resource Planning (ERP) system in large Construction Company in KSA. *Procedia Comput Sci* 164:463–470
- [94] Aloini D, Dulmin R, Mininno V (2007) Risk management in ERP project introduction: review of the literature. *Inf Manag* 44:547–567
- [95] Hung WH, Ho CF, Jou JJ, Kung KH (2012) Relationship bonding for a better knowledge transfer climate: an ERP implementation research. *Decis Support Syst* 52(2):406–414
- [96] Nah FF, Lau JL, Kuang J (2001) Critical factors for successful implementation of enterprise systems. *Bus Process Manag* 7:285–296
- [97] Wang ETG, Shin SP, Jiang JJ, Klein G (2008) The consistency among facilitating factors and ERP implementation success: a holistic view of fit. *J Syst Softw* 81:1609–1621
- [98] Chang JYT, Eric TGW, James JJ, Klein G (2013) Controlling ERP consultants: client and provider practices. *J Syst Softw* 86(5):1453–1461
- [99] Kumar V, Bharat M, Kumar U (2003) An investigation of critical management issues in ERP implementation: empirical evidence from Canadian organizations. *Technovation* 23:793–807
- [100] Tsai WH, Lin TW, Chen SP, Hung SJ (2007) Users' service quality satisfaction and performance improvement of ERP consultants selections. *Int J Bus Syst Res* 1(3):280
- [101] Ozalp V, Ozcan Y, Cunha MMC (2012) ERP consultant selection problem using AHP, fuzzy AHP and ANP: a case study in turkey. *J Bus Manag Econ* 3(3):106–117
- [102] Zavadskas EK, Kaklauskas A, Turskis Z, Tamošaitienė J (2008a) Selection of the effective dwelling house walls by applying attributes values determined at intervals. *J Civ Eng Manag* 14(2):85–93
- [103] Zavadskas EK, Turskis Z, Tamošaitienė J, Marina V (2008b) Multi criteria selection of project managers by applying grey criteria. *Technol Econ Dev Econ* 14(4):462–477
- [104] Zavadskas EK, Turskis Z, Tamošaitienė J (2010) Risk assessment of construction projects. *J Civ Eng Manag* 16(1):33–46

[105] Maity SR, Chatterjee P, Chakraborty S (2012) Cutting tool material selection using grey complex proportional assessment method. *Mater Des* 36:372–378

[106] Nguyen HT, Dawal STM, Nukman Y, Aoyama H (2014) A hybrid approach for fuzzy multi-attribute decision making in machine tool selection with consideration of the interactions of attributes. *Expert Syst Appl* 41:3078–3090

[107] Senthil S, Srirangacharyulu B, Ramesh A (2014) A robust hybrid multi- criteria decision making methodology for contractor evaluation and selection in third-party reverse logistics. *Expert Syst Appl* 41:50–58

[108] Beehr TA (2014) *Psychological stress in the workplace (psychology revivals)*. Routledge

[109] Katz D, Kahn RL (1978) *The social psychology of organizations, vol 2*. Wiley, New York

[110] Eatough EM, Chang C-H, Miloslavic SA, Johnson RE (2011) Relationships of role stressors with organizational citizenship behavior: a meta-analysis. *J Appl Psychol* 96(3):619

[111] Lambert EG, Qureshi H, Frank J, Klahm C, Smith B (2018) Job stress, job involvement, job satisfaction, and organizational commitment and their associations with job burnout among Indian police officers: a research note. *J Police Crim Psychol* 33(2):85–99

[112] McDonald N, Ronayne T (1989) Jobs and their environment: the psychological impact of work in noise. *Ir J Psychol* 10(1):39–55

[113] Taap Manshor A, Fontaine R, Siong Choy C (2003) Occupational stress among managers: a Malaysian survey. *J Manag Psychol* 18(6):622–628

[114] Rezaei J, Nispeling T, Sarkis J, Tavasszy L (2016) A supplier selection life cycle approach integrating traditional and environmental criteria using the best worst method. *J Clean Prod* 135:577–588

[115] Amindoust A, Saghafinia A (2017) Textile supplier selection in sustainable supply chain using a modular fuzzy inference system model. *J Text Inst* 108(7):1250–1258

[116] Kopelman RE (1985) Job redesign and productivity: a review of the evidence. *Natl Product Rev* 4(3):237–255

[117] Verma, V. (1996). *The human aspects of project management: human resource skills*

for the project manager, volume two

[118] Bader C, Patrick W, Kolb D, Gershenfeld N (2016) Digital fabrication. In: Burdick A, Drucker J, Lunenfeld P, Presner T, Schnapp J (eds) *Digital_Humanities*. MIT Press, pp 121–142

[119] Farhang M (2018) Additive manufacturing and its societal impact: a literature review. *Int J Adv Manuf Technol* 95(5–8):1953–1968

[120] Lipson H, Kurman M (2013) *Fabricated: The New World of 3D Printing*

[121] Murphy SV, Atala A (2014) 3D bioprinting of tissues and organs. *Nat Biotechnol* 32(8):773–785

[122] Hauser S, Wulle F, Schork N, Ziefle M (2016) A critical review of the environmental impacts of 3D printing and potential ways to address them. *Resour Conserv Recycl* 113:32–40

[123] Castells M (2010) *The rise of the network society: information age: Economy, Society, and Culture (Vol. 1)*. John Wiley & Sons

[124] Pike R, Girod B (2018) The environmental impact of 3D printing: an overview of the literature. *Int J Adv Manuf Technol* 98(5–8):2127–2145

[125] DiMaggio P, Hargittai E, Celeste C, Shafer S (2004) From unequal access to differentiated use: a literature review and agenda for research on digital inequality. In: Neckerman K (ed) *Social inequality*. Russell Sage Foundation, pp 355–400

[126] Slater M, Sanchez-Vives MV (2016) Enhancing our lives with immersive virtual reality. *Front Robot AI* 3:74

[127] Sabherwal, R.: The role of trust in outsourced IS development projects. *Commun. ACM* 42(2), 80–81 (1999)

[128] da Silva, F.Q.; Costa, C.; Franca, A.C.C.; Prikladinicki, R.: Challenges and solutions in distributed software development project management: a systematic literature review. In: 2010 5th IEEE International Conference on Global Software Engineering, pp. 87–96. IEEE (2010)

[129] International Institute of Business Analysis (2015) *A guide to the business analysis body of Knowledge® (BABOK® Guide) v3*, IIBA

[130] Project Management Institute (PMI) (2017) A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 6th ed., PMI

[131] Maglyas A, Nikula U, Smolander K (2013) What are the roles of software product managers? An empirical investigation. J Syst Softw 86:3071–3090.
<https://doi.org/10.1016/j.jss.2013.07.045>

[132] Ebert C, Brinkkemper S (2014) Software product management – an industry evaluation. J Syst Softw 95:10–18. <https://doi.org/10.1016/j.jss.2013.12.042>

[133] Maglyas A, Nikula U, Smolander K, Fricker SA (2017) Core software product management activities. J Adv Manag Res 14:23–45.
<https://doi.org/10.1108/JAMR-03-2016-0022>

[134] Jantunen S, Hietaranta K, Gause DC (2013) Adjusting to increasing product management problems: Challenges and improvement proposals in one software company. In: Doerr J, Opdahl AL (eds) Lect Notes Comput Sci (Including Subser Lect Notes Artif Intell Lect Notes Bioinformatics). Springer Verlag, pp 386–400.
https://doi.org/10.1007/978-3-642-37422-7_28

[135] Bekkers W, Brinkkemper S, van Den Bemd L, Mijnhardt F, Wagner C, van De Weerd I (2012) Evaluating the software product management maturity matrix. In: 2012 20th IEEE Int Requir Eng Conf RE 2012 – Proc, pp. 51–60. <https://doi.org/10.1109/RE.2012.6345839>

[136] Ankiety PG (2019) GUT CUI <https://ankiety.pg.edu.pl/?lang=en> . Accessed 23 April 2020

[137] Eclipse Foundation. (2019). Scrum EPG version 1.5
https://www.eclipse.org/downloads/download.php?file=/technology/epf/Scrum/library/scrum_library_1.5_20080820.zip . Accessed 1st March 2019.

[138] Ebert, C. (2007). The impacts of software product management. Journal of Systems and Software, 80(6), 850–861.

[139] Humphrey, W. (2000). The Team Software Process (TSP). Software Engineering Institute. https://resources.sei.cmu.edu/asset_files/TechnicalReport/2000_005_001_13754.pdf . Accessed 1st March 2019.

[140] Pai, D. R., Subramanian, G. H., & Pendharkar, P. C. (2015). Benchmarking software development productivity of CMMI level 5 projects. Information Technology and Management, 16(3), 235–251.

[141] Unterkalmsteiner, M., Gorschek, T., Islam, A. M., Cheng, C. K., Permadi, R. B., & Feldt, R. (2011). Evaluation and measurement of software process improvement—A systematic literature review. *IEEE Transactions on Software Engineering*, 38(2), 398–424.

[142] Laporte, C., & O'Connor, R. (2017). Software process improvement standards and guides for very small organization: An overview of eight implementations. *CrossTalk, The Journal of Defense Software Engineering*, 30(3), 23–27.

[143] Larrucea, X., & Fernandez-Gauna, B. (2019). A mapping study about the standard ISO/IEC29110. *Computer Standards & Interfaces*, 65, 159–166.

[144] Majchrowski, A., Ponsard, C., Saadaoui, S., Flamand, J., & Deprez, J. C. (2016). Software development practices in small entities: An ISO29110-based survey. *Journal of Software: Evolution and Process*, 28(11), 990–999.

[145] Ahimbisibwe, A., Daellenbach, U., & Cavana, R. (2017). Empirical comparison of traditional plan-based and agile methodologies—Critical success factors for outsourced software development projects from vendors' perspective. *Journal of Enterprise Information Management*, 30(3), 400–453.

[146] ISO, IEC. . (2012). ISO/IEC TR 29110-5-1-1:2012 Software engineering—Lifecycle profiles for very small entities (VSEs) Part 5-1-1: Management and engineering guide: generic profile group: Entry profile. International Organization for Standardization.

[147] Pasini, A., Esponda, S., Boracchia, M., & Pesado, P. (2013). Q-Scrum: una fusión de Scrum y el estándar ISO/IEC 29110. In *Proceedings of the XVIII Congreso Argentino de Ciencias de la Computación, Bahía Blanca, Argentina*, pp. 898–909.

[148] Jedlitschka, A., Ciolkowski, M., & Pfahl, D. (2008). Reporting controlled experiments in software engineering. In F. Shull, J. Singer, & D. Sjøberg (Eds.), *Guide to advanced empirical software engineering* (pp. 201–228). Springer.

[149] Wohlin, C., Runeson, P., Höst, M., Ohlsson, M. C., Regnell, B., & Wesslén, A. (2012). *Experimentation in Software Engineering*. Springer.

[150] McDermott T. Data, information, knowledge, and leadership in complex project management. In: 2019 IEEE Technology Engineering Management Conference (TEMSCON); 2019. pp 1–8, <https://doi.org/10.1109/TEMSCON.2019.8813672> .

[151] Couto JMC, Kroll J, Ruiz DD, et al. A pmbok extension proposal for data visualization in software project management. In: *Proceedings of the 23rd International Conference on Enterprise Information Systems, ICEIS 2021, Online Streaming, April 26-28, 2021, Volume*

2. SCITEPRESS; 2021. pp 54–65, <https://doi.org/10.5220/0010454600540065> .

[152] R. L. Glass, Software Creativity 2.0. developer.* Books, 2006

[153] Garousi V, Petersen K, Özkan B (2016a) Challenges and best practices in industry-academia collaborations in software engineering: a systematic literature review. Inf Softw Technol 79:106–127

[154] Briand L, Bianculli D, Nejati S, Pastore F, Sabetzadeh M (2017) The case for context-driven software engineering research. IEEE Softw 34(5):72–75

[155] ACM SIGSOFT, "SIGSOFT Impact project," <https://www.sigsoft.org/impact.html> , Last accessed: March 2018

[156] Osterweil LJ, Ghezzi C, Kramer J, Wolf AL (2008) Determining the impact of software engineering research on practice. IEEE Computer 41(3):39–49

[157] Garousi V, Herkiloğlu K (2016) Selecting the right topics for industry-academia collaborations in software testing: an experience report. In: IEEE International Conference on Software Testing, Verification, and Validation, pp 213–222

[158] Petersen K, Gencel C, Asghari N, Baca D, Betz S (2014a) Action research as a model for industry-academia collaboration in the software engineering context. In: Proceedings of the ACM International Workshop on Long-Term Industrial Collaboration on Software Engineering, pp 55–62

[159] Sandberg A, Pareto L, Arts T (2011) Agile collaborative research: action principles for industry-academia collaboration. IEEE Softw 28(4):74–83

[160] Gorschek T, Wohlin C, Carre P, Larsson S (2006) A model for technology transfer in practice. IEEE Softw 23(6):88–95

[161] Shen, Fangyang; Roccasalvo, Janine; Zhang, Jun; Tian, Yun; Yi, Yang Online technological STEM education project management. Education and Information Technologies (2023). doi: 10.1007/s10639-022-11521-7

[162] Wan, Qilong; Miao, Xiaodong; Wang, Chenguang; Dinçer, Hasan; Yüksel, Serhat A hybrid decision support system with golden cut and bipolar q-ROFSs for evaluating the risk-based strategic priorities of fintech lending for clean energy projects. Financial Innovation (2023). doi: 10.1186/s40854-022-00406-w

[163] Li, Xiaoxia; Zhu, Wanxia The influence factors of students' transferable skills

development in Blended-Project-Based Learning environment: a new 3P model. *Education and Information Technologies* (2023). doi: 10.1007/s10639-023-11892-5

[164] Li, Yuanbo; Lin, Meiyan; Shen, Houcai; Zhang, Lianmin Hedging against demand ambiguity in new product development: a two-stage distributionally robust approach. *Annals of Operations Research* (2023). doi: 10.1007/s10479-023-05644-4

[165] Dong, Tao; Li, Haiyan; Zhang, Ziqiong The using effect of fuzzy analytic hierarchy process in project engineering risk management. *Neural Computing and Applications* (2023). doi: 10.1007/s00521-023-09046-2

[166] Majumder, Soumi; Majumder, Soumyajit; Biswas, Debasish Impact of effective construction planning in project performance improvement. *Quality & Quantity* (2021). doi: 10.1007/s11135-021-01224-5

[167] Abdelkhalik, Heba Farouk; Azmy, Hisham Hussein The role of project management in the success of green building projects: Egypt as a case study. *Journal of Engineering and Applied Science* (2022). doi: 10.1186/s44147-022-00112-5

[168] Rane, Santosh B.; Narvel, Yahya A. M. Leveraging the industry 4.0 technologies for improving agility of project procurement management processes. *International Journal of System Assurance Engineering and Management* (2021). doi: 10.1007/s13198-021-01331-4

[169] Ubaid, Alaa M.; Dweiri, Fikri T. Business process management (BPM): terminologies and methodologies unified. *International Journal of System Assurance Engineering and Management* (2020). doi: 10.1007/s13198-020-00959-y

[170] Albtoush, A. M. Faten; Doh, S. I.; Rahman, R. A.; Al-Momani, A. H. Critical success factors of construction projects in Jordan: an empirical investigation. *Asian Journal of Civil Engineering* (2022). doi: 10.1007/s42107-022-00470-8

[171] Tagarev, Todor; Davis, Bríd Á.; Cooke, Michael Business, Organisational and governance modalities of collaborative cybersecurity networks. *Multimedia Tools and Applications* (2021). doi: 10.1007/s11042-021-11109-2

[172] Padala, S. P. Sreenivas Application of Axiomatic Design and Design Structure Matrix for Early Identification of Changes in Construction Projects. *Journal of The Institution of Engineers (India): Series A* (2022). doi: 10.1007/s40030-021-00612-2

[173] Avikal, Shwetank; Nigam, Mukesh; Ram, Mangey A hybrid multi criteria decision making approach for consultant selection problem in ERP project. *International Journal of System Assurance Engineering and Management* (2021). doi:

10.1007/s13198-021-01505-0

[174] Gholizadeh-Tayyar, Shadan; Okongwu, Uche; Lamothe, Jacques A Heuristic-Based Genetic Algorithm for Scheduling of Multiple Projects Subjected to Resource Constraints and Environmental Responsibility Commitments. *Process Integration and Optimization for Sustainability* (2021). doi: 10.1007/s41660-020-00150-7

[175] Sazvar, Zeinab; Nayeri, Sina; Mirbagheri, Reza; Tanhaeean, Mehrab; Fallahpour, Alireza; Wong, Kuan Yew A hybrid decision-making framework to manage occupational stress in project-based organizations. *Soft Computing* (2022). doi: 10.1007/s00500-022-07143-3

[176] Zhao, Jianxia; Cai, Xiangyu Shaping the creative landscape through the role of digital and computer technologies in advancing art product design and industry applications. *The International Journal of Advanced Manufacturing Technology* (2023). doi: 10.1007/s00170-023-11844-w

[177] Akbar, Muhammad Azeem; Mahmood, Sajjad; Khan, Arif Ali; AlSanad, Ahmed; Gumaei, Abdu Prioritizing Management Success Factors in Offshore Software Development. *Arabian Journal for Science and Engineering* (2020). doi: 10.1007/s13369-020-04607-2

[178] Springer, Olga; Miler, Jakub A comprehensive overview of software product management challenges. *Empirical Software Engineering* (2022). doi: 10.1007/s10664-022-10134-5

[179] Galvan-Cruz, Sergio; Mora, Manuel; Laporte, Claude Y.; Duran-Limon, Hector Reconciliation of scrum and the project management process of the ISO/IEC 29110 standard-Entry profile—an experimental evaluation through usability measures. *Software Quality Journal* (2021). doi: 10.1007/s11219-021-09552-3

[180] Couto, Julia Colleoni; Kroll, Josiane; Ruiz, Duncan Dubugras; Prikladnicki, Rafael Extending the Project Management Body of Knowledge (PMBOK) for Data Visualization in Software Project Management. *SN Computer Science* (2022). doi: 10.1007/s42979-022-01168-z

[181] Garousi, Vahid; Pfahl, Dietmar; Fernandes, João M.; Felderer, Michael; Mäntylä, Mika V.; Shepherd, David; Arcuri, Andrea; Coşkunçay, Ahmet; Tekinerdoğan, Bedir Characterizing industry-academia collaborations in software engineering: evidence from 101 projects. *Empirical Software Engineering* (2019). doi: 10.1007/s10664-019-09711-y

2. Cross-Continental Collaborations, Diversity and Inclusion

Machine generated summaries

Machine generated keywords: diversity, oss, agile, gender, race, oss project, technology, collaborative, mentor, ethic, age, scrum, structured, field, ethical

Structured software development versus agile software development: a comparative analysis [78]

This is a machine-generated summary of:

Mishra, Alok; Alzoubi, Yehia Ibrahim: Structured software development versus agile software development: a comparative analysis [78]

Published in: International Journal of System Assurance Engineering and Management (2023)

Link to original: <https://doi.org/10.1007/s13198-023-01958-5>

Copyright of the summarized publication:

The Author(s) 2023

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The use of agile methodology has become widespread in organizations that previously relied on traditional or structured software development methods, such as the waterfall

approach."

"To take advantage of the benefits of each method, many organizations are using a hybrid approach that combines Agile with Waterfall and structured software development methodologies."

"This study aims to compare and contrast agile and waterfall methodologies in order to create a decision tree for selecting the most suitable method for a software development project."

"Despite many advantages of Agile methodologies, a combination approach may be necessary, as Waterfall may be required for certain projects or development phases."

"This study explores the feasibility of combining Waterfall and Agile methodologies in software development management."

Introduction

"The two most common methodologies of software development to date are agile and waterfall."

"Understanding the flow of several development methodologies is crucial, especially agile and waterfall as the two most used methodologies."

