Jurnal Info Sains : Informatika dan Sains
Volume 14 , Number 01, 2024, DOI 10.54209/infosains.v14i01.3740
ESSN 2797-7889 (Online)
https://ejournal.seaninstitute.or.id/index.php/InfoSains

Continuous Improvement in Construction Project Inventory Systems: An XP-Based Investigation during the Warranty Phase

Denny Jean Cross Sihombing
Faculty of Engineering, Atma Jaya Catholic University of Indonesia

Article Info

Keywords:
Continuous Improvement
Project Inventory Systems
Warranty Phase
XP-Based Investigation

ABSTRACT

This research explores the importance of effective management in the context of construction projects, with a particular focus on the warranty phase and inventory systems. An efficient inventory system is critical in ensuring the smooth operation of construction projects involving the management of materials, equipment, and other supplies. This research focuses on common challenges in inventory management, including accurate stock monitoring and inventory risk management. This research proposes a Continuous Improvement approach, with the implementation of Extreme Programming (XP), to systematically detect, analyze, and address issues in the inventory system of construction projects on an ongoing basis. The warranty phase in the construction project cycle is identified as a critical period that requires special attention to construction quality and performance. The research stages involved data collection, application development, and user acceptance analysis. The results included identifying project needs through interviews, surveys, and observations and developing an XP-based application to improve inventory management. Feature testing and user acceptance analysis showed that this application can meet the needs of construction projects with a user satisfaction rate of 87 percent. This research is expected to make a real contribution toward improving the efficiency and effectiveness of construction projects through responsive and adaptive inventory solutions.

Corresponding Author:
Denny Jean Cross Sihombing
Atma Jaya Catholic University of Indonesia
E-mail : denny.jean@atmajaya.ac.id

INTRODUCTION

Effective management is critical to success in the dynamic world of construction projects[1]–[3]. By ensuring good coordination between resources, time, and cost, effective project management supports the achievement of critical objectives and prevents possible obstacles during project execution. The inventory system in construction projects is essential for maintaining a smooth operation. This includes managing materials, equipment, and other supplies needed to ensure project sustainability, quality of construction results, and fulfillment of overall project needs[2]–[9]. The warranty phase in the construction project cycle is a period of responsibility for defects and repairs and a critical stage to ensure high-

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quality construction results[10]–[15]. A focus on maintaining and improving the performance of the inventory system can have a positive impact during this phase. Although inventory systems are integral to construction projects, some common issues can arise. From inefficient stock management to sub-optimal coordination between different aspects of inventory, these issues require special attention to improve performance[16]–[21].

Challenges in inventory management include accurate stock monitoring, efficient procurement, and managing inventory-related risks. Understanding and overcoming these challenges can contribute significantly to project success. In the context of construction projects, specific constraints such as sudden design changes, uncertainty of material supply, or limited space for inventory storage can be obstacles that need to be overcome to maintain smooth operations. Existing inventory systems may have specific limitations, either in terms of technology or process. Understanding these limitations is the first step to designing the necessary improvements and developments[22]–[26].

The warranty phase in the construction project cycle is the period after the completion of construction where the contractor is responsible for improving and maintaining the quality of the construction results. In the research context, this phase is essential to ensure the continuity and sustainability of the construction results. Continuous improvement, in the context of this research, refers to a systematic approach to detecting, analyzing, and correcting problems that arise in the management of construction project inventory systems on an ongoing basis. This research is expected to make a real contribution towards improving the quality and performance of construction projects. Identifying the inhibiting factors and implementing suitable solutions are expected to create a more efficient, effective, and high-quality project environment. Identifying inhibiting factors and implementing suitable solutions are expected to create a more efficient, effective, and high-quality project environment.

The selection of continuous improvement as an approach in this research is based on the need to identify and address problems that may arise in the construction project inventory system on an ongoing basis. Continuous improvement offers a systematic approach to improving construction project processes, performance, and results by utilizing continuous learning and adaptation to change[27]–[29]. The implementation of Extreme Programming (XP) was chosen because of its speed and flexibility in addressing rapid changes, which often occur in construction projects. In the context of this research, XP can provide an adaptive framework to address challenges and improve efficiency in the management of construction project inventory systems[27], [30]–[36].