"The software firms realized that certain project aspects, for instance, purpose, requirements, resources, architecture, and scale will determine which methodology best suits them—either agile or waterfall or even a hybrid of the two (Bishop and Deokar 1)."

"Although waterfall development is still necessary, utilizing the agile methodology often leads to higher progress."

"It also evaluates whether software development companies should adopt a hybrid approach that incorporates both agile and waterfall methodologies."

"This study will particularly answer the following questions: When is the agile methodology preferable over the waterfall methodology, and vice versa?"

"When is it best to combine the waterfall and agile methodologies?"

Background and related work

"Even though other studies have compared the agile and waterfall approaches, this article

stands out because it presents the most recent research on the subject and offers a decision tree that software project organizations may use to determine when and how the two methodologies may be merged."

"Many previous studies have compared waterfall and agile methodologies and asserted that agile increased the likelihood that the project would be successful, monitored all processes during each iteration to provide the client with a complete understanding of the software product, and could rapidly repair defects."

"Of a study done by Khoza and Marnewick (2), agile methodologies are 60% more effective in process development than waterfall, however, there is no distinction between projects that use waterfall or agile methodologies in terms of the success of the business."

"The third category of the literature identified focused on the hybrid combination development of agile and waterfall in order to enhance the development process of the traditional methodologies."

Agile and waterfall developments mechanisms

"According to Kuusinen and others (3), agile methodologies place a greater emphasis on people, working software, collaboration, customer cooperation, and change than they do on waterfall sequential, procedures, contracts, extensive documentation, and plans."

"Several frameworks are available for the agile methodology, including Scrum, Kanban, XP, Behavior-driven development, Feature-driven software development, Dynamic Systems Delivery, and Crystal, among others (Gustavsson and others 4)."

"The Scrum Master, the Product Owner, testers, developers, and data engineers make up a typical agile team."

"Initiation: The major project requirements, including functionality and intended outcomes, are delivered to the team by the product owner."

"A waterfall team consists of a project manager, a business analyst, testers, and developers, among other positions."

"Development: All project is broken down into components during the development phase and assembled in a linked sequence until the entire final product is assembled."

Comparison between agile and waterfall developments

"For more than 20 years, software project management has been dominated by waterfall

and agile methodologies (Sinha and Das 5)."

"Compared to 10% of agile projects, about 30% of waterfall programs failed."

"Agile software development projects take 22.4% longer than anticipated compared to 13.65% longer than the estimated time for the waterfall method (Khoza and Marnewick 2)."

"The waterfall project management is more established compared to an agile project."

"The project may work better with the waterfall or agile methodologies, depending on its unique characteristics."

"The waterfall methodology works well for simple projects and for making improvements to current products, while agile is a better option for complicated projects."

"If the project's requirements are not known from the beginning, the agile methodology works well."

The hybrid software development approach

"The adoption of both agile and waterfall methodologies in the same software development firm is explored in this section using various suggestions and recommendations."

"This has led to the development of a new project management methodology called the hybrid methodology."

"Hybrid methodology benefits from lower project costs, faster development, and well-managed documentation (Morgan 6)."

"To increase team productivity, complete faster production, provide precise metrics to all project stakeholders, and foster a climate that is conducive to all forms of work, 44% of project directors embrace a hybrid methodology, according to AdobeTeam (7)."

"A hybrid methodology might combine the waterfall's organized up-front project plan with an agile emphasis on delivering small software components (Boersma 8)."

"Some software development experts blend a structured, waterfall methodology with elements of the agile mindset that succeed for them."

"While project management may select waterfall to ensure dependencies and deadlines,

developers may select agile to improve code productivity."

Discussion

"This review investigated the perennial debate over whether agile or waterfall software management methodologies are better."

"Many firms are still using the waterfall methodology since it simply works and has a successful track record, even though it has begun to be replaced by agile methodology as the industry norm for software project delivery."

"Waterfall and agile are two distinct management methodologies that work best for particular project types."

"When a project must adhere to rigorous standards, the waterfall methodology is preferable because it calls for deliverables for each step before moving on to the next (Pai and others 9)."

"Small projects have a success rate that is three times higher than large ones for agile projects, and for waterfall projects, small initiatives have a 6X higher success rate than large ones (Mersino 10)."

"The feasibility of combining the waterfall and agile methodologies in software development management is investigated in this paper."

Conclusions and future directions

"Agile software development has been advocated for more than 20 years as a solution to the rigidity issue with structured/traditional methodologies such as the waterfall."

"Current evidence indicates that many software firms continue to use the waterfall methodology."

"Although there are many alternative methodologies available for software development, the waterfall and agile methodologies are generally regarded as the most efficient."

"There are ongoing discussions regarding whether Agile Methods or structured methodology is better suited for software firms, which never seem to end."

"The article also included a decision tree that could be used to decide whether the agile or waterfall methodology is better suited for a certain project setting."

"The software firms may therefore need to use a hybrid framework that combines agile and waterfall."

"This is essential to learn how and when they employ agile or waterfall, and what kinds of projects they successfully accomplished utilizing the hybrid methodology."

Relationship between diversity of collaborative group members' race and ethnicity and the frequency of their collaborative contributions in GitHub [79]

This is a machine-generated summary of:

Shameer, Sheik; Rodríguez-Pérez, Gema; Nagappan, Meiyappan: Relationship between diversity of collaborative group members' race and ethnicity and the frequency of their collaborative contributions in GitHub [79]

Published in: Empirical Software Engineering (2023)

Link to original: <https://doi.org/10.1007/s10664-023-10313-y>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2023

Copyright comment: Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"An empirical study that analyzes how peer members' racial and ethnic diversity in a collaborative group relates to the frequency of their collaborative contributions in OSS projects."

"We performed a large-scale quantitative analysis of the relationship between the race and ethnicity of peer members in a collaborative group and the frequency of their collaborative contributions in GitHub."

"We finally used mixed effects regression modeling of the group members' contributions – measured by the total number of pull requests merged as a collaborative group – to assess the relationship between the racial and ethnic diversity of the members in a collaborative group and the frequency of their collaborative contributions."

"Our results indicate that (1) a major part of the developers' population are White developers; (2.1) the distribution of collaborative members' contributions from homogeneous and heterogeneous collaborative groups, with respect to the race and ethnicity of the groups' members, is different."

"Heterogeneous groups have a higher median number of contributions than homogeneous groups; and (2.2) the diversity of race and ethnicity of members in a collaborative group does have a statistically significant relationship with the frequency of the collaborative group members' contributions."

"The racial and ethnic diversity of peer members in a collaborative group may have a role to play in the frequency of groups' contributions in OSS."

"Further research is needed to understand how the diverse racial and ethnic composition of collaborative group members leads to a higher rate of group contributions."

Introduction

"We study the race and ethnicity of OSS developers participating in collaborative groups in GitHub."

"Motivated by (1) recent studies (Nadri et al. 12, 13) that found that perceived nonwhite developers have lower odds of getting their pull requests accepted when compared to perceived White developers in GitHub; (2) a GitHub Survey (Vasilescu et al. 14) which showed that developers could be aware of the race and ethnicity of other developers in a collaborative environment; and that 30% of GitHub developers have felt sometimes negative experiences due to diversity in terms of national origin, language, and ideology;

and (3) the lack of knowledge about racial and ethnic diversity in OSS collaborative groups, we present this large-scale empirical analysis in GitHub that answers the following research questions: RQ1: What is the distribution of races and ethnicities of members in collaborative groups in GitHub?"

"This study helps improve the body of knowledge regarding diversity in OSS environments and can be used to develop best practices and interventions to increase racial and ethnic diversity in GitHub collaborative groups."

Theoretical Framework

"Following previous studies, we also consider GitHub as a social network where we analyze the collaboration of OSS developers."

"Using the social network analysis, this study aims to provide numbers and knowledge that help researchers and practitioners understand the racial and ethnic diversity of collaborative groups in GitHub (RQ1) as the current state of racial and ethnic diversity in OSS is uncertain."

"With this study, we have two objectives: (1) to ascertain whether homogeneous and heterogeneous collaborative groups, with respect to the race and ethnicity of their group members, have statistically significant differences in the distribution of their contributions (RQ2.1), and (2) to investigate whether the racial and ethnic diversity of the collaborative groups has a positive relationship with their contributions in GitHub (RQ2.2)."

"No previous work has studied how developers' race and ethnicity in collaborative groups correlate to their total contributions."

Related Work and Background

"Previous studies on racial and ethnic diversity in groups yield mixed results on the relationship between racial and ethnic diversity and group outcomes."

"Our study further investigates the relationship between racial and ethnic diversity and group outcome and reports the first large-scale study on racially and ethnically diverse groups in collaborative online environments."

"The relationship between the diversity of members in a collaborative group and the collaborative group outcome may be different in online groups than in offline groups (Martins et al. 15)."

"Our study differs from previous diversity studies in two main concepts: First, this is the first study that analyses collaborative group members' diversity from a racial and ethnic

point of view in GitHub."

"We study the relationship between the diversity of race and ethnicity members in a collaborative group and the frequency of their collaborative contributions."

Experimental Design

"Step 1 – Creation of the collaborative network graph: To identify different developers who have collaborated in a GitHub project, we used the idea of a collaborative network graph based on pull request/issue comments, which has been used in previous research works (Ortu et al. 16; El Mezouar et al. 17)."

"In Step 3, we extracted the members of the collaborative groups within a project by identifying the completely connected components or cliques of three or more developers."

"Following Vasilescu et al. (18) to measure diversity reliably, we only considered those groups for which we were able to infer race and ethnicity for 75% of the group members."

"Following Vasilescu et al. (18), for the collaborative groups with members for whom we were not able to infer race and ethnicity, the measure only considers the fraction of the group for which we could infer the race and ethnicity."

Results

"The results show that among the 4, 570 collaborative groups, 27.74% (1,268/4,570) of them are homogeneous groups (i.e., comprised of developers of the same race and ethnicity), and 66.67% (3,047/4,570) of them are partially homogeneous groups (i.e., have a majority of developers belonging to the same race and ethnicity)."

"Among the 4, 570 collaborative groups, the API race and ethnicity has the highest number of collaborative groups 30.56% (1,397) of which API developers are a minority."

"The results show that homogeneous and heterogeneous groups, with respect to race and ethnicity, have different distributions of collaborative group members' contributions."

"This relationship has an estimate of 0.224 indicating that for an increase in race and ethnic diversity, the group's collaborative contributions increase by a factor of 0.224."

Discussion

"These results highlight a more serious issue: developers of other racial and ethnic groups may not be proportionally represented in GitHub communities, especially when forming

collaborative groups to develop OSS."

"We failed to infer the race and ethnicity of 13.51% of the developer population in collaborative groups in GitHub."

"Our results align with these previous works as they indicate that collaborative groups formed by members of more than one race and ethnicity (heterogeneous groups) have a statistically significantly higher median number of collaborative contributions than groups formed by members of the same race and ethnicity (homogeneous groups)."

"RQ2.2: Racial and ethnic diversity among the collaborative group members has a statistically positive relationship with the group contributions in GitHub In our model, racial and ethnic diversity has a statistically positive relationship with group members' collaborative contributions."

"Our study provides initial insights into racial and ethnic diversity's benefits to the group when collaborating in OSS development."

Threats to Validity

"Construct Validity We use tools like Name-Prism and Stanford Entity detector to estimate developers' race and ethnicity."

"In spite of this, we are only concerned with the digital footprint or the race and ethnicity - that is how a developer's race and ethnicity is by another developer."

"Name-Prism (Ye et al. 19) uses broad racial and ethnic categories which may be a threat because predominant races and ethnicities may vary depending on the country."

"Since there is no solid ground truth that we can use here, we followed the previous research which has used the same number of words for extracting the personality traits of developers in contribution in GitHub (Iyer et al. 20)."

"We estimate developers' race and ethnicity based on their names using the Name Prism Tool (Ye et al. 19)."

"We are only concerned about the developers' gender and developers' race and ethnicity."

Conclusion

"This paper has conducted a large-scale empirical study on the relationship between racial and ethnic diversity of peer members in collaborative groups and the frequency of their

contributions in GitHub by analyzing 4, 570 collaborative groups."

"We computed the racial and ethnic diversity of the collaborative group members using their Blau Index."

"Heterogeneous collaborative groups have a higher median number of collaborative contributions than homogeneous groups; and (3) racial and ethnic diversity among the group members has a statistically positive relationship with group contributions in GitHub."

"It will help create awareness of developers' racial and ethnic distribution in GitHub collaborative groups."

"We have provided evidence that racial and ethnic diversity could improve collaborative contributions."

"Our work provides a quantitative analysis of collaborative group members' racial and ethnic diversity and their collaborative contributions in GitHub."

Design and evaluation of a high– fidelity virtual reality manufacturing planning system [80]

This is a machine-generated summary of:

Al-Jundi, Hamza A.; Tanbour, Emad Y.: Design and evaluation of a high– fidelity virtual reality manufacturing planning system [80]

Published in: Virtual Reality (2022)

Link to original: <https://doi.org/10.1007/s10055-022-00683-x>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer-Verlag London Ltd., part of Springer Nature 2022

Copyright comment: Springer Nature or its licensor holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms

of such publishing agreement and applicable law.

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The challenge is to design, integrate, and evaluate VR simulation for manufacturing Systems that improves the effectiveness of the planning process."

"We describe the VR system setup and the integration of hardware and software to produce high-fidelity virtual simulation for manufacturing planning purposes."

"The designing guidelines are demonstrated by a high-fidelity VR simulation of a stamping process."

"This paper assesses the factors that affect overall fidelity of the VR simulation."

"Objective evaluation of the VR simulation was conducted using the fidelity framework and the scales, whereas the subjective evaluation methods used were VR-simulation-driven data interpretation."

"The VR simulation was evaluated by a selective sample of 33 senior engineering students using a highly reliable scale (Cronbach's Alpha = .93) questionnaire that was designed to evaluate functionality, performance, and experience."

"The realism and sensory systems factors were found to be the main significant factors affecting the fidelity of the VR system."

Introduction

"Several studies have shown VR technology as the basis of visualization for virtual prototyping, assembly planning, process simulations, and layout planning (Abidi and others 21; Akpan and others 22; Al-Jundi & Tanbour, 23; Damiani and others 24; Bendul & Blunck 25; Bordegoni & Ferrise 2013; Büttner and others 26; Cecil and others 27; Cipresso and others, 2019; Dorozhkin and others, 2012; Kesavadas & Ernzer 28, 29; Mourtzis and others, 30; Srinivasan and others 31; Söderberg and others, 32; Taylor and others 33)."

"Several contributions were made by researchers to evaluate fidelity of VR systems."

"VR technologies are still under development, but measuring the fidelity of VR systems is still not comprehensive enough to address all human-sensory systems."

"There is a need for multipurpose VR simulation that used for manufacturing planning at different levels of product, process, and operations."

"This paper introduced new approaches, techniques, and evaluations of VR simulations in manufacturing planning."

"The development of the VR simulation was based on applying and combining a DT concept and virtual planning process requirements."

"The VR simulation enables users to simulate the manufacturing system and use it for different purposes, such as product prototyping, process planning, layout planning, and training."

Methods and guidelines

"A complete virtual manufacturing planning process includes creating, visualizing, and optimizing the whole transformation process from a raw material stock into a desired product."

"In the era of digital manufacturing, 3D modeling and computer graphics techniques are being used to develop virtual models for manufacturing simulation."

"Simulation of the VR manufacturing system is a powerful decision support system in manufacturing process planning and scheduling."

"The simulation was developed to enable users to visualize, validate, and verify the car door inner panel's designs and its manufacturing processes by direct demonstration."

"The following are the outcomes from the implementation of the VR simulation requirements identification process: a) Include a detailed design drawing of the chosen complex product and descriptions, including CAD drawings, digital bill of materials, appearance, dimensions, and surface finishes."

"The 3D models were imported into Unity to construct a complete virtual factory for car door inner panels, and design VR audio."

Implementation

"Research investigating the benefits of high-fidelity VR systems suggests that upgrading and improving one or more critical factors of fidelity can improve the overall performance of VR simulation (Rosa and others, 34)."

"The digital sensory system is considered the main aspect that affects the overall fidelity of the VR experience, specifically the visual system fidelity."

"Several contributions in multisensory VR simulations that involve visual, auditory, and haptic systems suggest the benefits of using the digital sensory systems in improving the overall fidelity of VR systems."

"Research investigating the benefits of high-fidelity VR systems suggests that upgrading and improving one or more critical factors of fidelity can improve the overall performance of VR simulation (Rosa and others, 34)."

"We can notice that the auditory system's fidelity has negatively affected the overall fidelity of the digital sensory system.3.2 The subjective evaluation of the VR simulation was performed into two phases."

Results

"The fidelity of presence was ($M = 5.13$) for the four factors, while the fidelity mean of this specific question was found to be ($M = 5.15$) which indicates the accuracy of results."

"Fidelity has a statistically significant negative relationship with distraction factor ($r = -0.60, p < 0.001$)."

"The sensory systems fidelity has the most significant positive relationship with immersion and presence among other factors of presence sensory systems factor ($r = 0.75, p < 0.001$), ($r = 0.92, p < 0.001$)."

"The fidelity correlations were found for presence ($r = 0.99, p < 0.001$), immersion ($r = 0.81, p < 0.001$), control factor ($r = 0.84, p < 0.001$), realism factor ($r = 0.88, p < 0.001$), and sensory systems factor ($r = 0.92, p < 0.001$)."

Discussion

"To create a high-fidelity VR content for manufacturing planning at product, process, and operations level, it requires an accurate configuration and integration of the VR system."

"The results of this study provide an assessment of the effectiveness of collaborative manufacturing planning processes with high-fidelity, using VR technology."

"The findings shown that the fidelity in questions designed to evaluate the performance of VR simulation in manufacturing planning process were high, such as "RF16_The virtual factory seemed more efficient for planning purposes than the real world traditional methods," "SF9_The performance in the manufacturing planning process is more effective using virtual reality compared with other traditional methods," and "RF4_I learned how the inner panel of the door can be manufactured and assembled"."

"These results indicate that the fidelity of VR simulation for manufacturing planning processes were found to be high-fidelity."

Conclusions

"We presented a method for manufacturing planning using VR technology along with implementation of this method through high-fidelity VR simulation that is designed to plan manufacturing at product, process, and layout levels."

"We discussed the technical infrastructure necessary to design a high-fidelity VR system for manufacturing planning."

"We described a basic VR system and how it may be used for this purpose and then extended this system by introducing the VR system setup, digital manufacturing planning process, and integration of hardware and software to produce a high-fidelity virtual simulation for manufacturing planning purposes."

"The focus in measuring fidelity of the VR simulation was concentrated on the digital sensory system fidelity as it was assumed to be the most significant factor affecting fidelity in the manufacturing planning process."

Directions for future work

"The design and implementation of the VR simulation for manufacturing planning presented in this paper has demonstrated the successful overcoming of several challenges related to the development, implementation, and evaluation of a virtual factory using VR technology."

"One such improvement would include expanding the study to involve industry experts working to improve the credibility of the fidelity framework and the scale presented to evaluate the fidelity of VR systems."

"A potential expansion of the presented work in this study could utilize the linkage of the virtual factory VR simulation with a real manufacturing environment."

"Deploying VR in CAE results visualization could reduce the potential for errors in design."

"Because designing VR simulation requires cooperative efforts from engineers, cognitive scientists, psychologists, and expert artists and animators, this collaboration between different disciplines would enrich future research results."

Using structured ethical techniques to facilitate reasoning in technology ethics [81]

This is a machine-generated summary of:

Murphy, Matt A.: Using structured ethical techniques to facilitate reasoning in technology ethics [81]

Published in: AI and Ethics (2023)

Link to original: <https://doi.org/10.1007/s43681-023-00371-9>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Nature Switzerland AG 2023

Copyright comment: Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"With popular and often contentious fields like artificial intelligence (AI), a slew of technical and functional (used here to mean primarily "non-technical") approaches are continually developed by diverse organizations to bridge the theoretical-practical divide."

"Technical approaches and coding interventions are useful for programmers and developers, but often lack contextually sensitive thinking that incorporates project teams or a wider group of stakeholders."

"Contrarily, functional approaches tend to be too conceptual and immaterial, lacking actionable steps for implementation into product development processes."

"Despite best efforts, many current approaches are therefore impractical or challenging to use in any meaningful way."

"After surveying a variety of different fields for current approaches to technology ethics, I propose a set of originally developed methods called Structured Ethical Techniques (SETs) that pull from best practices to build out a middle ground between functional and technical methods."

Introduction

"Many notions of technology ethics have grown out of the AI discipline and AI ethics comprises a large portion of current "technology ethics" focuses, discussions, and regulations."

"It's easy to conceptualize ethical quandaries that AI face because they often involve the same decisions and tradeoffs that humans must face."

"The applications of AI involve many high stakes decisions that beg exigent ethical questions and warrant careful ethical analysis."

"Much of the discussion over ethical AI is in the healthcare field, where ethical decisions around AI involve people's medical treatment and well-being [35]."

"The AI ethics sub-discipline can be illustrative of how technology ethics may be shaped and continue to emerge across other disciplines."

"Much of the below background therefore uses the evolving field of AI ethics as a prime example of technology ethics research and methods."

Background of field and research efforts

"Some technology ethics questions are readily answered using more technical methods, while some require more human deliberation and action."

"Given the widely varying sophistication, depth, and contexts of existing methods, it's impractical to highlight all the attempts that have been created across many technological domains to address ethical questions."

"Functional methods might include these conceptual frameworks that help or encourage companies to draft ethical AI principles."

"Some functional methods go beyond conceptual principles, questions, and ethical checklists by embedding these elements into more formalized strategies for ethical reasoning."

"Because we've been using AI as an example, but AI does not encompass the entire field of technology ethics, this paper does not address the most technical end of the continuum; many technical tools that involve programming, algorithmic model tuning, and statistical analysis of data."

Introduction to SETs

"Some of the main reasons SETs are useful are because they make the traditionally implicit or obfuscated process of ethical reasoning explicit through comparisons and visualizations."

"These criticisms of SATs are useful to underscore because they help frame how SETs acknowledge these similar gaps in ethical reasoning and attempt to mitigate them where appropriate."

"SETs encourage the ethical reasoner to consider the role of bias in their technology and simply make it explicit."

"This is a feature, not a flaw, of SETs and other ethical reasoning methods."

"Ethical reasoning in technology can contribute to better business outcomes, and SETs strive to be a great way among other methods to do so."

"SETs and other ethical reasoning methods can't be easily measured in terms of the probability that they get a technology to an ethical ideal, let alone define an ethical ideal

themselves."

Examples of SETs

"The SPF is primarily designed to answer the question "How will I identify and engage stakeholders to ethically evaluate my technology?""

"The SPF also, like other SETs, forces the user to both identify underrepresented voices and to make clear why any particular stakeholders might not be represented in their ethical evaluation."

"The ERIT seeks to answer the question "What ethical risks does my technology bring, and how do they impact my stakeholders?"."

"A piece of the required documentation to prove ethical ramifications of developed technology have been considered, show identified risks, and to provide the required audit trail."

"EFA answers the question "Can the measures and strategies I put in place mitigate ethical risks posed by my technology?""

"It helps users consider and document how perceived ethical risks weigh against their mitigation strategies for those risks."

Conclusion

"This paper has discussed ethical reasoning as inherently restrictive, SETs provide an opportunity to increase benefits and prevent harms to technology organizations and their stakeholders."

"SETs are of course not a silver bullet for technology ethics."

"Depending on the specific project or technology development environment, SETs may not completely address the need for ethical reasoning."

"Just like the many technology ethics certifications, checklists, and other frameworks that exist, it's a mistake to assume that using SETs completely fulfills requirements for ethical thinking."

"Considering this, SETs should be viewed as another approach to technology ethics in the ever-growing compendium of methods that can be adopted and honed by technologists; all

contributing toward the same goal."

"On the flip side, SETs seek to foster ethical technology development from its inception, through a bottom-up approach."

The use of QCA in science, technology and innovation studies: a review of the literature and an empirical application to knowledge transfer [82]

This is a machine-generated summary of:

Fernández-Esquinas, Manuel; Sánchez-Rodríguez, María Isabel; Pedraza-Rodríguez, José Antonio; Muñoz-Benito, Rocío: The use of QCA in science, technology and innovation studies: a review of the literature and an empirical application to knowledge transfer [82]

Published in: Scientometrics (2021)

Link to original: <https://doi.org/10.1007/s11192-021-04012-y>

Copyright of the summarized publication:

The Author(s) 2021

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming

from.

Abstract-Summary

"This article analyses the use of qualitative comparative analysis (QCA) in social studies on science, technology and innovation."

"The article finds that the acceptance of QCA is unevenly distributed in the major research fields related to knowledge production."

"It is used mainly to study innovation in firms but is largely absent in science and technology studies."

"The article offers an account of challenges and directions for future research and discusses the possibilities of the method as a third way between qualitative and quantitative traditions in science, technology and innovation."

Introduction

"There has been a marked division between qualitative and quantitative approaches in social studies on science and technology (Leydesdorff, 36)."

"The research field of Science and Technology Studies (STS) has preferred to observe knowledge-building processes through interpretative analyses."

"Scholars in this field often concentrate on phenomena which enable the application of reflexive strategies to observe meanings, interests and social processes in the construction of science and technology (Edge, 37; Martin and others, 38)."

"The more transversal research field of Science Policy and Innovation Studies (SPIS) is more interested in knowledge production and application with a practical orientation towards policy and management."

"Quantitative studies on science and technology as a distinctive research field (including bibliometrics) are usually closer to the latter in methodological issues and practical aims."

"QCA can also be used as a strategic methodology to combat the customary division between qualitative and quantitative traditions in the broader area of science, technology and innovation (STI hereinafter)."

Background: what QCA is and why it is important for science, technology and

innovation studies

"Unlike quantitative analysis, which is based on a significantly high number of cases, and qualitative analysis based on direct observations and interpretations of complex facts, QCA enables a small number of case studies to be used simultaneously through a procedure of explanatory analysis susceptible to formalization, making it easy to implement through software."

"QCA explores how combinations of conditions form the pathways to a certain outcome, instead of analysing the individual impact of independent variables on dependent ones."

"In phase 1, the researcher defines the conditions and outcomes, grounded in previous hypotheses, and the calibration or measurement criteria that must be considered when coding (Ragin, 39; Rihoux & Marx, 40)."

"The possible sets that represent necessary and/or sufficient conditions provide individual analysis of the conditions, as well as the logical combinations or configurations."

Literature review: an exploration of the use of QCA in science, technology and innovation studies

"In order to be included, an article had to focus on meaningful topics for science, technology and innovation, or related activities, levels of analysis and sectors."

"There are a few articles in the leading journals in the research field of innovation studies (SPIS)."

"Neither did we find any related article in the top journals in the STS research field (Social Studies of Science, Science Technology and Human Values, Minerva, etc), nor in journals specializing in quantitative science and technology studies (Scientometrics and others)."

"Given the concentration of existing research, our strategy was to assess the use of QCA in significant domains of science, technology and innovation (not only innovation), and in different sectors (not only firms)."

"To select the remaining articles, we scrolled down the ranking in each conceptual category until finding at least the same number of studies that highlighted other levels of analysis (individual/team, project, territorial) and other sectors (university, research centres, public administrations, societal/civic society)."

An empirical application: the study of university–industry relationships in innovation systems

"Knowledge transfer, broadly understood as the process by which actors (individuals or groups) use knowledge produced in a different organizational or institutional domain (Bozeman and others, 41), is a difficult phenomenon to observe."

"Knowledge transfer is especially difficult to observe in SMEs."

"There is a marked contrast between the evidence available from high-tech firms and SMEs, particularly in terms of the factors that influence knowledge acquisition from universities (Corral de Zubielqui and others, 42; Dada & Fogg, 43; Poorkavoos and others, 44)."

"Although regional development is the objective of many universities, it is difficult to know how knowledge transfer really takes place (Fernández-Esquinas and others, 45)."

"Many universities are surrounded by SMEs that find useful resources in nearby departments and research groups, and many researchers are associated with them both formally and informally."

"Qualitative observations alone have some limitations for explaining the determinants of knowledge transfer (Álvarez-Coque and others, 46)."

Research site

"Knowledge transfer activities are carried out thanks to the legal possibility for university professors to enter into contracts with firms."

"We have used 40 case studies of firms of various sectors, sizes, ownership and types of link with the university that represent different forms of knowledge transfer and conditioning factors."

"Our initial criterion to specify the observational outcomes was to focus on firms that have a contractual relationship with the university for both original R&D and services, compared to those that do not."

"We acknowledge that empirical research on science and industry relationships uses a large array of detailed variables for exploring influences on knowledge transfer, including information about productive sectors, technological content, organizational characteristics of firms and universities, finance and the internal structure of projects (Perkmann and others, 47)."

Analysis and results

"The main conclusions from the consistency column are as follows: Of the firms that have

undertaken a project (PROJ), 89% have a special presence of university graduates (QUAL), 67% have an R&D (RDDPT) department, 78% produce technology (TECPROF), 100% have contacts with university professors and 67% have sufficient information about collaboration mechanisms (INFO)."

"Of the firms that have entered into a service contract, 83% have a special presence of university graduates (QUAL), 75% have an R&D (RDDPT) department, 58% produce technology (TECPROF), 100% have contacts with university professors and 58% have sufficient information about collaboration mechanisms (INFO)."

"The overall results of the analysis are interpreted through combinations of attributes in firms that appear as necessary or sufficient conditions for the existence of a project or service contract with the university."

"For R&D projects we found only one option: the combination of personal contacts with university professors and a technological profile."

Discussion: some challenges and directions for future research

"Potential problems often do not stem from the technical and financial practicalities of performing a study on a small number of cases and different sources of information accessible to a wide range of researchers."

"There is a need to develop theory that can account for the complexity of configurations, given that even with a small number of cases the theoretical combinations are extremely high (Fiss and others, 48)."

"In order for this potential limitation to be considered, some studies recommend combining QCA with other methods to take into account the rationale of causal mechanisms and processes at work behind the conditions in the cases (Kraus and others, 49; Schneider & Rohlfing, 50)."

"Because of sensitivity to complexity, the ability to analyze small and medium groups of cases and the coverage of various types of information and units of analysis, several forms of added value can be identified for science, technology and innovation."

Conclusions

"These results have several implications for the use of data and methods in the social studies of science, technology and innovation that go beyond the application of QCA."

"An important question is whether this approach to configurational logic and causality fits with our understanding of the production, application and distribution of knowledge

(instead of, or in combination with, other meta-theoretical approaches based on GLM in which each variable is assumed to be capable of influencing the level of probability regardless of the values of other variables)."

"The potential application of QCA in science, technology and innovation studies is closely related to how the above challenges are addressed."

"Inclusion in the established toolkit of scholars exploring scientific knowledge production, technology and different kinds of innovations will depend on the research community's meta-theoretical assumptions and methodological preferences when addressing typical problems."

Perceived diversity in software engineering: a systematic literature review [83]

This is a machine-generated summary of:

Rodríguez-Pérez, Gema; Nadri, Reza; Nagappan, Meiyappan: Perceived diversity in software engineering: a systematic literature review [83]

Published in: Empirical Software Engineering (2021)

Link to original: <https://doi.org/10.1007/s10664-021-09992-2>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Perceived diversity in Software Engineering has been recognized as a high-value team property and companies are willing to increase their efforts to create more diverse work teams."

"Less is known about how other perceived diversity factors such as race, nationality, disability, and age of developers are related to Software Engineering."

"Through a systematic literature review, we aim to clarify the research area concerned with perceived diversity in Software Engineering."

"Our goal is to identify (1) what issues have been studied and what results have been reported; (2) what methods, tools, models, and processes have been proposed to help perceived diversity issues; and (3) what limitations have been reported when studying perceived diversity in Software Engineering."

"Our ultimate goal is to identify gaps in the current literature and create a call for future action in perceived diversity in Software Engineering."

"Perceived diversity aspects related to SE participants' race, age, and disability need to be further analyzed in Software Engineering research."

Introduction

"Recent studies have shown that SE teams have problems associated with perceived diversity aspects in both industrial and Open Source Software (OSS) environments."

"Through a Systematic Literature Review (SLR) we analyze the previous studies that have been published until May 2020 on the topic of perceived diversity in SE."

"There are five literature reviews for some perceived diversity aspects in SE previous to our SLR."

"Our SLR differs from the previous SLR because (i) we analyze studies that address not only gender and cultural – in our SLR, culture is a sub-dimension inside nationality – diversity but other software perceived diversity aspects (e.g., age, and race), and (ii) we summarize the outcomes studied and identify gaps in the literature."

"Researchers in SE can use these studies as the basis of future investigations into perceived diversity."

"Researchers and practitioners can use these results to assess perceived diversity in their

teams."

Background and Related Work

"Previous to our SLR, five literature reviews have analyzed gender diversity in SE."

"Our SLR differs from the systematic mapping because our study largely explains the outcome of the papers."

"Another difference is that the systematic mapping includes papers related to software management and agile methodologies but our SLR does not."

"The closest study to ours is the SLR by Menezes and Prikladnicki (51) which aims to analyze the characteristics of diversity in SE through a systematic literature review."

"Their SLR included 29 papers and their findings relate the types of perceived diversity with a SE domain."

"Our SLR includes the 29 papers from Menezes and Prikladnicki's SLR (51) and goes further to identify not only the SE domain, but also the type of study, the tools, methods, and processes proposed."

Systematic Literature Review Methodology

"Our purpose is to help researchers and practitioners to identify what has been studied so far, what has been proposed to help foster perceived diversity in SE, and what are the limitations and threats faced in previous SE perceived diversity studies."

"Motivation With this question our goal is to depict an overview of the perceived diversity state-of-the-art in SE and help researchers and practitioners to better understand what has been studied and what are the results of these studies."

"Motivation With this question we aim to help researchers identify the threats to validity and limitations that previous studies have faced when studying perceived diversity in SE."

"The inclusion criteria for studies to be included in our SLR are: We included studies that analyze any perceived diversity aspect related to SE."

"We removed discussion papers, i.e., those papers studying the perceived diversity in a psychological, social, or philosophical context because they were not related to SE activities."

Results

"We report gender differences based on women and men as the studies included in this SLR only reported differences based on these two genders."

"Other studies report gender differences during code review practices indicate that (1) accepted pull requests submitted by women and men provide similar descriptions in terms of length, and generate a similar number of discussions [SLR(Imtiaz and others 52)], (2) when both genders are known, women tend to have contributions accepted more often than men when they the contributors are from insiders to a project, but men's acceptance rates are higher when the contributors are from outsiders to a project, [SLR(Terrell and others 53)], (3) while women concentrate their work across fewer projects and organizations, men contribute to a higher number of projects and organizations [SLR(Imtiaz and others 52)], (4) there are gender differences in the use of positive opinion words, emoticons, and expletives during the code review as while men tend to express more positive/negative sentiments, women tend to express more neutral comments instead of expressing strong sentiments [SLR(Paul and others 54)], and (5) men and women follow different comprehension strategies when reading source code [SLR(Zohreh Sharafi and others 55)]."

"Studies on SO reported that (1) men and women posted equally as often in that platform, but men post statistically significant a higher number of posts [SLR(Kuechler and others 56)], and (2) there are significant gender differences in the participation and success in SO."

"Studies analyzing industrial workplaces indicate that (1) the gender of software engineers was a statistically significant predictor of self-rated productivity as software engineers who identified themselves as women and who selected to write their gender identity reported significantly higher self-rated productivity than men [SLR(Murphy-Hill and others 57)]; (2) gender diversity has a significant positive effect on performance [SLR(Gila and others 58)], (3) while the self-perception in men's end-user debuggers is positively correlated with the debugging performance, the self-perception in women's end-users is not correlated [SLR(Chintakovid and Wiedenbeck 59)], (4) women do not seem to be willing to acknowledge their own performance in software development teams, but their performance is highly regarded by their teammates [SLR(Bastarrica and Simmonds 60)], (5) all professional software developers, both men and women, have implicit gender biases which may impact their decision-making on the evaluation of other developers' contributions [SLR(Yi and Redmiles 61)], and (6) there is a gender pay gap of 18% in a UK company in which only 11% of senior positions were taken by women [SLR(Kirton and Robertson 62)]."

Discussion

"This SLR shows that perceived diversity studies in SE have critically reflected upon practices, methods, and even tools concerning inequality issues in both the development of software and the social aspects of the software."

"While most of the studies analyzed in this SLR have shown social issues related to gender, less has been done to research how racial, age, and nationality diversity relates to SE."

"The study of nationality diversity can help to identify the benefits of developing software in a cross-cultural environment and how to solve cultural issues."

"In this SLR, most of the studies about nationality diversity have shown that collaboration between industrial organizations from different cultures may raise misunderstandings, discomfort, or cultural issues that may end with people leaving the organization."

"Casey [SLR(Casey 63)] studied the implications of misunderstanding and not addressing cultural differences in an Irish multinational organization that off-shored part of their software development process to Malaysia."

Threats to Validity

"Although we believe we have analyzed the most important papers in perceived diversity in SE so far, we may have missed some relevant studies due to language constraints, and thus underestimate the extent of perceived diversity research in SE."

"Although we might have missed some important papers due to the search strings we used in Google Scholar and IEEE database, we have contacted field experts in the perceived diversity area to assess our SLR and minimize the number of important studies missed."

"Although we have analyzed more than one hundred papers that addressed some perceived diversity issues in SE, we cannot claim that our results can be generalized outside the SE community."

"For the analyses of our SLR, we have extracted as much data as possible from the 131 papers: publication year, authors, venue, type of publication, SE activity done in the paper, and purpose."

Conclusion

"We first defined the four perceived diversity aspects (gender, age, race, and nationality) considered in this SLR and then analyzed what 131 previous studies have discovered and proposed to increase the awareness and reduce the bias of these four perceived diversity

aspects in SE."

"With this SLR we aim 1) to assist the SE community with the understanding of the different factors that may influence the engagement and permanence of diverse developers working in software engineering; 2) to identify different methods used to improve perceived diversity in teams, and 3) to be aware of the threats to validity and limitations that previous studies have."

"Our SLR indicates that race has been the perceived diversity aspect least studied in SE and they should be further studied."

Being a Mentor in open source projects [84]

This is a machine-generated summary of:

Steinmacher, Igor; Balali, Sogol; Trinkenreich, Bianca; Guizani, Mariam; Izquierdo-Cortazar, Daniel; Cuevas Zambrano, Griselda G.; Gerosa, Marco Aurelio; Sarma, Anita: Being a Mentor in open source projects [84]

Published in: Journal of Internet Services and Applications (2021)

Link to original: <https://doi.org/10.1186/s13174-021-00140-z>

Copyright of the summarized publication:

The Author(s) 2021

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit

<http://creativecommons.org/licenses/by/4.0/> .

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Mentoring is a well-known way to help newcomers to Open Source Software (OSS) projects overcome initial contribution barriers."

"Despite the importance of OSS mentors, they are understudied in the literature."

"Understanding who OSS project mentors are, the challenges they face, and the strategies they use can help OSS projects better support mentors' work."

"We employ a two-stage study to comprehensively investigate mentors in OSS."

"We identify the characteristics of mentors in the Apache Software Foundation, a large OSS community, using an online survey."

"Through interviews with OSS mentors (n=18), we identify the challenges that mentors face and how they mitigate them."

Introduction

"Past work has shown that identifying appropriate tasks for newcomers is one of the key challenges that mentors face [66], therefore, in this research question, we conduct a deeper investigation of (a) the specific challenges related to task recommendation and (b) the strategies mentors employ to overcome them from the interviews."

"Scientifically identifying challenges and strategies that mentors adopt to support newcomers can help OSS communities, mentors, and researchers create better tools and processes to support mentorship."