This research aims to significantly contribute to improving the efficiency and effectiveness of construction projects. By identifying areas of improvement in the inventory system and applying continuous improvement, it is expected that the results will positively impact the overall performance of the construction project. The main objective of this research is to investigate and understand how the application of continuous improvement, using the XP approach, can improve the management of the inventory system during the warranty phase of a construction project. Through this understanding, concrete steps are

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expected to be determined to improve the effectiveness of inventory management. This research intends to develop construction project management practices that are more adaptive and responsive to change. The benefits involve refining practices that can be widely applied in the construction industry, assisting organizations in achieving project goals more effectively. Extreme Programming (XP) is a software development methodology emphasizing team collaboration, adaptability, and responsiveness to change. Its implementation in this study will involve specific steps to integrate XP principles in managing a construction project inventory system.

METHODS

This research followed three main stages, Figure 1, to develop and improve a construction project dashboard. The first stage was data collection, which involved interviews, surveys, and observations to understand the project needs and user expectations. Once the data was collected, the research moved on to the application development stage with the application of Extreme Programming (XP) methodology. This process includes planning, creating system specifications, UI/UX design, code development, and unit testing to ensure optimal quality and performance. The final stage is user acceptance analysis, where alpha and beta tests engage users in an in-depth evaluation to obtain valuable feedback. The results of this analysis became the basis for adjustments and improvements before the app's official launch. The overall research created a solution that is responsive, adaptive, and suited to the practical needs of construction projects, focusing on improving management visibility and effectiveness.

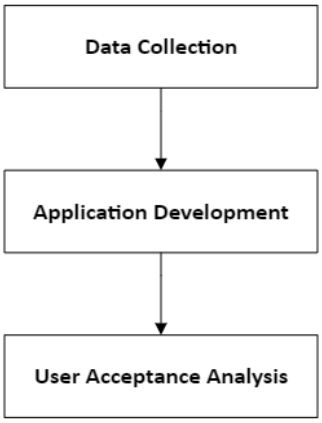

Figure 1. Research Methods

Data Collection

The first phase of the research focused on holistic data collection to understand the needs and dynamics of construction projects. Through stakeholder interviews, surveys, and on-site observations, in-depth information was obtained to form the basis of application

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development. This combination of methods provided a comprehensive understanding of the management challenges, visibility limitations, and user expectations of technology solutions.

Application Development

After gathering the data, the attention turned towards the development of the application. They commenced with meticulous planning, identifying hardware and software needs, and selecting an apt development approach, specifically Extreme Programming (XP). The subsequent steps included system specification and UI/UX design, ensuring alignment with the desired standards of both functionality and appearance. Code development followed, employing XP principles, with unit testing implemented to guarantee stability and achieve optimal performance.

User Acceptance Analysis

Once the application reaches a certain level of maturity, the user acceptance analysis stage begins. Alpha and beta tests engage users in in-depth evaluation through interviews and observations. The results of this analysis form the basis for adjustments and improvements before the official launch. The adjustments focus on ensuring that the app meets the users' expectations and can optimally fulfill their practical needs. The official launch marks the app's readiness for widespread use in a production environment. This stage evaluates and improves the app and ensures that the product is ready to be used properly in practical daily-use situations.

RESULTS AND DISCUSSION

Results of Data Collection

The results of the data collection phase show that the holistic approach applied in this research has successfully generated in-depth information on the needs and dynamics of construction projects. Comprehensive data was collected through intensive stakeholder interviews, careful surveys, and on-site observations. This information provided a solid foundation for the development of the application, providing a deep understanding of the management challenges faced in construction projects, overcoming visibility limitations, and responding to user expectations for innovative technology solutions. The data collection phase provided a solid foundation for designing a solution that fits construction projects' accurate and in-depth needs.