"Our contribution is a comprehensive view of: 1) the characteristics of mentors in a large OSS community and how they differ from non-mentors; 2) the challenges mentors face to support newcomers onboarding to OSS projects; 3) the challenges of recommending tasks for newcomers; and 4) the strategies mentors employ to mitigate these challenges."

Background

"To factual knowledge, mentors' technical guidance helps mentees develop job-related skills [67–68]."

"Mentoring relationships are commonly employed in communities of practice, in which mentors provide mentees with support in developing the skills and competencies necessary for full and productive participation in the community."

"In OSS projects, the role of an OSS mentor is to support software developers in their technical activities — e.g., explaining the architecture of the project's software, recommending tasks, and assisting in software development activities."

"Besides helping in technical activities, mentors can encourage developers to improve their communication and collaboration skills [69]."

Method

"Stage, we interviewed mentors from the ASF and included mentors from several other OSS communities to provide a broad view of the mentors' challenges and strategies."

"The survey comprised 25 questions, and we used for the present paper 10 of those questions, including how often the respondents contribute as mentors to the projects; if the contributor had a mentor when they started; gender; age; education level; experience as contributor; compensation (paid/mix/unpaid); and English proficiency for technical and social interactions."

"We recruited mentors from the Stage 1 survey who said they would be available for a follow-up interview."

"We interviewed 18 experienced OSS mentors, 10 from several OSS projects (P1-P10), and eight from the ASF community (P11-P18)."

"Interviews included a central question about the challenges that mentor faces while mentoring other contributors, and questions about how the mentor recommends tasks for newcomers."

Results

"According to P3, "to keep them [the newcomers] engaged you need [...] to pick a task that is appropriate for them..., which can be a challenge for mentors.""

"Two mentors reported that ADJUSTING INTERACTION STYLE TO DIFFERENT MENTEE PERSONALITIES is a challenge since mentors are likely to collaborate with diverse people who have unique personalities and working styles, as stated by P9: "[...] you always have to adapt based on each individual newcomer [...] one solution doesn't always work for everyone.""

"Mentors also mentioned a DIFFICULTY TO KEEP THE MENTEES ENGAGED, because "people come, they fix their bug, and they go away." (P16) Indeed, [70] showed that a great number of newcomers place a single contribution and do not return to the project."

Discussion

"When mentors assign tasks to newcomers, they need to filter them based on complexity and required skills."

"Our results indicate that expertise and skill identification (Prod2.7) is a key challenge for mentors who recommend tasks to newcomers."

"Mentors usually interact with newcomers to collect additional information to match their current skill level with the skills required for a specific project or task."

"We found that providing up-to-date and straightforward documentation of available open issues and precise tagging of available open issues are some techniques that OSS communities can utilize to support newcomers and mentors."

"We also identified a set of task recommendation strategies that mentors can use to recommend tasks to newcomers."

"Future work may focus on investigating how each challenge and strategy influence newcomers with different motivations [71], retention in the project, and assertiveness in recommended tasks."

Limitations and threats to validity

"We continued interviewing until we could not identify any new challenges or strategies in two interviews in a row."

"To increase the number of respondents in our study, we deployed multiple tactics to reach mentors, contact survey respondents, as well as reaching out to personal contacts (and snowballing) and previous contacts with Google Summer of Code mentors, social media posts, and OSS-related mailing lists."

"We are aware that the OSS universe is vast, and challenges and strategies can differ according to projects."

"Challenges and strategies may be different for companies, other online communities, and different types of users."

"Future research should focus on analyzing the commonalities and differences among challenges and strategies in different domains to build generalized models and theories about onboarding and mentorship in open collaboration communities."

Related work

"We provide more details about the existing literature related to mentorship in OSS projects, choosing appropriate tasks for newcomers, and strategies to support task recommendation."

"Although the literature shows some interest in OSS mentorship and approaches to support finding an appropriate task for newcomers, to the best of our knowledge there is no systematic identification of strategies that mentors employ to help newcomers select their tasks and the challenges they face in this process."

"Although the literature explores strategies for task recommendation in OSS projects, they rely on extensive manual work to tag the issue tracker since issue trackers usually either do not consider newcomers' skills and interests or only work with developers who have previous experience in the project."

"We extend the existing literature by uncovering mentors' strategies to recommend appropriate tasks for newcomers."

Conclusion

"OSS communities frequently rely on mentors to guide newcomers to become long-term, active contributors."

"We also identified 25 challenges faced by mentors in OSS projects."

"We identified 7 challenges that mentors face when recommending tasks to newcomers."

"We also identified 13 approaches to recommending tasks for newcomers."

"Our results provide initial insights about characteristics of mentors and challenges they

face, and strategies they employ, which OSS communities and mentors can leverage to improve the current state of practice."

Spearheading agile: the role of the scrum master in agile projects [85]

This is a machine-generated summary of:

Shastri, Yogeshwar; Hoda, Rashina; Amor, Robert: Spearheading agile: the role of the scrum master in agile projects [85]

Published in: Empirical Software Engineering (2021)

Link to original: <https://doi.org/10.1007/s10664-020-09899-4>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Science+Business Media, LLC part of Springer Nature 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Empirical studies focusing on the role of the scrum master in practice are scarce."

"We present and describe the scrum master's role in agile projects in terms of (a) the grounded theory of the role of the scrum master which involves everyday activities of facilitating, mentoring, negotiating, process adapting, coordinating, and protecting; (b) the varying involvement of the scrum master in selected agile practices carried out by the team; and (c) a positive association between the presence of the scrum master and the frequency with which agile practices are carried out by the team."

"This study presents for the first time a multifaceted study of the multiple dimensions of the scrum master role and will enable practitioners to better manage expectations of this role in practice."

Introduction

"While key practitioner literature has stressed the centrality of the scrum master in agile projects (Sutherland and Schwaber 72), studies which investigate the role of the scrum master are limited."

"Answering these questions allows us to address the lack of knowledge regarding the role that scrum masters play in agile projects."

"In an endeavour to answer some of the questions around the scrum masters role, we present the results of a Grounded Theory study with a mixed methods approach to employing supplementary quantitative data in addition to the primary qualitative data."

"This study on the role of the scrum master in agile projects utilized: a) Grounded Theory to analyze qualitative data from over 45 h of semi-structured interviews with 39 software practitioners; and b) Statistical analysis such as crosstabulation and Chi-Square to analyze quantitative data from 47 questionnaire respondents who gave insights into the role of the scrum master."

Background

"The following section presents a literature review which traces the introduction of agile methods in the software industry and the role of the scrum master in agile software development projects."

"The scrum master serves the team by facilitating agile adoption, removing impediments, facilitating performance of scrum ceremonies, and coaching teams which are starting out in scrum (Sutherland and Schwaber 72)."

"Bass' (73) empirical study identified six overarching activities performed by the scrum master: process anchor; stand-up facilitator; impediment remover; sprint planner; scrum of scrums facilitator; and integration anchor."

"There is a lack of an overarching study which takes a holistic view of the scrum master's role in agile projects and which takes into account the different dimensions of the role."

"There still exists ambiguity around the role of the scrum master in agile software development as proposed in theory (Sutherland and Schwaber 72), (Schwaber and Beedle

74) and identified in practice (Bass 73), (Noll and others 75)."

Research design

"We conducted a Grounded Theory (GT) study, into the role of the scrum master, with a mixed methods approach to employing supplementary quantitative data in addition to the primary qualitative data, within a pragmatic philosophical perspective."

"As our study looked to understand the intangible aspects of the scrum master's role in agile projects, it was primarily qualitative in nature."

"It was decided to embed the quantitative strand for the following reasons: The questionnaire allowed us to form a picture of the interview participant's project and the role of the scrum master in the project."

"The pre-interview questionnaire, created using Google Forms, was used to not only collect demographic data but also information on agile practices and involvement of scrum masters in these practices."

"The extent of participation and involvement of the scrum master in ten selected agile activities was gathered from the pre-interview questionnaire."

Findings

"Section 4.2.1 looks at the possible correlation between the scrum master being present in an agile project and the frequency with which an agile practice is carried out by the team."

"Section 4.2.2 deals with the level of involvement a scrum master has in selected agile practices carried out by the team."

"We ran a crosstabulation between two survey categories: a) The presence of the scrum master in the respondents project; and b) the frequency of agile practices carried out by the team."

"Another key aspect of the scrum master's role identified in the qualitative phase of our study was to make sure that the team implemented agile practices and performed them regularly."

"The survey question, "what is the extent of the scrum master's involvement in agile practices carried out by the team?""

Comparing to related work

"The wide spread of the scrum master's role as documented in our study is supported in the findings of recent empirical studies (Hoda and others 76), (Bass 73), (Noll and others 75), where the scrum master's activities encompassed both software development and project management activities."

"Our finding that the scrum master's highest involvement is in mentoring activities is supported by other studies (Bass 73), (Noll and others 75)."

"While in our study, the coordinating and negotiating activities formed, however small, part of the scrum master's role."

"Some of the key functions of the scrum master role (as mentioned in the Scrum Guide™) such as coaching, facilitating, ensuring scrum artefacts and events are followed, and removing impediments, are supported by our activities of mentoring and facilitating."

"Our protecting activity is supported by the Scrum Guide™ when it says that, "If others are present, the Scrum Master ensures that they do not disrupt the meeting" (Sutherland and Schwaber 72)."

Evaluation of the study

"This means the generated theory should closely reflect the data collected from participants."

"The codes and concepts which emerged from our analysis were closely related to the concerns of the participants, which is, regarding the role of the scrum master in agile projects."

"While our theory is specific to our research context, it can act as a predictor tool for the scrum masters role in ASD projects."

"Using our theory we can say that, depending on the project context, a high percentage of the scrum master's role will involve facilitating and mentoring."

"Out of 47 survey respondents, 17% had the job title of scrum masters, whereas the rest were a diverse cohort of job titles."

"In the qualitative data collection, the percentages are different as participants chose to talk about multiple projects in which they quite often had acted as scrum masters."

Implications for practice and research

"Our study highlights the diversity of informal activities carried out by the scrum master, the varying involvement of the scrum master in agile practices, and the positive association between the scrum master's presence and the frequency with which agile practices are carried out by the team."

"For organizations the range and depth of the scrum masters activities gives them a good guide to build a realistic job description when advertising for scrum master roles."

"For scrum masters, especially those who are new or transitioning into the role, the everyday activities will help set realistic expectations of their role."

"These activities are: Scrum masters will need to set the frame of reference for teams who are new to agile."

"While coordinating is a small aspect of the scrum masters role, in some projects, especially those that involve multiple teams or even specialists, this activity can assume a lot of importance."

Limitations

"A Grounded Theory study generates a "mid-ranged" theory which is limited to the contexts studied and remains open to modification based on new data to suit new contexts (Glaser 77)."

"While the quantitative study looked at the level of involvement and possible association of the scrum master with agile practices, it did not measure the effectiveness of the scrum master in those activities."

"We believe that the topic of scrum master effectiveness is ripe for future research."

"One other limitation is that there could be factors other than the presence of the scrum master which could lead to certain practices exhibiting an increase in their usage by the team."

Conclusion

"We have presented a Grounded Theory study with a mixed methods approach to study the role of the scrum master in agile projects."

"A grounded theory of the role of the scrum master which explains that scrum masters perform six everyday activities which are: Facilitating: This activity involves the scrum master clearing obstacles and issues, facilitating the project teams functioning, and easing the team's transition to scrum."

"Mentoring: Mentoring involves the scrum master empowering the team on the path of self-organization, educating the team and stakeholders in agile practices, and ensuring team adherence to agile practices."

"Coordinating: The key coordinating activities carried out by the scrum master are involving specialists in the project and coordinating collaboration between teams from different areas of the organization."

"Scrum masters need to be prepared to perform any of the six identified activities in agile projects."

Bibliography

[1] Bishop D, Deokar A (2014) Toward an understanding of preference for agile software development methods from a personality theory perspective. In: 47th Hawaii international conference on system sciences, Waikoloa, USA. IEEE, pp 4749–4758

[2] Khoza LT, Marnewick C (2020) Waterfall and agile information system project success rates: a South African perspective. *S Afr Comput J* 32(1):43–73

[3] Kuusinen K, Gregory P, Sharp H, Barroca L (2016) Strategies for doing agile in a non-agile environment. In: 10th ACM/IEEE international symposium on empirical software engineering and measurement, Ciudad Real, Spain. ACM, pp 1–6

[4] Gustavsson T, Berntzen M, Stray V (2022) Changes to team autonomy in large-scale software development: a multiple case study of scaled agile framework (SAFe) implementations. *Int J Inf Syst Proj Manag* 10(1):29–46

[5] Sinha A, Das P (2021) Agile methodology versus traditional waterfall SDLC: a case study on quality assurance process in software industry. In: 5th international conference on electronics, materials engineering & nano-technology (IEMENTech), Kolkata, India. IEEE, pp 1–4

- [6] Morgan JD (2018) Applying 1970 waterfall lessons learned within today's agile development process. *PM World J* 7:1–19
- [7] AdobeTeam (2022) Project management—agile versus waterfall. Adobe Experience Cloud Blog. <https://business.adobe.com/blog/basics/agile-vs-waterfall> , viewed 23 October 2022 [Online]
- [8] Boersma E (2022) Is there a place for the waterfall methodology in 2021? Plutora.com. <https://www.plutora.com/blog/waterfall-methodology> , viewed 26 October 2022 [Online]
- [9] Pai A, Joshi G, Rane S (2019) Integration of agile software development and robust design methodology in optimization of software defect parameters. *Int J Syst Assur Eng Manag* 10:1043–1051
- [10] Mersino A (2022) Why agile is better than waterfall. Vitality Chicago. <https://vitalitychicago.com/blog/agile-projects-are-more-successful-traditional-projects/> , viewed 24 October 2022 [Online]
- [11] Lazear EP (1999) Globalisation and the market for team-mates. *The Economic Journal* 109(454):15–40
- [12] Nadri R, Rodríguez-Pérez G, Nagappan M (2021) On the relationship between the developer's perceptible race and ethnicity and the evaluation of contributions in oss. *IEEE Transactions on Software Engineering*
- [13] Nadri R, Rodríguez-Pérez G, Nagappan M (2020) Insights into nonmerged pull requests in github: Is there evidence of bias based on perceptible race? *IEEE Software*
- [14] Vasilescu B, Filkov V, Serebrenik A (2015) Perceptions of diversity on git hub: A user survey. In 2015 IEEE/ACM 8th international workshop on cooperative and human aspects of software engineering pages 50–56. IEEE
- [15] Martins LL, Gilson LL, Maynard MT (2004) Virtual teams: What do we know and where do we go from here? *Journal of management* 30(6):805–835
- [16] Ortu M, Destefanis G, Counsell S, Swift S, Tonelli R, Marchesi M (2017) How diverse is your team? investigating gender and nationality diversity in github teams. *Journal of Software Engineering Research and Development* 5(1):1–18
- [17] El Mezouar M, Zhang F, Zou Y (2019) An empirical study on the teams structures in social coding using github projects. *Empirical Software Engineering* 24(6):3790–3823

[18] Vasilescu B, Posnett D, Ray B, van den Brand MGJ, Serebrenik A, Devanbu P, Filkov V (2015) Gender and tenure diversity in github teams. In Proceedings of the 33rd annual ACM conference on human factors in computing systems pages 3789–3798, New York, NY, 2015. ACM

[19] Ye J, Han S, Hu Y, Coskun B, Liu M, Qin H, Skiema S (2017) Nationality classification using name embeddings. In Proceedings of the 2017 ACM on conference on information and knowledge management pages 1897–1906

[20] Iyer RN, Yun SA, Nagappan M, Hoey J (2019) Effects of personality traits on pull request acceptance. IEEE Transactions on Software Engineering pages 1–12

[21] Akpan IJ, Shanker M (2017) The confirmed realities and myths about the benefits and costs of 3D visualization and virtual reality in discrete event modeling and simulation: A descriptive meta-analysis of evidence from research and practice. Comput Ind Eng 112:197–211. <https://doi.org/10.1016/j.cie.2017.08.020>

[22] Al-Jundi HA, Tanbour EY (2022) A framework for fidelity evaluation of immersive virtual reality systems. Virtual Reality 6:1–20

[23] Alcácer V, Cruz-Machado V (2019) Scanning the industry 4.0: a literature review on technologies for manufacturing systems. Eng Sci Technol Inter J 22(3):899–919. <https://doi.org/10.1016/j.jestch.2019.01.006>

[24] Elor A, Powell M, Mahmoodi E, Hawthorne N, Teodorescu M, Kurniawan S (2020) On shooting stars: comparing CAVE and HMD immersive virtual reality exergaming for adults with mixed ability. ACM Trans Comput Healthc 1(4):1–22. <https://doi.org/10.1145/3396249>

[25] Büttner, S., Mucha, H., Funk, M., Kosch, T., Aehnelt, M., Robert, S., & Röcker C (2017) The design space of augmented and virtual reality applications for assistive environments in manufacturing: a visual approach. In Proceedings of the 10th International Conference on Pervasive Technologies Related to Assistive Environments. 433–440

[26] Cabrera ME, Wachs JP (2017) A human-centered approach to one-shot gesture learning. Front Robot AI. <https://doi.org/10.3389/frobt.2017.00008>

[27] Cecil ., Albuhamood S, Cecil-Xavier A, Ramanathan P, (2017) An advanced cyber physical framework for micro devices assembly, special issue on "advanced CPS for industry 40 - enabling technologies, real-world implementations, and impact assessments", IEEE Transactions on Systems, Man, and Cybernetics: Systems. pp. 1–15

- [28] Kesavadas, T., & Ernzer, M. (1999b). Design of virtual factory using cell formation methodologies. In: industrial virtual reality: manufacturing and design tool for the next millennium, proceedings of the asme symposium on virtual reality environment for manufacturing. pp 14–19
- [29] Lindquist M, Maxim B, Proctor J, Dolins F (2020) The effect of audio fidelity and virtual reality on the perception of virtual greenspace. *Landsc Urban Plan* 202:103884. <https://doi.org/10.1016/j.landurbplan.2020.103884>
- [30] Mourtzis D (2020) Simulation in the design and operation of manufacturing systems: state of the art and new trends. *Int J Prod Res* 58(7):1927–1949. <https://doi.org/10.1080/00207543.2019.1636321>
- [31] Srinivasan H, Figueroa R, Gadh R (1999) Selective disassembly for virtual prototyping as applied to de-manufacturing. *Robot Comput-Integr Manuf* 15(3):231–245
- [32] Söderberg R, Wärmefjord K, Carlson JS, Lindkvist L (2017) Toward a digital twin for real-time geometry assurance in individualized production. *CIRP Ann Manuf Technol* 66(1):137–140
- [33] Taylor, F., Jayaram, S., Jayaram, U., & Mitsui, T. (2000, September). Functionality to facilitate assembly of heavy machines in a virtual environment. In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. American Society of Mechanical Engineers. 35111, pp 737–745
- [34] Rosa E, Dahlstrom N, Knez I, Ljung R, Cameron M, Willander J (2021) Dynamic decision-making of airline pilots in low-fidelity simulation. *Theor Issues Ergon Sci* 22(1):83–102. <https://doi.org/10.1080/1463922X.2020.1758830>
- [35] Morley, J., et al.: The ethics of AI in health care: A mapping review. *SSRN Electron. J.* (2020). <https://doi.org/10.2139/ssrn.3830408>
- [36] Leydesdorff, L. (1989). The relations between qualitative theory and scientometric methods in science and technology studies. *Scientometrics*, 15(5–6), 333–347
- [37] Edge, D. (1995). Reinventing the wheel. In S. Jasanoff, G. E. Markle, J. C. Petersen, & T. Pinch (Eds.), *Handbook of Science and Technology Studies*. (pp. 3–23). Sage.
- [38] Martin, B. R., Nightingale, P., & Yegros-Yegros, A. (2012). Science and technology studies: Exploring the knowledge base. *Research Policy*, 41(7), 1182–1204

- [39] Ragin, C. (1987). *The Comparative Method*. University of California Press.
- [40] Rihoux, B., Álamos-Concha, P., Bol, D., Marx, A., & Rezsöhazy, I. (2013). From niche to mainstream method? A comprehensive mapping of QCA applications in journal articles from 1984 to 2011. *Political Research Quarterly*, 66, 175–184
- [41] Bozeman, B., Fay, D., & Slade, C. P. (2013). Research collaboration in universities and academic entrepreneurship: the-state-of-the-art. *The Journal of Technology Transfer*, 38(1), 1–67
- [42] Corral de Zubielqui, G., Jones, J., Seet, P. S., & Lindsay, N. (2015). Knowledge transfer between actors in the innovation system: a study of higher education institutions (HEIS) and SMES. *Journal of Business & Industrial Marketing*, 30(3/4), 436–458
- [43] Dada, O., & Fogg, H. (2016). Organizational learning, entrepreneurial orientation, and the role of university engagement in SMEs. *International Small Business Journal*, 34(1), 86–104
- [44] Poorkavoos, M., Duan, Y., Edwards, J. S., & Ramanathan, R. (2016). Identifying the configurational paths to innovation in SMEs: A fuzzy-set qualitative comparative analysis. *Journal of Business Research*, 69(12), 5843–5854
- [45] Fernández-Esquinas, M., Pinto, H., Pérez-Yruela, M., & Santos-Pereira, T. (2016). Tracing the flows of knowledge transfer: Latent dimensions and determinants of university–industry interactions in peripheral innovation systems. *Technological Forecasting and Social Change*, 13, 266–279
- [46] Álvarez-Coque, J. M. G., Mas-Verdú, F., & Roig-Tierno, N. (2017). Technological innovation versus non-technological innovation: different conditions in different regional contexts? *Quality & Quantity*, 51(5), 1955–1967
- [47] Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Brostrom, A., D'Este, P., Fini, R., Geuna, A., Grimaldi, R., Hughes, A., Krabel, S., Kitson, M., Llerena, P., Lissoni, F., Salter, A., Sobrero, A.. (2013). Academic engagement and commercialization: A review of the literature on university-industry relations. *Research Policy*, 42(2), 423–442
- [48] Fiss, P. C., Marx, A., & Cambré, B. (2013). Configurational theory and methods in organizational research, *Research in the sociology of organizations*, 38. Emerald.
- [49] Kraus, S., Ribeiro-Soriano, D., & Schüssler, M. (2018). Fuzzy-set qualitative comparative analysis (fsQCA) in entrepreneurship and innovation research—the rise of a method. *International Entrepreneurship and Management Journal*, 14(1), 15–33

- [50] Schneider, C. Q., & Rohlfing, I. (2016). Case studies nested in fuzzy-set QCA on sufficiency: Formalizing case selection and causal inference. *Sociological Methods & Research*, 45(3), 526–568
- [51] Menezes Álvaro, Prikladnicki R (2018) Diversity in software engineering. In: *Proceedings of the 11th International workshop on cooperative and human aspects of software engineering*. pp 45–48
- [52] Imtiaz N, Middleton J, Chakraborty J, Robson N, Bai G, Murphy-Hill E (2019) Investigating the effects of gender bias on github. In: *2019 IEEE/ACM 41st international conference on software engineering (ICSE)*. IEEE, pp 700–711
- [53] Terrell J, Kofink A, Middleton J, Rainear C, Murphy-Hill E, Parnin C, Stallings J (2017) Gender differences and bias in open source: Pull request acceptance of women versus men. *PeerJ Computer Science* 3:e111
- [54] Paul R, Bosu A, Sultana KZ (2019) Expressions of sentiments during code reviews Male vs. female. In: *2019 IEEE 26th international conference on software analysis, evolution and reengineering (SANER)*. IEEE, pp 26–37
- [55] Zohreh Sharafi, Soh Z, Guéhéneuc Y-G, Antoniol G (2012) Women and men—different but equal: On the impact of identifier style on source code reading. In: *2012 20th IEEE International conference on program comprehension (ICPC)*. IEEE, pp 27–36
- [56] Kuechler V, Gilbertson C, Jensen C (2012) Gender differences in early free and open source software joining process. In: *IFIP International conference on open source systems*. Springer, pp 78–93
- [57] Murphy-Hill E, Jaspan C, Sadowski C, Shepherd D, Phillips M, Winter C, Knight A, Smith E, Jorde M (2019) What predicts software developers' productivity? *IEEE Trans Softw Eng*
- [58] Gila AR, Jaafa J, Omar M, Tunio MZ (2014) Impact of personality and gender diversity on software development teams' performance. In: *2014 International conference on computer, communications, and control technology (I4CT)*. IEEE, pp 261–265
- [59] Chintakovid T, Wiedenbeck S (2009) User perceptions and gender in end-user debugging: How do they affect outcomes?. In: *2009 IEEE symposium on visual languages and human-centric computing (VL/HCC)*. IEEE, pp 217–224
- [60] Bastarrica MC, Simmonds J (2019) Gender differences in self and peer assessment in a software engineering capstone course. In: *2019 IEEE/ACM 2nd international workshop on gender equality in software engineering (GE)*. IEEE, pp 29–32

[61] Yi W, Redmiles D (2019) Implicit gender biases in professional software development: An empirical study. In: 2019 IEEE/ACM 41st International conference on software engineering: software engineering in society (ICSE-SEIS). IEEE, pp 1–10

[62] Kirton G, Robertson M (2018) Sustaining and advancing IT careers: Women's experiences in a uk-based IT company. *J Strateg Inf Syst* 27(2):157–169

[63] Casey V (2009) Leveraging or exploiting cultural difference?. In: 2009 Fourth IEEE international conference on global software engineering, pp 8–17. IEEE

[64] Balali S, Steinmacher I, Annamalai U, Sarma A, Gerosa MA (2018) Newcomers' barriers... is that all? an analysis of mentors' and newcomers' barriers in oss projects. *Computer Supported Cooperative Work (CSCW)* 27(3-6):679–714

[65] Balali S, Annamalai U, Padala HS, Trinkenreich B, Gerosa MA, Steinmacher I, Sarma A. Recommending tasks to newcomers in oss projects: How do mentors handle it? In: *Proceedings of the 16th International Symposium on Open Collaboration*. New York: Association for Computing Machinery: 2020. p. 1–14.

[66] Steinmacher I, Conte T, Gerosa MA. Understanding and supporting the choice of an appropriate task to start with in open source software communities. In: 2015 48th Hawaii International Conference on System Sciences (HICSS '15). IEEE: 2015. p. 5299–308.
<https://doi.org/10.1109/hicss.2015.624> .

[67] Brashear TG, Bellenger DN, Boles JS, Barksdale Jr HC. An exploratory study of the relative effectiveness of different types of sales force mentors. *J Pers Sell Sales Manag.* 2006; 26(1):7–18.

[68] Hale R. To match or mis-match? the dynamics of mentoring as a route to personal and organisational learning. *Career Dev Int.* 2000; 5(4/5):223–34.
<https://doi.org/10.1108/eum000000005360> .

[69] Fagerholm F, Guinea AS, Münch J, Borenstein J. The role of mentoring and project characteristics for onboarding in open source software projects. In: *Proceedings of the 8th ACM/IEEE International Symposium on Empirical Software Engineering and Measurement*: 2014. p. 1–10.

[70] Pinto G, Steinmacher I, Gerosa M. More common than you think: An in-depth study of casual contributors. In: 2016 IEEE 23rd International Conference on Software Analysis, Evolution, and Reengineering (SANER). IEEE: 2016. p. 112–23.
<https://doi.org/10.1109/saner.2016.68> .

[71] Gerosa M, Wiese I, Trinkenreich B, Link G, Robles G, Treude C, Steinmacher I, Sarma A. The shifting sands of motivation: Revisiting what drives contributors in open source. In: 2021 IEEE/ACM 43rd International Conference on Software Engineering (ICSE). IEEE: 2021. <https://doi.org/10.1109/icse43902.2021.00098> .

[72] Sutherland J, Schwaber K (2017) The scrum guide: the definitive guide to scrum. <https://www.scrumguides.org/docs/scrumguide/v2017/2017-Scrum-Guide-US.pdf#zoom=100> . Accessed 22 November 2018

[73] Bass JM (2013) Agile Method Tailoring in Distributed Enterprises: Product Owner Teams. In: IEEE 8th Int. Conf. Global Software Eng, pp 154–163. <https://doi.org/10.1109/ICGSE.2013.27>

[74] Schwaber K, Beedle M (2002) Agile software development with scrum. Prentice-Hall, Upper Saddle River

[75] Noll J, Razzak MA, Bass JM, Beecham S (2017) A study of the scrum Master's role. In: Felderer M., Méndez Fernández D., Turhan B., Kalinowski M., Sarro F., Winkler D. (eds) Product-Focused Software Process Improvement. PROFES 2017. Lecture Notes in Computer Science (Vol. 10611). Springer, Cham. https://doi.org/10.1007/978-3-319-69926-4_22

[76] Hoda R, Noble J, Marshall S (2013) Self-organizing roles on agile software development teams. IEEE Trans Software Eng 39:422–444. <https://doi.org/10.1109/TSE.2012.30>

[77] Glaser BG (1992) Basics of grounded theory analysis. Sociology Press, Mill Valley

[78] Mishra, Alok; Alzoubi, Yehia Ibrahim Structured software development versus agile software development: a comparative analysis. International Journal of System Assurance Engineering and Management (2023). doi: 10.1007/s13198-023-01958-5

[79] Shameer, Sheik; Rodríguez-Pérez, Gema; Nagappan, Meiyappan Relationship between diversity of collaborative group members' race and ethnicity and the frequency of their collaborative contributions in GitHub. Empirical Software Engineering (2023). doi: 10.1007/s10664-023-10313-y

[80] Al-Jundi, Hamza A.; Tanbour, Emad Y. Design and evaluation of a high – fidelity virtual reality manufacturing planning system. Virtual Reality (2022). doi: 10.1007/s10055-022-00683-x

[81] Murphy, Matt A. Using structured ethical techniques to facilitate reasoning in

technology ethics. *AI and Ethics* (2023). doi: 10.1007/s43681-023-00371-9

[82] Fernández-Esquinas, Manuel; Sánchez-Rodríguez, María Isabel; Pedraza-Rodríguez, José Antonio; Muñoz-Benito, Rocío The use of QCA in science, technology and innovation studies: a review of the literature and an empirical application to knowledge transfer. *Scientometrics* (2021). doi: 10.1007/s11192-021-04012-y

[83] Rodríguez-Pérez, Gema; Nadri, Reza; Nagappan, Meiyappan Perceived diversity in software engineering: a systematic literature review. *Empirical Software Engineering* (2021). doi: 10.1007/s10664-021-09992-2

[84] Steinmacher, Igor; Balali, Sogol; Trinkenreich, Bianca; Guizani, Mariam; Izquierdo-Cortazar, Daniel; Cuevas Zambrano, Griselda G.; Gerosa, Marco Aurelio; Sarma, Anita Being a Mentor in open source projects. *Journal of Internet Services and Applications* (2021). doi: 10.1186/s13174-021-00140-z

[85] Shastri, Yogeshwar; Hoda, Rashina; Amor, Robert Spearheading agile: the role of the scrum master in agile projects. *Empirical Software Engineering* (2021). doi: 10.1007/s10664-020-09899-4

3. Real-world Case Studies, Socio-cultural Dynamics, Communication Strategies, Multi-Regional Projects

Machine generated summaries

Machine generated keywords: design, product design, product, contractor, uncertainty, trust, fuzzy, user, construction, demand, computing, distribute, transmission, cognitive, power

Effects of reliability indicators on usage, acceptance and preference of predictive process management decision support systems [52]

This is a machine-generated summary of:

Fröhlich, Peter; Mirnig, Alexander G.; Falcioni, Damiano; Schrammel, Johann; Diamond, Lisa; Fischer, Isabel; Tscheligi, Manfred: Effects of reliability indicators on usage, acceptance and preference of predictive process management decision support systems [52]

Published in: *Quality and User Experience* (2022)

Link to original: <https://doi.org/10.1007/s41233-022-00053-0>

Copyright of the summarized publication:

The Author(s) 2022

License: OpenAccess CC BY 4.0

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"DSS are designed to support users in making more informed decisions in specialized tasks through more accurate predictions and recommendations."

"This mixed-methods user study contributes to the research on trust calibration by analyzing the potential effects of integrated reliability indication in DSS user interfaces for process management in first-time usage situations characterized by uncertainty."

"We found that while users stated that they need full access to all information to make their own decisions, reliability indication in DSS tends to make users more willing to make preliminary decisions, with users adapting their confidence and reliance to the indicated reliability."

"It is recommended that for the design of reliability indication practitioners consider displaying a combination of reliability information at several granularity levels in DSS user interfaces, including visualizations, such as a traffic light system, and to also provide explanations for the reliability information."

Introduction

"Decision support systems (DSS) aim to provide users with tools to enhance their decision making process for semi-structured or unstructured problems [2, 3, 4]."

"Process management in the construction industry represents one of the most challenging DSS application areas, as the involved tasks are characterized by high complexity [5] and thus would require sophisticated technological aids to support decisions [6, 7]."

"These forms of decision support systems are also increasingly introduced in the process management of construction projects."

"One of the most decisive factors for the acceptance and uptake of predictive DSS in general is the trust in the decisions and underlying knowledge base [4]."

"In construction and renovation projects, practitioners traditionally have limited trust in the underlying data [5, 8]."

"A major factor for the limited trust is the uncertainty and complexity of construction projects, which can be defined as "the chance of the occurrence of some event where probability distribution is genuinely not known" [9]."

Intended contribution and research questions

"The intended contribution of this paper is to demonstrate the effects of reliability indication on prediction strategies, decision confidence, trust, and acceptance in complex process management under unfamiliar and uncertain conditions."

"The specific research questions (RQ) are as follows: RQ1: Does the indication of reliability in Predictive decision support systems have effects on users' (a) prediction strategies, and (b) confidence in these predictions in the context of renovation process management (and if yes, how can the effects be described)?"

"RQ2: Does the indication of reliability have effects on trust and acceptance of Predictive DSS in the context of renovation process management (and if yes, how can the effects be described)?"

"RQ3: Which and how much information should reliability indicators provide when integrated in predictive decision support systems for renovation process management, such that their users are optimally supported in calibrating their trust?"

Background and related work

"This is reflected by some of the adapted TAM versions that deal with automated and intelligent systems, also highlighting the role of trust as an important antecedent for user intention [10, 11]."

"Zhang and others [12] show that presenting confidence scores can enable calibration of users' trust in an AI-assisted decision-making model, which can assist human experts in applying their knowledge to improve final decision results."

"For clinical decision support systems, [13] found that explanations did not always effectively support users in calibrating their trust, due to conflicts with usability and required efforts."

"Given the narrow perspectives taken by previous studies on trust calibration, there is not yet a clear indication on the impact of reliability cues on the user interface of a DSS overall, or on its impact on the usefulness and intention to use in specific application contexts."

Methodology

"In the prediction strategies task that address the effects of reliability indicators on users' prediction strategies (RQ1) participants performed cost prediction tasks with a dedicated DSS experimental prototype and reported their reasoning and experience using the "thinking aloud method" [14]."

"In order to investigate the effect of reliability indication on decision strategies (RQ1), participants were asked to predict the costs of a renovation project phase and to provide a rating on the confidence in their decision."

"The interactions and experiences the participants made in this phase served as the basis for the two subsequent phases where participants reflected on trust and acceptance, as well as on their preference with regard to the future design of reliability indicators."

"In this final phase of the study, to address RQ3, participants were asked to share their preferences with regard to granularity and type of information for reliability indication."

Results

"In the conditions where data reliability indicators were shown (middle column), four participants consistently chose the moderate cost scenario, and four participants adapted the selection of the pessimistic, moderate and optimistic scenarios to the respective reliability level thus using the indicators for calibrating their reliance on the provided

information in the DSS."

"Some participants stated that it is difficult to make a prediction without an indication about the reliability (P2): "If there is no reliability indicator, it is difficult to measure the prediction (P2)"."

"Regarding the difference between the presence and absence of reliability indication, several participants stated that their trust was increased if they have trust cues—or put in another way: "if there is no indicator then I cannot trust it at all" (P2)."

"The amount of data also played an important role, and therefore participants welcomed situations where it was indicated how many construction projects the respective recommendation was building upon (P2, P7)."

Discussion

"We will discuss the effects of reliability indication that this study identified in the context of previous literature, starting with a focus on users' prediction strategies and their confidence in the predictions (thus addressing RQ1), followed by a discussion on trust and acceptance related to the overall system usage (RQ2)."

"The study also provides implications for the further operationalization of trust and acceptance measurement with regard to the comparative evaluation of reliability indicators in predictive DSS."

"This reflects well the above discussed results on the effects on prediction strategies and confidence: A predictive DSS is seen as more useful if it provides reliability indicators that support users in 'daring a prediction' as this helps to adjust the prediction and confidence of the underlying data quality."

"A novel finding of this study is that predictive DSS for process management should provide reliability indication on several levels, aspects and granularities of the user interface."

Conclusions

"In line with the overall implication of persistently offering reliability indication in a DSS, especially if complementary rather than repetitive, relevant information should be provided at several different abstraction or granularity levels of the user interface."

"The exploration and inquiry of information granularity implies that exclusively providing one single reliability indicator at the top level (e.g., attached to the predicted overall project costs) may not support trust formation in most professionals."

"Future research should investigate usage situations that encompass longer usage times and that support final decisions based on more complete availability of context information, using, for example, an extended experience prototype that provides integrated simulated data about project performance, spatial and temporal simulations of a fictive project and more risk management procedures."

"In order to develop a more general concept of reliability indication in intelligent systems, future studies need to look beyond the process management of renovation projects."

D-WASPAS: Addressing Social Cognition in Uncertain Decision-Making with an Application to a Sustainable Project Portfolio Problem [53]

This is a machine-generated summary of:

Mohagheghi, Vahid; Mousavi, S. Meysam: D-WASPAS: Addressing Social Cognition in Uncertain Decision-Making with an Application to a Sustainable Project Portfolio Problem [53]

Published in: Cognitive Computation (2019)

Link to original: <https://doi.org/10.1007/s12559-019-09679-3>

Copyright of the summarized publication:

Springer Science+Business Media, LLC, part of Springer Nature 2019

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Utilizing various decision-making approaches can result in different results and confusion

among DMs."

"This paper presents a novel MCGDM approach, double-weighted aggregated sum product assessment (D-WASPAS), under interval-valued Pythagorean fuzzy (IVPF) uncertainty."

"This approach considers three decision-making methods."

"The results of the ranking approaches are aggregated."

"This process starts with computing the objective weights of the ranking approaches and aggregating the outcome with the subjective weights of the approaches."

"The WASPAS method is applied to aggregate the obtained rankings and obtain a set of rankings for each DM."

"The second aggregation is utilized to aggregate the results for the DMs and reach a final set of rankings."

"The subjective and objective weights of the DMs are applied in the WASPAS to aggregate the results."

"Since the WASPAS method is utilized twice to aggregate the results, this approach is called D-WASPAS."

"A case study of the application of the proposed method shows that it is applicable to many multiple-criteria analysis and decision-making processes."

"The results are more reliable because various decision-making methods are taken into consideration, and it is a last-aggregation process."

"Double-weighted aggregated sum product assessment offers a novel decision-making framework that is applicable in real-world decision-making situations."

"Introducing this new decision-making framework and applying extended fuzzy sets would make the proposed method more widely applicable."

"The last-aggregation nature of this method avoids loss of cognitive information and assigning weights to the DMs, and the different ranking methods address the social cognition that leads to the judgments expressed and the final decisions."

Introduction

"Researchers have applied fuzzy sets to handle uncertain decision-making problems [15, 16]."

"Farhadinia and Xu [17] introduced a fuzzy hesitant decision-making approach based on distance and aggregation."

"Tao and others [18] applied intuitionistic fuzzy sets in decision-making."