Table 1. Data Collection

Data Source	Results
Interview	Key findings involved more transparency in the project and expectations for easily accessible technology solutions. Fifteen respondents were interviewed, and key stakeholder needs and expectations were acquiring in-depth information about their perspectives and experiences in construction projects.

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Survey	One hundred questionnaires were distributed, and survey analysis showed that 80% of respondents expressed the need for real-time reporting, and 75% wanted an intuitive user interface.
Observation	Ten days of on-site observation. The observations revealed that the lack of coordination between the project teams caused delays in certain stages.

The data collection results, Table 1, through interviews, surveys, and observations revealed critical needs in construction projects. Interviews with fifteen respondents highlighted a push for greater transparency and an expectation for easily accessible technology solutions. A survey of one hundred respondents showed that 80% of them longed for real-time reporting, while 75% wanted an intuitive user interface. Ten days of field observation revealed that a lack of coordination between project teams can cause delays. Overall, these findings provide a solid basis for developing an application to overcome challenges and improve construction project management through increased transparency, real-time reporting, and an intuitive user interface.

Application Development

After a successful data collection phase, the next focus was on the in-depth application development phase. The needs analysis of the application began with a thorough understanding of the essential features needed to improve the management of inventory systems in construction projects. Based on the results from the literature research, interviews, and field data, the research team was able to detail the specific needs that the app needed to accommodate. Next, the design of the app prototype became the main focus. The design team worked to create a user interface that was intuitive and accurately represented the needs and preferences of construction project users. This prototype design involves careful iteration and consultation with stakeholders so that the resulting solution truly matches expectations.

Once the prototype design was generated, the next stage was to implement the XP-based inventory system. The development team worked to translate the design into a fully functional application. They adopted XP principles, including iterative integration, to ensure consistency and reliability of the built system. The development process involved intensive collaboration between team members to ensure that every part of the application met the identified needs. Functionality testing and system integration are performed iteratively as critical steps in this stage of development. Each element of the application is tested to ensure that critical functions are working correctly and that the integration between the components is smooth. These tests are essential to identify potential bugs or technical issues, which can be fixed before the application is presented to the end user. With this development stage, the resulting application can provide reliable, responsive solutions and the needs of managing inventory systems in construction projects.

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Table 2. Features of Application

App Features	Description
Stock Management	This feature lets users view and manage construction project materials and equipment stock in real time. Information on availability, order status, and stock usage history can be accessed easily.
Inventory Monitoring	Users can monitor and manage inventory directly through an intuitive dashboard. Graphs and reports related to inventory provide a comprehensive overview of the state of inventory.
Order Management	Facility to create and track orders for new materials or equipment. Users can view order status, estimated delivery time, and manage pending or late orders.
Barcode Integration	Integrates barcode technology to simplify stock recording and monitoring. Users can quickly scan and update stock information using mobile devices.
Availability Notification	The system automatically alerts when the stock reaches minimum levels or orders have been received. This helps users to take prompt action to avoid stock shortages.
Warranty Phase Management	It has a dedicated module to manage inventory during the warranty phase. This includes repair monitoring, receipt of goods, and quality tracking during the warranty period.
Team Collaboration	A collaboration facility that allows project teams to communicate effectively, share stock information, and provide feedback on the state of inventory.
Reports and Analysis	Provides reports and analysis on inventory performance, utilization efficiency, and project comparisons. This helps in informational decision-making.

The integrated features of the app, Table 2, provide a comprehensive solution for efficient management of construction project inventory. The Stock Management feature enables real-time monitoring and control of materials and equipment, ensuring users have instant access to critical information such as availability, order status, and usage history. The Inventory Monitoring feature further enhances this by presenting a visual dashboard with graphs and reports, providing a holistic view of inventory status. Order Management simplifies procurement, allowing users to create and track orders efficiently. Barcode integration simplifies stock recording via mobile devices, improving accuracy and speed. The Availability Notification feature ensures timely responses to stock levels and incoming orders, preventing shortages. The warranty Phase Management module addresses post-construction concerns, tracking repairs, goods receipt, and quality during the warranty period. Team Collaboration encourages effective communication between project teams, facilitating information sharing and inventory-related feedback. Finally, the Reports and Analysis

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feature provides informative reports, aiding informed decision-making on inventory performance, utilization efficiency, and project comparisons. These features create a robust and user-friendly application to optimize construction project inventory management.