"It can be concluded that utilizing fuzzy sets to extend existing multi-attribute decision-making (MADM) methods for handling real-world problems is a common approach."

"This method applies entropy to address the weights of the decision-making criteria."

"The weights of the DMs in both subjective and objective ways are considered to aggregate the group decision-making method."

"Review, the main novelties of this paper as compared to previous studies mentioned are as follows: The proposed decision-making approach is based on three different ranking and assessment methods."

"Both the subjective and objective weights of each decision-making approach are computed and used to aggregate the results of the methods."

Interval-Valued Pythagorean Fuzzy Sets

"The following formula is applied to denote an IFS called F in a universe of discourse (X): It should be noted that $\mu_F: X \rightarrow [0, 1]$ depicts the membership degree of element $x \in X$ to set F . $\nu_F: X \rightarrow [0, 1]$ presents the degree of non-membership of element $x \in X$ to set F . These values must satisfy the following constraint: An IFS that is called the degree of indeterminacy $\pi_F(x)$ is computed using These sets were initially presented by Atanassov [19]."

"The following is used to show a PFS F in a universe of discourse (X): It should be noted that $\mu_F: X \rightarrow [0, 1]$ denotes the membership degree of element $x \in X$ to the set F . In addition, $\nu_F: X \rightarrow [0, 1]$ depicts the non-membership degree of element $x \in X$ to the set F . The following constraint limits the values of μ_F and ν_F to acceptable values: It can be concluded that the degree of indeterminacy $\pi_F(x)$ is calculated as follows: However, these sets utilize single values to express degrees of membership, non-membership, and hesitancy."

The Proposed Methodology

"To address social cognition in group decision-making, this paper offers a new decision-

making method that addresses the importance of DMs coming from different cognitive backgrounds by using a weighted last-aggregation process."

"In the sixth step, the weight of each ranking approach is computed, and then, the rankings are aggregated by using the WASPAS method."

"After this, the results are normalized by using the following equation: This step applies the third method to rank the alternatives."

"As carried out in the previous steps, in this step, a similar method of weight computation is carried out to compute the weights of the DMs, which denote the importance of each DM in the final results."

"The aggregated weights of the DMs ($AGDW^k$) are computed as shown below: The following is applied to aggregate the results for all the DMs and obtain the aggregated ranking scores for each DM: 0

Application in Sustainable Project Portfolio Evaluation

"The main reason for using various ranking approaches is to address the different ranking methods in order to reach a final result."

"The proposed method has resulted in three sets of rankings for each expert."

"To improve the aggregation method, it is necessary to correctly address the weights of the decision-making results."

"The subjective weights of each ranking approach, based on the opinions of the DMs, are set at 0.3, 0.3, and 0.4 for the proposed IVPF-EDAS, IVPF-EDAS, and IVPF-COADAP, respectively."

"After computing the weights, the next step aggregates the results using the WASPAS method."

"The second WASPAS is carried out in this step to finalize the rankings results by aggregating the opinions of the DMs."

"This section describes how the aggregation process unifies the results into a set of rankings."

Conclusion

"Both the objective and subjective weights of the decision-making methods were applied in the first WASPAS."

"This paper aggregates the judgments in a last-aggregation process that assigns weights to different DMs and methods based on all of the gathered information, in order to address social cognition in a group decision-making process."

"It was shown that including both the subjective and objective weights in the aggregation steps may allow more flexibility in expressing preferences in the decision-making process."

"The enhanced space to express degrees of membership, non-membership and hesitancy in interval-valued Pythagorean fuzzy sets permits domain experts to focus more clearly and accurately on expressing their agreement and disagreement as independent variables. Utilizing a last-aggregation approach makes this process more transparent for project decision-making."

Power transmission project: a framework to align project success with organization goal [54]

This is a machine-generated summary of:

Ghatak, Achintya; Garg, Adarsh: Power transmission project: a framework to align project success with organization goal [54]

Published in: International Journal of System Assurance Engineering and Management (2022)

Link to original: <https://doi.org/10.1007/s13198-021-01568-z>

Copyright of the summarized publication:

The Author(s) under exclusive licence to The Society for Reliability Engineering, Quality and Operations Management (SREQOM), India and The Division of Operation and Maintenance, Lulea University of Technology, Sweden 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The study proposes a project management framework for power transmission projects based on project critical success factors."

"Power Transmission projects are often influenced by numerous critical success factors which support the organization to reach its intended goals with high efficiency."

"A total of 46 critical success factors are considered of strategy, risk, contract, information technology, and stakeholder."

"The outcome of statistical analysis by SPSS-25 reveals that Project success has a positive direct relation with strategy, risk, information technology, stakeholder and whereas, a contract has not directed relation."

"The contract has a significant indirect relation with project success."

"The proposed framework will support the alignment of project success with organizational goals through identified Critical Success Factors."

Introduction

"Infrastructure projects are very vital to almost all industry including the Power sector projects."

"The power transmission projects are the backbone of the power sector."

"Power Transmission projects are unique and with a well-defined timeline."

"Each project has different necessities and purposes regarding stakeholders and the type of project, the critical success factors are defined as legal needs."

"CSFs have different sets of factors based on project type and focus on the reliant method of the theory and practice of project management (Dvir and others 20)."

"Substation creation of power transmission projects and non-power projects have a few comparable essential capabilities, together with a manipulate control room constructing, firefighting pump houses, diesel generator rooms, converter rooms (for high-voltage direct

current transmission), guardrooms, dormitory buildings, and worker house building (Pall and others 21)."

Related studies

"Objectives of projects (the iron triangle of time, cost, and scope), Objectives of business (proprietor's expectation), and The objective of Social and environmental (local population expectation) This part of the observation displays a thorough evaluation of previous empirical studies and literature relevant to critical success factors (CSFs) area, which supports the existing research to conclude the success factors for the power transmission projects."

"A series of steps have been taken to discover and finalize the critical success factors (CSFs) of power transmission projects for the study in hand, and reflected as follows, First, critical success factors (CSFs) are diagnosed through the extensive literature evaluation, which is detected in earlier studies from the power transmission projects perspective and other construction projects."

"Although, maximum of the literature has neglected the effect of those factors on power transmission projects' success."

"Strategy validates the factors that may also impact the project success, inclusive of, risk, contract, stakeholder, and information technology."

Research objective

"On literature review the factors are decided to cater to the following objectives of the research in hand: To find the critical success factor for power transmission projects."

"Developing a framework for the power transmission construction project through critical success factors."

Research methodology

"Even though 46 characteristics may not be sufficient and complete because of the wide importance and dynamic feature of the power transmission construction business."

"The important people profession on power transmission projects has been the "unit of evaluation" for the present study."

"370 survey forms were sent to 14 public & private companies in India that are working on power sector projects."

"These companies operate in India in different states, and they executed power transmission projects (substation/Line) since ten (10) years of consistency exist in industry revenue above Rs."

Results and discussion

"The independent variable strategy and mediator variables, risk, contract, information technology, and stakeholder all put together impact 41% ($R^2 = 0.41$) on dependent variable project success."

"H1, Strategy significantly affects project success ($p = 0.020$)."

"H2, Risk significantly affects project success ($p = 0.025$)."

"H3, the Contract significantly affect project success ($p = 0.162$)."

"H4, Information significantly affects project success ($p = 0.011$)."

"H5, Stakeholder significantly affect project success ($p = 0.046$)."

"The planned model hypothesized the speculation that PT project success is because of 5 major varieties of CSFs namely, strategy, risk, contract, information technology, and stakeholder."

"This framework discussed 46 critical success factors into six groups of variables are below: Project Success- Dependent Variables Strategy- Independent Variable Risk- Mediator Variable Contract- Mediator Variable Stakeholder- Mediator Variable Information Technology- Mediator Variable"

Findings, implications, and limitations

"The study gives necessary input, i.e. (1) acknowledges the numerous factors responsible for success of power transmission projects in the available literature for the primary time; (2) groupings the valuable factors into 5 CSFs group namely; strategy, risk, contract, information technology, and stakeholder; (3) suggests a novel model that has the foremost necessary CSFs of project success, considering this is often first time within the literature of power transmission projects to place in different words, independent variable(strategy) and mediator variables (CSFs) (risk, contract, data technology, and stakeholder) is thought-about as an indicator of performance to advocate the power transmission projects; (4) unlocks the discussion and further thanks to the re-orientation of interpretation of project success in the available literature in step with totally different nature of projects."

"The findings suggest that (1) Agencies working on power transmission projects must look at proposed CSFs for the completion of the project successfully, (2) Project management professional can apply this model to enhance the project success given business and socio-economic achievement, and (3) researcher and academician can gain knowledge on critical success factor for further research on power transmission projects."

Conclusion

"This study infers the relation and impact of CSFs regarding PT project success."

"Whereas the grouping of critical success factors (CSFs) into independent, mediator, and dependent variables in power transmission projects."

"Further, on evaluation and coding of these success factors, five important CSFs are classified as Strategy, Risk, Contract, information technology, and stakeholder."

"A significant positive association is verified through multiple regression analysis and Andrew F. Hayes Mediation Process Model-5, among project influence CSFs and power transmission project success."

"The above results conclude that the strategy, risk, information technology, and stakeholder have a straight direct relation with project success."

IIAG: a data-driven and theory-inspired approach for advising how to interact with new remote collaborators in OSS teams [55]

This is a machine-generated summary of:

Wang, Yi; Redmiles, David: IIAG: a data-driven and theory-inspired approach for advising how to interact with new remote collaborators in OSS teams [55]

Published in: Automated Software Engineering (2021)

Link to original: <https://doi.org/10.1007/s10515-021-00283-0>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"We propose an approach and corresponding intelligent system called IIAG (Initial Interaction Assistant based on Game theory analytics), which identifies and advises its users about strategies for initial interactions with new remote collaborators."

"IIAG integrates game theory, decision models, and social factors with the collaborative traces mined from empirical project data to achieve this goal."

"When a user seeks IIAG's advice, it simulates an individual's decision processes to find the strategies that yield the best outcomes."

"The results show that IIAG can identify the payoff-optimal strategy with over 80% accuracy."

"IIAG can help OSS team members in making informed decisions about interacting with new remote collaborators."

Introduction

"Using game theory analytics and simulations of decision processes, IIAG can identify the best potential strategy which is supposed to maximize an OSS team member's benefit from his/her interaction with a new remote collaborator."

"This work's contributions are realized through the following five elements: The presentation of novel Data-Driven Game Theory analytics based on theoretical work; The design of IIAG, which is an example of Data-Driven Game Theory analytics; The implementation of the computational tool for IIAG, which can automatically identify proper strategies for OSS team members' initial interaction; The evaluation of IIAG and its computational tool combining mining data from three large open source projects and user study, which demonstrates the approach achieves favorable performance on advising proper strategies for initial interactions; The user study demonstrating the usefulness of

IIAG from the potential users' perspective."

Theoretical background and related work

"The following two strategies will help overcome the limitation of abstract models: (1) constructing the "context" for game-theoretic analysis using empirical data collected from real-world decision situations, and (2) adding dynamics using behavioral theories and modeling individual characteristics (Wang and Redmiles 22)."

"Using the above two strategies, though game-theoretic analytical models are abstracted simplifications, they can still be used to develop tools to help people identify the best interpersonal interaction strategies."

"Through collaboration in OSS teams could be more complicated; it is still worth trying the combination of game theory models, behavioral theories, and empirical data to help practitioners' behavioral decisions."

"By automating and simulating the analysis process, the combination of game theory, decision theories, and empirical data will lead to data analytics that can support decision-making in future interactions."

"Wang and Redmiles (23, 22)) proposed to use game theory to investigate interpersonal interactions in a globally distributed team."

IIAG in a nutshell: from analytics to strategic advice

"Please note that, IIAG's three strategies, C, C-C, and D, are not at the concrete behavioral level."

"Based on relevant collaborative traces, IIAG will simulate the decision processes to derive the best strategy."

"Decision process a is very straightforward: the user randomly chooses one of three possible strategies (i.e., "C", "D", and "C-C")."

"Decision process b is also very simple: the user just picks his/her favorite strategy [idiosyncratic preference (Wang and Redmiles 22)] and keeps using it constantly in all interactions no matter who is the target."

"For decision process c, suppose a strategy ST is used for k times in a m-size sample, ST will be selected if it satisfies: For decision process d, a strategy ST will be selected if it satisfies: To illustrate them in an intuitive way, we also provide a concrete example later in

the next section."

System instantiation

"For a decision process, the advised strategy should be the strategy (ST) that maximizes $P(ST)$, for it is the winning strategy in most of the simulation runs."

"We build an analytic and simulation engine to implement the decision processes a-d. It regulates the automated executions of the process in the prior section."

"The actual recommendations are generated with decision process c and d. It executes 10,000 rounds of independent simulation for each of them."

"For decision process c and d, the advised strategy (ST) is the strategy that wins in most independent rounds of 10,000 simulations."

"A typical usage scenario is that a user asks IIAG to suggest strategies for his/her future interaction with an unfamiliar, remote collaborator."

"Current IIAG has both results, for we want to evaluate which decision process model and corresponding parameters yield the most precise advice with empirical data (see the next section)."

Evaluating IIAG's performances with simulation experiments drive-by empirical data

"We empirically evaluate the performances of IIAG in identifying and advising proper strategies for OSS team members."

"The evaluation addresses the following research questions: The research questions investigate whether the approach and its implementation (IIAG system) are useful and how good is such an approach compared with three baseline alternatives 1: the randomly picked strategy (baseline 1), 2: the constantly used strategy based on individual preference (baseline 2), 3: the actual strategy used in interaction (baseline 3)."

"If IIAG is useful, the advice (generated with decision process c and d) should satisfy the following four criteria: We compare random strategy (the results of decision process a), constantly playing one strategy (the results of decision process b), IIAG's advice (the results of decision process c and d), and the actually used strategy through the accuracy over the gold standard."

"IIAG also performs relatively well when comparing its suggestions with the socially favorable strategies."

Evaluating IIAG with potential users

"We ask the participant to use IIAG to form a strategy for interacting with another member who has been in the project."

"After each task, a participant will be asked if he/she would like to follow the strategy suggested by IIAG and explain why if he/she decides not to adopt."

"Almost 30% of participants decide not to follow IIAG's suggestion to be defectors (using the strategy D)."

"Considering that the maximum possible rating is 42 on the six 7-point items, we conclude that a majority of participants believe that IIAG is useful."

"Considering that the maximum possible rating is 28 on the four 7-point items, we conclude that most participants agree on the fact that IIAG is easy to use."

"Considering that the maximum possible rating is 14 on the four 7-point items, we conclude that most participants would like to give IIAG a try in the future."

Discussion

"While the prior research was mostly focusing on technical decision-making in OSS development, it is urgent to support social decision-making in such a complex socio-technical system through designing innovative data-driven, theory-inspired intelligent systems."

"We show that combining data-driven approaches, decision theories, and game theory is a feasible way to support decision-making related to trust in initial social interactions between OSS team members."

"Our approach gives a live example of how to develop a data-driven and theory-inspired tool to support initial interactions in OSS teams."

"Other game structures related to collaboration, for example, coordination game (Cooper 24), may also be integrated with social science theories to guide the development of data-driven decision analytics focusing on team coordination."

"We expect that IIAG will achieve comparable performance in closed source contexts because people's actions are more predictable due to the impact of social norms in formal organizations are stronger."

Concluding remarks

"We proposed IIAG, a unique approach and intelligent system to identify and advise proper strategies for initial interaction between new collaborators in OSS teams."

"When a user seeks IIAG's advice, it simulates individuals' decision processes with collaborative traces and customized features, thus identifying and suggesting proper strategies."

"The evaluation shows that IIAG can identify and advise proper strategies for OSS team members in their initial interaction, with high success rates (AsterixDB: 82%, Lucene: 71%, Chromium OS: 88%) on proper parameters."

"IIAG and its evaluation support our assertion that data-driven game theory analytics can be utilized to build novel intelligent systems that fit the needs of OSS practitioners for better cooperation with their remote collaborators."

Using the IDEAL model for the construction of a deployment framework of IT Service Desks at the Brazilian Federal Institutes of Education [56]

This is a machine-generated summary of:

da Silva, Cristiano Domingues; Lins de Vasconcelos, Alexandre Marcos: Using the IDEAL model for the construction of a deployment framework of IT Service Desks at the Brazilian Federal Institutes of Education [56]

Published in: Software Quality Journal (2020)

Link to original: <https://doi.org/10.1007/s11219-020-09499-x>

Copyright of the summarized publication:

Springer Science+Business Media, LLC, part of Springer Nature 2020

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"A diagnosis of the quality of the IT support services, performed with the FI's CIOs, has shown that the service's provision in these institutions is below required."

"There is a clear need to develop a proposal to help the FIs to improve their IT support services."

"This work aimed to develop a framework, with a practical approach on "how to do," which guides the implementation and/or the improvement of Service Desks of the Federal Institutes."

"The proposal sought incorporates several practices related to Service Desk, identified in ITIL, ISO 20000, CMMI-SVC, and MR-MPS-SV models, creating a deployment and/or improvement approach through a life cycle framework, based on the IDEAL model, and a process toolbox, structured according to the seven dimensions of the EPMF."

"The research is relevant due to the lack of guidelines for the implementation and/or improvement of Service Desks from a practical point of view, since the main models found focus on "what has to be done," and little on "how to do.""

"The need to develop a proposal to help the FIs to improve the IT support service became evident, and the QoS-IT framework emerged."

"A gap analysis was done between user satisfaction surveys, comparing the results obtained before and after the Service Desk deployment at the Federal Institute, which presented evidences of a positive impact on the service provision after using the framework."

Introduction

"A diagnosis of the quality of the IT support services, performed with the FI's CIOs, has shown that the service's provision in these institutions is below required."

"It is intended to obtain a quality gain in the IT support service and a suitable practice for a Service Desk implementation and/or improvement."

"With this, it was sought to show that the proposed framework is suitable to implement and/or improve a Service Desk, and, consequently, to improve the IT support service in the FIs."

"The relevance of the study stems from the lack of a process focused on services quality and the lack of implementation guidelines of a Service Desk from the practical point of view, since the main models studied focus on "what has to be done," but little on the "how to do" approach."

Theoretical foundation

"Ishikawa (25) states that quality is based on the customer, with the products/services delivery that meet their needs."

"The concept of quality of service used in this work is related to the quality of the service management process and the fulfillment of customer needs."

"Several standards and models for improving the quality of services have been created and improved over the years."

"ITIL is a compilation of best practices used to manage information technology services, obtained in consensus after decades of practical observation, research, and work of IT professionals worldwide (Fernandes and de Abreu 26)."

"ITIL has gained more and more trust from companies because of its IT service management best practice proposition, conceived as an open standard, focusing on quality and process definition."

"The ITIL library describes particularities of the Service Desk, among which we can highlight choosing and training personnel; defining the responsibilities, the types of structures, and the single point of contact; and measuring performance and level of satisfaction."

Related works

"The purpose of our work is to focus on a Service Desk deployment life cycle, in addition to demonstrating how specific processes can be implemented."

"Based on the concepts of IT service management using ITIL, Tang and Todo (27), in their work entitled "A Study of Service Desk Setup in Implementing IT Service Management in Enterprises," analyzed the definition and the importance of a Service Desk from the perspective of ITIL best practices, offering suggestions on how to set up a good Service

Desk through three different views: people, processes, and technology."

"To the aforementioned differences from other works, this work has the following characteristics: flexibility, since it proposes an adaptive process that guides the implementation of new Service Desk or the improvement of existing ones; practical focus on "how to do" instead of "what to do," as it shows a structured and practical way to deploy and/or improve a Service Desk."

Research methodology

"The specific objectives are: (a) diagnose the current status (AS IS) of the quality of IT support service in FIs by investigating service providers' perceptions of best practices; (b) develop a Model (TO BE), including strategies and processes that guide the deployment or improvement of IT Service Desks in FIs, thus answering Q1; (c) select an organization, define an intervention plan, and evaluate the proposed Model to verify its efficiency; (d) assess the impact on service satisfaction according to the user's view, answering question Q2; (e) analyze the positives and negatives points of the framework, and report the lessons learned."

Diagnosis of the quality of support IT service in Federal Institutes

"Each dimension contains questions that help identifying the maturity level (1—Initial, 2—Repetitive, 3—Defined, 4—Managed, 5—Optimized) of the FI in relation to the IT support service provision."

"The Culture, Service, and Attitude dimension presented the worst result among the dimensions evaluated, 73.33% of the institutions, question 31, stated that they do not make recommendations for service improvement based on diagnoses or documented analyzes."

"Regarding the Organization, Communication, and Relationship dimension, 83.33% of the directors, question 39, stated that information regarding the current status or progress of a requisition or incident is communicated to the interested parties; and 80%, question 37, say that the IT support area focus lies in supporting the organization's strategies, providing customer satisfaction with the services provided."

The QoS-IT framework

"The framework meets the principles described as follows: Adaptability—ability to apply to new or existing Service Desks (the framework is prepared to deploy a "from scratch" Service Desk or to diagnose service problems and implement improvements); Result delivery—adopts as a deployment strategy an iterative approach, allowing to add value to the client during the project execution, through the phases and the process implementation; Flexibility—can be used for the organization to carry out the Service Desk

implementation or as a parameter for outsourcing; Quality focus—incorporates existing practices of specialized models for managing processes and services; Practicality—describes how to deploy and/or improve a Service Desk through a hands-on approach that is comprised of a life cycle and a process toolbox."

"The toolbox purpose is to support the deployment and improvement of Service Desks during the establishment and action phases' implementation."

QoS-IT framework evaluation

"The following activities were defined in action planning: (a) prepare the IT area infrastructure; (b) train IT staff (interpersonal skills, organizational strategy awareness, technical awareness, diagnostic techniques, support tools, systems tutorials, processes and procedures); (c) analyze and select technologies; (d) define architecture and service levels; (e) prepare the catalog of services; (f) define and document processes to manage requisitions, manage incidents and manage technical knowledge; (g) define contact points for the Service Desk, first via a system tool, and in case of doubts or unavailability, via telephone; (h) prepare the organization to receive the change; (i) define the communication strategy; (j) train users; (k) define indicators; (l) perform a satisfaction survey."

Conclusions and future works

"Other researches for IT service management can be derived from this study, such as: (a) Application of the QoS-IT framework in other organizational environments, such as Federal Universities and private organizations, in order to test its usefulness in these contexts; (b) Improvement of the framework through the development of methods to measure the Service Desk maturity; (c) Development of a software suite to support the framework life cycle implementation, with automation of flows, templates and toolbox processes activities; (d) Extending the related works review by using a more formal method, in order to broaden the framework approach, especially the process toolbox, to improve other areas of IT service management, corporate management and IT management; (e) Expanding the case study, with more applications of the model, conducting various deployment cycles, using more processes and a broader analysis of the effectiveness of the framework in different cultural environments."

[AT-d8sign: methodology to support development of assistive devices focused on user-centered design and 3D technologies \[57\]](#)

This is a machine-generated summary of:

Santos, A. V. F.; Silveira, Z. C.: AT-d8sign: methodology to support development of assistive devices focused on user-centered design and 3D technologies [57]

Published in: Journal of the Brazilian Society of Mechanical Sciences and Engineering (2020)

Link to original: <https://doi.org/10.1007/s40430-020-02347-w>

Copyright of the summarized publication:

The Brazilian Society of Mechanical Sciences and Engineering 2020

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The worldwide growing demand for assistive devices, due to the global trend of population aging and high rates of chronic diseases, creates design opportunities for study, optimization and clinical validation of these products, in search of quality products that promote quality of life and greater autonomy."

"The high abandonment rates of assistive devices, the low-quality and inefficient performance in many cases, in addition to the scarcity of options and the high prices, indicate possible failures in the initial design phases of these products."

"The preliminary results from the application of the methodology included: shorter design development time from informational design to clinical testing; effective insertion of the users and health professionals in the decision-making process throughout the conceptual design phase; better communication between the interdisciplinary research group due to the use of design techniques; gradual improvement of the conceptual and technical solutions supported by 3D printing, resulting in the refinement of fundamental attributes of assistive products: comfort, safety and functionality."

Introduction

"The design of devices in the health area, specifically in the context of Assistive Technology (AT), using virtual and physical prototypes, demands a repertoire of interdisciplinary knowledge."

"The disregard of the user's opinions and of the physical, social and cultural characteristics of their context; the poor device performance; the ease of purchasing low-quality products; the stigmatization associated with the poor-quality design are examples of factors that lead to abandonment [28, 29, 30]."

"This condition is favorable to the development of assistive products with high aggregated value, considering the user-centered design and the possibilities for generating prototypes in different design phases and tasks, in order to include more effectively the different users in the decision-making process."

"The main contribution of this work in engineering design area is to propose an adaptive design methodology focused on the Design for Assistive Technology (DfAT) considering user-centered design and 3D technologies."

Method

"The design demands for the three case studies were identified through the partnerships with health professionals and were then developed by interdisciplinary design teams, with some common steps, such as: study of patents and commercially available products for identification of the state of the art and the technique, as well as opportunities for innovation and improvement; interviews and questionnaires with users and health professionals to identify therapeutic needs, user requirements and design parameters, with the help of QFD (Quality Function Deployment); generation and improvement of technical solutions with the help of design tools and techniques, such as functional analysis, FMEA (Failure Mode and Effect Analysis), TRIZ (Theory of Inventive Problem Solving), among others; elaboration of virtual models (CAD) and manufacture of prototypes, through AM, for tests and evaluations with users."

Proposed methodology

"The design tools and techniques are very useful in helping to connect the subjective and technical domains, respectively, of the user and of the engineering, as well as for a clearer understanding of the problem and the functions to be fulfilled by the AD, thus favoring the identification of the possibilities of adaptation, improvement and innovation for the generation of a quality product."

"As the AT design is not guided purely by technology or by market, but above all by the user and his particularities, it is important to remember that not only aspects such as functionality and efficiency should be considered in the process of choosing and defining

concepts and solutions for the product, but also factors like comfort, appearance, etc It is also worth mentioning that these concepts and solutions will undergo modifications, readjustments and improvements based on the feedback obtained from the user and the health domain representatives (and other domains of interest) in the third phase of AT-d8sign (evaluation and refinement), carried out in parallel to the second phase."

Conclusions

"This work presents a design methodology, called AT-d8sign, for the development of assistive devices with a user-centered approach and the aid of additive manufacturing, in the context of Assistive Technology."

"One of the major gaps on the current scenario of the design methodology in the context of AT identified in the carried out systematic review and also an empirical finding in the experience of more than 5 years of design in this area was the absence or the very limited and little detailed use of design tools and techniques in the process of developing ADs, even in the case of more structured proposals."

"As future work, it is expected to be able to apply the presented method to new case studies, with the development of different types of AD and the use of other AM methods and machines, in order to evaluate and validate its applicability and effectiveness in designs with other characteristics and restrictions than those on the basis of which it was designed."

An innovative interval type-2 fuzzy approach for multi-scenario multi-project cash flow evaluation considering TODIM and critical chain with an application to energy sector [58]

This is a machine-generated summary of:

Mirnezami, Seyed Ali; Mousavi, Seyed Meysam; Mohagheghi, Vahid: An innovative interval type-2 fuzzy approach for multi-scenario multi-project cash flow evaluation considering TODIM and critical chain with an application to energy sector [58]

Published in: Neural Computing and Applications (2020)

Link to original: <https://doi.org/10.1007/s00521-020-05095-z>

Copyright of the summarized publication:

Springer-Verlag London Ltd., part of Springer Nature 2020

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Project management has been proven to be an effective tool to manage sophisticated activities."

"Various techniques of project management have played an essential role for successful project implementation in different areas."

"Managing projects, especially in a multi-project environment, involves a complex situation because of its distinguishing feature in which a number of projects are being executed simultaneously, that is, they are followed in parallel."

"With respect to handling a number of projects at the same time by most firms, it is sophisticated for contractors to cope with financial issues of projects, which involve different project cash inflows and outflows."

"There is a desperate need for uncertainties to be addressed thoroughly regarding their vital role for suitable project management."

"With these in mind, an innovative approach is proposed in this paper to anticipate the cash flow of project by considering type-2 fuzzy extension of both critical chain project management (CCM) for project scheduling and TODIM (an acronym in Portuguese for interactive Multi-Criteria Decision Making) method for selecting the best scenario in a multi-project environment."

Introduction

"Fuzzy sets theory has been extensively utilized to handle inherent uncertainties of projects [31, 32, 33, 34]."

"The more utilizing type-1 fuzzy sets to state uncertainties associated with projects raised, the more its deficiencies appeared, and consequently, the need for improvement in fuzzy

sets increased [35]."

"With type-1 fuzzy sets, T2FSs involve more uncertainties and are able to model them more precisely."

"With regard to the superiority of T2FSs over type-1 fuzzy sets and their merits, e.g., encompassing more uncertainties, in this investigation T2FSs are taken into account to cope with uncertainties."

"An innovative sound approach is introduced to prognosticate cash flow of project under TIT2FSs in a multi-project environment by taking both TODIM method to adopt the best way of project execution and CCM method for better project scheduling into account, which leads to an accurate project cash flow."

Literature review

"To analyze the cash flow of projects, Mohagheghi and others [36] proposed an analytical method in a fuzzy environment."

"Tabei and others [37] presented a model to predict the cash flow of the project using fuzzy sets theory."

"He and others [38] presented a model to optimize project cash flow considering multi-mode multi-project scheduling and using tabu search and simulated annealing algorithms."

"Despite the fact that fuzzy sets theory has been widely utilized in previous studies, such as Maravas and Pantouvakis [39], Mohagheghi and others [36], and Yu and others [40], to state uncertainties in project cash flow assessment, most of them were deprived of merits involved in T2FSs."

"There are few studies, i.e., Mohagheghi and others [35], in which T2FSs have been applied, none of which has considered the integration of scheduling, cash flow, and MCDM problems concurrently, especially in a multi-project environment."

Proposed approach

"In first phase, a diverse scenario representing various ways of project execution involved in both criteria and project experts' preferences initially is determined to select the best scenario."

"Type-2 fuzzy extension on TODIM method is utilized for all of the projects to adopt the best scenario."

"Different scenarios can be determined for project implementation, and the best one will be adopted in light of both project experts' preferences and appropriate criteria, e.g., quality, time, and cost."

"Given the information of adopted scenarios, the project network will be obtained utilizing TIT2F-CCM method in the multi-project environment."

"According to the derived project network and employing a cash flow method in the T2F-environment for multiple projects, cash flow of project for both the best and the worst cases will be computed calculating the total costs of activities in various periods over the life of the project."

Case study

"All aforementioned projects can be handled simultaneously based on the introduced approach, two of which consisting of six and nine activities, respectively, are considered in this paper."

"The collected data, which contain activities with type-2 fuzzy numbers, are based on petro-refining project reports."

"Applying this information, project scheduling can be obtained, and consequently, project cash flow will be computed."

"Activities and predecessors are determined for each project in two first columns, and subsequently regarding various ways of activities execution, the respective scenarios associated with criteria are defined."

"Based on the resulting cost distribution of projects, the cash flow of projects in an uncertain environment for the best and the worst cases can be computed by utilizing summation of cost distribution for projects activities."

"Besides, the same downward trend can be observed with no fluctuation for project cash flow uncertainty."

Managerial insights

"A number of managerial insights can be obtained from executing the presented approach in a real-world project as a case study below: Project scheduling is conducted in the presented approach for the purpose of prognosticating the project cash flow using activities with type-2 fuzzy numbers."

"Since the proposed approach is in accordance with the S-curve method in the fuzzy environment, an anticipation of uncertain circumstances can be made, and also a thorough understanding of financial requirements will be provided for managers in the entire life cycle of the project."

"Employing type-2 fuzzy numbers makes it more flexible for decision makers to address the uncertainties in projects."

"Due to the fact that there is a great deal of uncertainties in early stages of the project, the utilized type-2 fuzzy approach as a complicated uncertainty tool is able to properly state these uncertainties."

Conclusion and future research

"Given the profound effects of both uncertainties and execution of several projects simultaneously on project cash flow, it is required to take them into account in project cash flow anticipation."

"A comprehensive approach encompassing activities with type-2 fuzzy data was presented in this study, aiming at prognosticating cash flow of project in a multi-project environment in accordance with the extension of both TODIM and CCM methods for scenario selection and project scheduling, respectively."

"By applying the extension of CCM method, early start and finish time of activities, and subsequently, the project scheduling were obtained."

"Projects cash flows considering uncertainties were computed in the multi-project environment to analyze projects."

"For future research, more evaluation criteria, such as safety and risk, than what has been regarded in this study can be taken into account for more efficient project execution."

"Why couldn't we do this more often?": exploring the feasibility of virtual and distributed work in product design engineering [59]

This is a machine-generated summary of:

Ferguson, Sharon; Lai, Kimberly; Chen, James; Faidi, Safa; Leonardo, Kevin; Olechowski, Alison: "Why couldn't we do this more often?": exploring the feasibility of virtual and distributed work in product design engineering [59]

Published in: Research in Engineering Design (2022)

Link to original: <https://doi.org/10.1007/s00163-022-00391-2>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer-Verlag London Ltd., part of Springer Nature 2022

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Despite these advantages, product design engineering teams—those who develop physical products—have not widely adopted this working style due to perceived critical dependence on physical facilities and the belief that it is ineffective to communicate technical details virtually."

"This paper uses the mass shift in working conditions caused by the COVID-19 pandemic to explore the feasibility of virtual and distributed work in product design engineering."

"We conducted 20 semi-structured interviews with product design engineers working virtually to uncover current challenges of, and the beginning of promising strategies for, effective virtual engineering work."

"Contrary to present opinions, we found that much of a product design engineer's work is realizable in a virtual and distributed setting."

"These challenges, missing from existing virtual product design engineering literature, include but are not limited to individuals' lessened sense of accountability, fewer de-risking opportunities before product sign-off, and limited supervision of production staff."

"It is critical that we use this opportunity to understand the existing challenges for distributed product design engineers, so that organizations can best prepare and become resilient to future shocks."

Introduction

"Can physical products be designed and developed by teams working together virtually, from home?"

"Prior work on virtual hardware-dependent teams is limited, but we can extend the existing virtual collaboration theories to illuminate the unique needs of product design engineers."

"This widespread shift to virtual work allows us to study the adapted product design engineering skills, processes, and organizational arrangements (Marion and Fixson 41)."

"We believe that valuable lessons can be learned from product design engineers that likely would not otherwise have attempted completely virtual and distributed work."

"The contributions of this work are as follows: We present one of the first studies of widespread virtual work for professional product design engineers who design physical hardware products, with a specific focus on how this dependency challenges their adoption of a virtual or distributed working arrangement."

Background

"One study found that the percentage of time per week spent working virtually was positively associated with increased job performance, particularly for highly complex roles that are low in interdependence and social support (Golden and Gajendran 42), perhaps similar to product design engineering work."

"While researchers have studied virtual teams to a great extent, virtual product design engineering teams are rarely studied nor attempted in industry (Global Workplace Analytics 2020a)."

"When researchers do focus on virtual product design teams, it is often in terms of global organizations with co-located design teams that collaborate with manufacturers and suppliers overseas (Eppinger and Chitkara 43; Montoya and others 44)."

"Researchers have not targeted entirely virtual and distributed physical product design teams."

"Product design engineering includes distinct activities, yet virtual work literature in this area has yet to identify the unique challenges by activity type and how design teams could mitigate these challenges."

Methods

"We conducted 20 virtual semi-structured interviews to examine the unique challenges of virtual work experienced by product design engineers in each phase of the product design process."

"The interview guide was developed to address the following research question: how have virtual working conditions impacted hardware-dependent product design engineers?"

"Participants self-identified the phases they had been primarily working in during the virtual work period and were asked to respond to interview questions in the context of these phases."

"After the initial analysis, the entire research team revisited the compiled list of challenges and strategies and used consensus discussion to determine which phase of the product design process each specific challenge or strategy referred to, given the phases that the participant identified in the interview."

"Following this process, the three researchers then collectively compared results across participants to identify patterns between challenges and strategies and participant characteristics such as role and organization size."

Results and Discussion

"For the projects in Testing and Refinement and Production Ramp-Up when no one could go in, there isn't really a good substitute for that [when] work[ing] from home. (Participant 11) Thus, we highlight critical challenges to, and strategies specific for, virtual work in three distinct areas of the product design process: (1) Intangible Design activities, (2) Tangible Design activities, and (3) Communication and Project Management activities."

"I think as far as [company] design engineering goes, I think that's a really good balance...having time set aside...[where] I'm working from home where I know I can just sit down for three hours straight and work on a CAD design, to me that's really important to have. (Participant 4) Fewer distractions are a documented benefit of virtual work (Laumer and Maier 45); our participants cited this as one reason they'd like to continue with a hybrid approach: for the parts of the product design process that require detailed individual work, such as CAD modelling or documentation, participants believe they are more effective in their distraction-free home environment."

Limitations and future work

"The sudden nature of this change may have brought about some of the findings reported in this work, and they may not be applicable for product design engineering teams making a planned decision to move to virtual work."

"This work examined the feasibility of virtual product design engineering work using activities in the product design process as a framework."

"Our findings highlight how virtual communication challenges exist throughout all phases of the product design process; thus, it can be reasoned that studying other interpersonal processes in product design engineering would uncover new challenges and innovative strategies (Maruping and Agarwal 46)."

"Virtual product design engineering work can be evaluated for feasibility on the individual or team level to understand personal or team characteristics that are most conducive to virtual work."

"The survey could test for the severity of commonly encountered challenges for product design engineers working from home as well as highlight the challenges that persist as teams mature in their new working style."

Conclusion

"Although long believed to be ineffective, we have shown that it is feasible for product design engineers to work in a distributed and virtual manner."

"We find that Tangible Design activities, which include physical tools, facilities, and products, are most challenging to complete virtually."

"Some of the challenges uncovered in this work are missing from existing virtual product design engineering literature."

"The COVID-19 pandemic allowed product design engineers to realize the feasibility of virtual work, and here, we have provided an initial explanation of how this happened and what still needs to be done."

"While there still exists a need for some in-person work for product design engineers, we can see that it is possible for the industry to move towards a more flexible work schedule while remaining productive and effective."

Synergetic Order Parameter Identification of Prefabricated Building Projects Based on Main Theme Analysis [60]

This is a machine-generated summary of:

Qiao, Yaning; Shi, Xiaobo; Ren, Jia; Liu, Wanying; Shen, Fang; Chen, Jiayan; Opoku, Alex: Synergetic Order Parameter Identification of Prefabricated Building Projects Based on Main Theme Analysis [60]

Published in: Arabian Journal for Science and Engineering (2022)

Link to original: <https://doi.org/10.1007/s13369-021-06463-0>

Copyright of the summarized publication:

King Fahd University of Petroleum & Minerals 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"Although many factors are affecting the efficiency of prefabricated building projects, it is a current gap to assess which of them is/are more critical."

"Based on synergetics, the key factors (i.e. synergetic order parameters) affecting the collaborative management of prefabricated construction projects are identified by using the main melody analysis."

"This study concluded that information collaborative platform, project organization structure, and collaborative benefit (in the order of importance) are the key factors influencing the efficiency of prefabricated building projects."

"The research finding can help the managers of all parties in the construction industry to understand the decisive factors to ensure efficient collaboration in prefabricated

construction projects."

Introduction

"It is commonly known that the success of a project substantially depends on collaborative management [47]; however, significant information barriers and low level collaborative management widely exist so that prefabricated building construction workers find it difficult to achieve sufficient efficiency in the collaboration."

"The theoretical basis of collaborative management has not been well established for prefabricated building projects and is in urgent need of development."

"The existing research has not systematically investigated factors in the collaborative management of prefabricated construction projects."

"It remains a research gap regarding how to develop a theoretical method to identify more critical factors affecting collaborative management for prefabricated building projects."