User Acceptance Analysis

After completing the app development stage, the focus shifted to the User Acceptance Analysis stage. The development team conducted the first Alpha Test to identify potential bugs and technical issues. Once the fixes were made, the app was piloted on a limited group of users in the Beta Test phase. During this phase, feedback collection from users was actively engaged to provide insights into their experience with the app. The results from the Beta Test help identify areas that require improvement or enhancement. Further development is then carried out based on the feedback received, focusing on improving the system's overall implementation and performance. A final evaluation assesses overall user acceptance, ensuring the application meets user expectations and provides an effective solution. At this stage, the potential for further development to refine or add features that can enhance the application's overall functionality is also evaluated.

Table 3. Application Testing

Application Features	Testing Criteria	Result
Stock Management	Successfully provides real-time information and a holistic understanding of inventory.	Passed
Inventory Monitoring	Effectively presents holistic information through dashboards.	Passed
Order Management	Facilitates the procurement process well.	Passed
Barcode Integration	Quickly improve the accuracy of stock records.	Passed
Availability Notification	Effective in providing alerts related to stock and orders.	Passed
Warranty Phase Management	Provides fine-grained control during the post-construction period.	Passed
Team Collaboration	Strengthens communication and coordination among project teams.	Passed
Reports and Analysis	Provides deep insights into inventory performance.	Passed

Analysis of the application's feature testing results, Table 3, showed good maturity in meeting the inventory management needs of construction projects. The Stock Management and Inventory Monitoring features effectively presented real-time information and provided a holistic understanding of inventory status. Order Management facilitated the procurement process well, while Barcode Integration successfully improved stock recording accuracy. Availability Notification provided timely notifications, enabling quick action to avoid

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stock shortages. Warranty Phase Management provided reasonable control during the post-construction period, and Team Collaboration improved communication effectiveness among project team members. The Reports and Analysis feature proved its added value by providing deep insights into inventory performance, utilization efficiency, and project comparisons. While the results were generally positive, some notes may require further attention, such as continued development to improve some areas within certain features. Overall, the test results confirmed that the application had reached a sufficient level of maturity to be introduced into the construction project environment. Nonetheless, further development and continuous maintenance will be critical to ensure reliability, responsiveness, and evolution according to needs that may evolve in the future.

The results of the user acceptance analysis showed that out of a total of 25 users involved in the beta test, the satisfaction level reached 87 percent. This reflects a positive acceptance of the construction project inventory management application. The feedback received from users provided valuable insights into their experience with the application. In particular, the 87 percent user satisfaction indicates that most users are satisfied with the performance and functionality of the application. These positive factors can include efficiency in stock management, clarity of inventory information through the dashboard, and the success of other features such as Order Management and Availability Notification. With such a high level of satisfaction, the app has successfully met the expectations and needs of most users. Nonetheless, these results also provide opportunities for improvement or enhancement to the approximately 13 percent of users who may have some specific concerns or suggestions. The development team can, therefore, utilize this feedback to detail areas that require further attention, make improvements, and enhance the overall user experience. With a solid level of satisfaction, further focus can be put on continued development and maintenance to keep the app relevant and responsive and meet user needs over time.

CONCLUSION

This research highlights the importance of effective management in construction projects, especially in the warranty phase, focusing on the inventory system. In addressing common challenges such as inefficient stock management and sub-optimal coordination, this research identifies that continuous improvement in the inventory system can positively impact this phase. By understanding the constraints in inventory management, especially in construction projects with unique challenges such as sudden design changes, uncertainty in material supply, and limited storage space, this research takes a Continuous Improvement approach. The application of Extreme Programming (XP) was chosen for its speed and flexibility in dealing with rapid changes, which commonly occur in construction projects. Through the stages of data collection, application development, and user acceptance analysis, this research successfully produced an inventory management application that is responsive, adaptive, and in accordance with the practical needs of construction projects. The results of the user acceptance analysis showed a satisfaction level of 87 percent, reflecting positive

acceptance of the app. Nonetheless, the findings from feature testing provide opportunities for further development to improve certain areas. Overall, this research successfully achieved its goal of improving the efficiency and effectiveness of construction projects through a Continuous Improvement approach and the application of XP. Providing an adaptive and responsive solution is expected to improve construction project management practices at large.