"This research proposes that synergetic order parameters (SOPs) are the key elements of collaborative management of prefabricated building projects."

"Based on the evaluation opinions of 20 experts, the main melody of collaborative management of prefabricated construction projects is extracted."

Methodology

"The main melody analysis method is used to identify the SOPs of prefabricated building projects, and the collaborative management ability is strengthened by controlling these key elements."

"This study adopts the main melody analysis method to identify the SOPs of prefabricated building projects."

"An ideal point utility function is used to construct the main melody model as the expression of the value quantity of SSP competing behaviour of the prefabricated building projects."

"On the basis of identified SSP system, the main melody analysis method is used in the second stage to select the most important parameters of all SSPs as SOPs of prefabricated building."

"Literature analysis, this study proposes that collaborative management of prefabricated

building projects is mainly carried out from five dimensions, including organization collaboration, information collaboration, process collaboration, objective collaboration, and environmental collaboration."

Analysis

"The evaluation vector and value weight of SSPs are obtained following steps (1) to (3): (1) Main melody model based on ideal point function In this study, the experts of prefabricated buildings interviewed above were invited to join the evaluation team to identify SOPs and analyse the main melody."

"The main melody of the SSPs of the prefabricated building projects is expressed by evaluating the value weight of the group, and several melodies can be obtained by cluster analysis of the value weight of the SSPs of the evaluation group."

"According to the 20/80 rule, the value weight that gathers more than 20% of the members (four experts) is regarded as the main melody of the SSPs of the prefabricated building projects [48]."

"It is more difficult to gather the experts' value weight on the SSPs into one category, which cannot properly reflect the difference between the expert groups on the main melody of the SSPs of prefabricated building projects."

Results and Discussion

"Obtaining enough relevant information for collaborative management is the basis of project management for organization collaboration, process collaboration, target collaboration, resource balance, overall optimization, risk control, etc BIM and other modern information technology should be considered as a priority to build a prefabricated building information collaboration platform to improve efficiency."

"In prefabricated building projects, the organization structure should consider a highly collaborative organization structure to form a clear management level and consistent goal for stakeholders, which can greatly reduce the occurrence of conflicts, and creates a collaborative atmosphere [49]."

"Enhancing synergy means increasing the social, economic, sustainable, and other comprehensive benefits achieved through collaborative management of prefabricated construction projects [50]."

"Giving full play to the driving role of synergy to drive all SSPs to develop and evolve in the direction of collaborative order is conducive to the final realization of collaborative

management of prefabricated construction projects."

Conclusion

"The current research gap shows that there is a lack of a theoretical method to systematically identify key factors influencing the efficiency of collaboration in prefabricated building projects."

"This study established a novel approach by incorporating SOPs, based on the synergetic theory, to identify key factors and their priority to enhance collaborative management of prefabricated building projects."

"The research shows that collaborative platform, project organization structure, and synergy (listed in the order of importance) are the three most influential SOPs of prefabricated construction projects."

"This means that these three parameters are the decisive factors in the collaborative process of prefabricated building projects."

"With the development of prefabricated construction projects, the parameter indicators to measure the collaborative state of projects will not only develop in many aspects but also have the change in timeliness, which needs further research."

Image search system and industrial product design based on CPU parallel computing [61]

This is a machine-generated summary of:

He, Li; Hu, Zhefang; Yu, Yang: Image search system and industrial product design based on CPU parallel computing [61]

Published in: Wireless Networks (2021)

Link to original: <https://doi.org/10.1007/s11276-021-02680-5>

Copyright of the summarized publication:

The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2021

All rights reserved.

If you want to cite the papers, please refer to the original.

For technical reasons we could not place the page where the original quote is coming from.

Abstract-Summary

"The goal of industrial product design is to market products that meet consumer needs, which specifies that the creative behavior of product design should be restricted by the market environment."

"The further integration of technology, design, and market is developing rapidly, and we need to shift the focus from art and design thinking to a favorable position that encompasses the entire society."

"Parallel algorithms developed on multi-core CPUs are highly adaptable and can be used in most environments."

"By using parallel computing on a multi-core CPU, you can make full use of processor resources and improve resources."

"By improving and optimizing algorithms, parallel processing technology is used to increase the speed of image processing."

"Sparse image resolution algorithms and aircraft recognition methods use multi-core CPU parallel processing technology to increase processing speed and processing efficiency."

Introduction

"The range of design disciplines is very wide, including political science, economics, architecture, medicine, material science, ethics, art, etc However, multi-core processors are used to organize billions of transistors into multiple parallel processor cores composed of hundreds of floating-point modules."

"Compared with single-core processors, these processor cores have a purely physical parallel design."

"Hardware parallelism is the main reason to increase the speed of multi-core processors, which is also the reason why parallel computing is more effective than sequential computing."

"By improving and optimizing the algorithm, and then using parallel computer technology to increase the image processing speed, this is an effective solution."

"There are a large number of similar images on the Internet, namely original images or several new images created using zooming, editing, or post-processing."

Related work

"MATLAB has developed many powerful modules and toolkits for many professional fields, such as: signal processing, image processing, probability and statistics, neural networks, wavelet analysis, etc , as well as parallel computing, which have been added in later versions."

"Improve the interpolation technology to reduce the blur of the edges when the image resolution is increased."

"In the design process, developers must improve product safety and standardization through design, and reduce the risk of product use."

"[51], the color effect of the product is mainly expressed through the color matching of the product design sketch."

"After sketching the shape, the designer must consider the results of the multicolor analysis during the product design stage."

"First draw the color dividing lines of different colors, and then define the color effect of the designed product."

Image search system based on CPU parallel computing

"In order to show that we did not use too much space, we only selected some images (or the results of images a, b, c, d, e, and f), and the other images are the same."

"When verifying parallel algorithms, serial and parallel algorithms are used to perform high-resolution processing on different images to obtain images."

"Minkowski distance is the generalization and extension of three distance formulas: Manhattan distance, Euclidean distance and Chebyshev distance."

"If the histogram is calculated in a similar way, the Bhattacharya distance will have the best effect, but the calculation will be the most difficult."

"Adjusting local image features based on BagOfFeatures is effective, but the quantizer usually leads to a decrease in search accuracy."

"A is a set of linked images that have been correctly extracted, B is a set of linked but not extracted images, and C is a set of unlinked but misidentified images."

Industrial product design principles and management planning of the design process

"In order to enable the designer to complete the relevant design work according to the final product design plan, the company must provide some basic information, otherwise the designer must receive this information, which includes: (1) Present situation introduction: product range and early product types, models and technical capabilities; (2) Business strategy: market positioning determined by the company (customer), existing business problems or opportunities; (3) Market information: market conditions and market shares, best product lines and sales methods, and products to be compared, for example, competitive products, company's relative advantages and disadvantages, production costs and design advantages, creativity in marketing plans, Market price and point of sale, etc ; (4) The shortcomings of the existing product design and improvement are prominent: there are concentration problems in maintenance and repair, and the adaptability to use in different environments."

Conclusions

"With the continuous development of image processing technology, the amount of digital image data is increasing."

"The rapid development of computer networks and multimedia technologies has stimulated people's use of the Internet to publish, store, and search for multimedia data such as images and other skills and needs."

"Safety research in industrial product design brings together knowledge from different disciplines and reflects the design's concern for people, nature, society, culture and the future."

"It reflects the essence of product design and human characteristics and its relationship with nature."

References

[1] van der Waa J, Schoonderwoerd T, van Diggelen J, et al (2020) Interpretable confidence measures for decision support systems. Int J Human Comput Stud 144:102493

[2] Arnott D, Pervan G (2008) Eight key issues for the decision support systems discipline. *Decision Support Syst* 44(3):657–672. <https://doi.org/10.1016/j.dss.2007.09.003>, www.sciencedirect.com/science/article/pii/S0167923607001698

[3] Provost F, Fawcett T (2013) Data science and its relationship to big data and data-driven decision making. *Big data* 1(1):51–59

[4] Shibl R, Lawley M, Debusse J (2013) Factors influencing decision support system acceptance. *Decision Support Syst* 54(2):953–961

[5] Bakht MN, El-Diraby TE (2015) Synthesis of decision-making research in construction. *J Construct Eng Manage* 141(9):04015,027

[6] Abioye SO, Oyedele LO, Akanbi L et al (2021) Artificial intelligence in the construction industry: A review of present status, opportunities and future challenges. *J Build Eng* 44(103):299

[7] Jato-Espino D, Castillo-Lopez E, Rodriguez-Hernandez J, et al (2014) A review of application of multi-criteria decision making methods in construction. *Auto Construct* 45:151–162

[8] Marcher C, Giusti A, Matt DT (2020) Decision Support in Building Construction: A Systematic Review of Methods and Application Areas. *Buildings* 10(10):170

[9] Wood H, Ashton P (2009) Factors of complexity in construction projects. In: *Proceedings 25th annual ARCOM conference, vol 2. ARCOM*, pp 857–866, *Proceedings 25th annual ARCOM conference*, Conference date: 07-09-2009

[10] Fröhlich P, Sackl A, Trösterer S, et al (2018) Acceptance factors for future workplaces in highly automated trucks. In: *Proceedings of the 10th international conference on automotive user interfaces and interactive vehicular applications*, pp 129–136

[11] Vorm E, Combs DJ (2022) Integrating transparency, trust, and acceptance: The intelligent systems technology model (istam). *Int J Human Comput Interact*, pp 1–18

[12] Zhang Y, Liao QV, Bellamy RK (2020) Effect of confidence and explanation on accuracy and trust calibration in AI-assisted decision making. In: *Proceedings of the 2020 conference on fairness, accountability, and transparency*, pp 295–305

[13] Naiseh M, Al-Thani D, Jiang N et al (2021) Explainable recommendation: when design meets trust calibration. *World Wide Web* 24(5):1857–1884

- [14] Nielsen J, Clemmensen T, Yssing C (2002) Getting access to what goes on in people's heads? Reflections on the think-aloud technique. In: Proceedings of the second Nordic conference on human-computer interaction, pp 101–110
- [15] Hajjighasemi Z, Mousavi SM. A new approach in failure modes and effects analysis based on compromise solution by considering objective and subjective weights with interval-valued intuitionistic fuzzy sets. *Iran J Fuzzy Syst.* 2018;15(1):139–61.
- [16] Mohagheghi V, Mousavi SM, Vahdani B. A new multi-objective optimization approach for sustainable project portfolio selection: a real world application under interval-valued fuzzy environment. *Iran J Fuzzy Syst.* 2016;13(6):41–68.
- [17] Farhadinia B, Xu Z. Distance and aggregation-based methodologies for hesitant fuzzy decision making. *Cogn Comput.* 2017;9(1):81–94.
- [18] Tao, Z., Han, B., & Chen, H. (2018). On intuitionistic fuzzy copula aggregation operators in multiple-attribute decision making. *Cogn Comput*, 1–15. Article in Press. DOI: <https://doi.org/10.1007/s12559-018-9545-1>.
- [19] Atanassov, K. T. (1983). Intuitionistic fuzzy sets in: V. Sgurev, Ed., VII ITKR's Session, Sofia, (Central Sci. and Techn. Library, Bulg. Academy of Sciences, 1984).
- [20] Dvir D, Lipovetsky S, Yhar A, Tishler A (1998) In search of project classification: a non-universal approach to project success factors. *Res Policy* 27:915–935
- [21] Pall GK, Bridge AJ, Skitmore M, Gray J (2016) Comprehensive review of delays in power transmission projects. *IET Gener Transm Distrib* 10(14):3393–3404
- [22] Wang, Y., Redmiles, D.: The diffusion of trust and cooperation in teams with individuals' variations on baseline trust. In: Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing. ACM, New York, CSCW '16, pp. 303–318 (2016b). <https://doi.org/10.1145/2818048.2820064>
- [23] Wang, Y., Redmiles, D.: Cheap talk, cooperation, and trust in global software engineering. *Empir. Softw. Eng.* 21(6), 2233–2267 (2016a). <https://doi.org/10.1007/s10664-015-9407-3>
- [24] Cooper, R.: *Coordination Games*. Cambridge University Press, Cambridge (1999)
- [25] Ishikawa, K. (1993). *Controle de Qualidade Total: à maneira japonesa*. Rio de Janeiro:

Campus.

[26] Fernandes, A. A.; Abreu, V. F. de (2014). Implantando a Governança de TI-: Da estratégia à Gestão de Processos e Serviço. Rio de Janeiro: Brasport.

[27] Tang, X., & Todo, Y. (2013). A study of service desk setup in implementing IT service management in enterprises. *Technology and Investment*, 4(3) Available at: <http://www.scirp.org/journal/PaperInformation.aspx?PaperID=35498>.

[28] Plos O, Buisine S, Aoussat A, Mantelet F, Dumas C (2012) A universalist strategy for the design of Assistive Technology. *Int J Ind Ergon* 42(6):533–541

[29] Phillips B, Zhao H (1993) Predictors of assistive technology abandonment. *Assist Technol* 5(1):36–45

[30] Gherardini F, Mascia MT, Bettelli V, Leali F (2018) A co-design method for the additive manufacturing of customised assistive devices for hand pathologies. *J Int Des Process Sci* 22(1):21–37

[31] Camps JA (1996) Simple steps help minimize costs risks in project management. *Oil Gas J* 94(4):32–36

[32] Chapman CB, Ward S (1997) *Project risk management: processes, techniques and insights*. Wiley, New York

[33] Guildford WS (1998) Practical risk assessment for project management. *Int J Project Manag* 16(2):130–131

[34] Simister SJ (1994) Usage and benefits of project risk analysis and management. *Int J Project Manag* 12(1):5–10

[35] Mohagheghi V, Mousavi SM, Vahdani B (2017) An assessment method for project cash flow under interval-valued fuzzy environment. *J Optim Ind Eng* 10(22):73–80

[36] Mohagheghi V, Mousavi SM, Vahdani B, Siadat A (2017) A mathematical modeling approach for high and new technology-project portfolio selection under uncertain environments. *J Intell Fuzzy Syst* 32(6):4069–4079

[37] Tabei SMA, Bagherpour M, Mahmoudi A (2019) Application of fuzzy modelling to predict construction projects cash flow. *Period Polytech Civ Eng* 63(2):647–659

[38] He Y, Zhang J, He Z (2019) Metaheuristic algorithms for multimode multiproject

scheduling with the objective of positive cash flow balance. IEEE Access 7:157427–157436

[39] Maravas A, Pantouvakis JP (2012) Project cash flow analysis in the presence of uncertainty in activity duration and cost. Int J Project Manag 30(3):374–384

[40] Yu MC, Dang VL, Yeh HC (2017) Measuring cash flow and overdraft for fuzzy project networks with overlapping activities. J Civ Eng Manag 23(4):487–498

[41] Marion TJ, Fixson SK (2021) The transformation of the innovation process: how digital tools are changing work, collaboration, and organizations in new product development. J Prod Innov Manag 38:192–215. <https://doi.org/10.1111/jpim.12547>

[42] Golden TD, Gajendran RS (2019) Unpacking the role of a telecommuter's job in their performance: examining job complexity, problem solving, interdependence, and social support. J Bus Psychol 34:55–69. <https://doi.org/10.1007/s10869-018-9530-4>

[43] Eppinger SD, Chitkara AR (2009) The practice of global product development. MIT Sloan Manag Rev 50:1–11. <https://doi.org/10.1109/emr.2007.329130>

[44] Montoya MM, Massey AP, Hung YTC, Crisp CB (2009) Can you hear me now? Communication in virtual product development teams. J Prod Innov Manag 26:139–155. <https://doi.org/10.1111/j.1540-5885.2009.00342.x>

[45] Laumer S, Maier C (2021) Why do people (not) want to work from home? An individual-focused literature review on telework. In: SIGMIS-CPR 2021—Proc 2021 Comput People Res Conf 41–49. <https://doi.org/10.1145/3458026.3462155>

[46] Maruping LM, Agarwal R (2004) Managing team interpersonal processes through technology: a Task-technology fit perspective. J Appl Psychol 89:975–990. <https://doi.org/10.1037/0021-9010.89.6.975>

[47] Ollus, M.; Jansson, K.; Karvonen, I.; Uoti, M.; Riikonen, H.: Supporting collaborative project management. Prod. Plan. Control 22(5), 538–553 (2011). <https://doi.org/10.1080/09537287.2010.536624>

[48] Xu, X.L.; Yu, L.; Wang, T.D.; Economics, S.Q.: Analysis of order parameters for co-evolution of regional sci-tech innovation and sci-tech finance system. Sci. Technol. Manag. Res. 37(15), 15–20 (2017)

[49] Li, H.S.; Fei, J.X.: Analysis of influencing factors of project group management coordination. Project Manag. Technol. 14(9), 31–36 (2016)

[50] Xu, J.F.; Lei, X.H.: Research and classification of supply chain partnership of China's engineering general contracting enterprises based on BIM. *Civil Eng. J. Eng.* 2015(6), 122–128 (2015)

[51] Mazloom, M., et al. (2013). Querying for video events by semantic signatures from few examples. In *Proceedings of the 21st ACM international conference on multimedia* (vol. 68, No. 5, pp. 609–612).

[52] Fröhlich, Peter; Mirnig, Alexander G.; Falcioni, Damiano; Schrammel, Johann; Diamond, Lisa; Fischer, Isabel; Tscheligi, Manfred Effects of reliability indicators on usage, acceptance and preference of predictive process management decision support systems. *Quality and User Experience* (2022). doi: 10.1007/s41233-022-00053-0

[53] Mohagheghi, Vahid; Mousavi, S. Meysam D-WASPAS: Addressing Social Cognition in Uncertain Decision-Making with an Application to a Sustainable Project Portfolio Problem. *Cognitive Computation* (2019). doi: 10.1007/s12559-019-09679-3

[54] Ghatak, Achintya; Garg, Adarsh Power transmission project: a framework to align project success with organization goal. *International Journal of System Assurance Engineering and Management* (2022). doi: 10.1007/s13198-021-01568-z

[55] Wang, Yi; Redmiles, David IIAG: a data-driven and theory-inspired approach for advising how to interact with new remote collaborators in OSS teams. *Automated Software Engineering* (2021). doi: 10.1007/s10515-021-00283-0

[56] da Silva, Cristiano Domingues; Lins de Vasconcelos, Alexandre Marcos Using the IDEAL model for the construction of a deployment framework of IT Service Desks at the Brazilian Federal Institutes of Education. *Software Quality Journal* (2020). doi: 10.1007/s11219-020-09499-x

[57] Santos, A. V. F.; Silveira, Z. C. AT-d8sign: methodology to support development of assistive devices focused on user-centered design and 3D technologies. *Journal of the Brazilian Society of Mechanical Sciences and Engineering* (2020). doi: 10.1007/s40430-020-02347-w

[58] Mirnezami, Seyed Ali; Mousavi, Seyed Meysam; Mohagheghi, Vahid An innovative interval type-2 fuzzy approach for multi-scenario multi-project cash flow evaluation considering TODIM and critical chain with an application to energy sector. *Neural Computing and Applications* (2020). doi: 10.1007/s00521-020-05095-z

[59] Ferguson, Sharon; Lai, Kimberly; Chen, James; Faidi, Safa; Leonardo, Kevin; Olechowski, Alison “Why couldn't we do this more often?": exploring the feasibility of

virtual and distributed work in product design engineering. *Research in Engineering Design* (2022). doi: 10.1007/s00163-022-00391-2

[60] Qiao, Yaning; Shi, Xiaobo; Ren, Jia; Liu, Wanying; Shen, Fang; Chen, Jiayan; Opoku, Alex Synergetic Order Parameter Identification of Prefabricated Building Projects Based on Main Theme Analysis. *Arabian Journal for Science and Engineering* (2022). doi: 10.1007/s13369-021-06463-0

[61] He, Li; Hu, Zhefang; Yu, Yang Image search system and industrial product design based on CPU parallel computing. *Wireless Networks* (2021). doi: 10.1007/s11276-021-02680-5

END