REFERENCE

C. Trask and H. C. Linderoth, "Digital technologies in construction: A systematic mapping review of evidence for improved occupational health and safety," Journal of Building Engineering, vol. 80. Elsevier Ltd, Dec. 01, 2023. doi: 10.1016/j.jobe.2023.108082.

P. V. Ingle and G. Mahesh, "Construction project performance areas for Indian construction projects," International Journal of Construction Management, vol. 22, no. 8, pp. 1443–1454, 2022, doi: 10.1080/15623599.2020.1721177.

S. Divya Sankar and J. Selvam, "Risk Management in Construction Industry," International Research Journal of Engineering and Technology, 2020, [Online]. Available: www.irjet.net

J. I. Alzahrani and M. W. Emsley, "The impact of contractors ' attributes on construction project success : A post construction evaluation," JPMA, vol. 31, no. 2, pp. 313–322, 2013, doi: 10.1016/j.ijproman.2012.06.006.

N. Pan, "Fuzzy AHP approach for selecting the suitable bridge construction method," Autom Constr, vol. 17, no. 8, pp. 958–965, 2008, doi: 10.1016/j.autcon.2008.03.005.

M. M. Marzouk, "Automation in Construction ELECTRE III model for value engineering applications," Autom Constr, vol. 20, no. 5, pp. 596–600, 2011, doi: 10.1016/j.autcon.2010.11.026.

Y.-Y. Lai, L.-H. Yeh, P.-F. Chen, P.-H. Sung, and Y.-M. Lee, "Management and Recycling of Construction Waste in Taiwan," Procedia Environ Sci, vol. 35, pp. 723–730, 2016, doi: 10.1016/j.proenv.2016.07.077.

P. H. D. Nguyen and A. Robinson Fayek, "Applications of fuzzy hybrid techniques in construction engineering and management research," Autom Constr, vol. 134, p. 104064, 2022, doi: 10.1016/j.autcon.2021.104064.

A. Fredriksson and M. Huge-Brodin, "Green construction logistics – a multi-actor challenge," Research in Transportation Business and Management, vol. 45, no. PA, p. 100830, 2022, doi: 10.1016/j.rtbm.2022.100830.

A. Nieto-Morote and F. Ruz-Vila, "A fuzzy multi-criteria decision-making model for construction contractor prequalification," Autom Constr, vol. 25, pp. 8–19, 2012, doi: 10.1016/j.autcon.2012.04.004.

F. Guo, K. Wang, and E. Cao, "A Digital Twin (DT) Framework at Design and Construction Phases," 2023. [Online]. Available: https://www.researchgate.net/publication/371416031

J. Choi and M. Ha, "Validation of project management information systems for industrial construction projects," Journal of Asian Architecture and Building Engineering, vol. 21, no. 5, pp. 2046–2057, 2022, doi: 10.1080/13467581.2021.1941999.

J. Gao, "Research on Financial Informatization Construction of Business and Finance Integration," International Journal of Science and Research (IJSR), vol. 11, no. 7, pp. 354–358, Jul. 2022, doi: 10.21275/sr22704192347.

J. Zhang, J. C. P. Cheng, W. Chen, and K. Chen, "Digital Twins for Construction Sites: Concepts, LoD Definition, and Applications," Journal of Management in Engineering, vol. 38, no. 2, Mar. 2022, doi: 10.1061/(asce)me.1943-5479.0000948.

M. Almashhadani, H. Almashhadani, and H. A. Almashhadani, "The Impact of Education on Construction Management: A Comprehensive Review," International Journal of Business and Management Invention (IJBMI) ISSN, vol. 12, pp. 284–290, 2023, doi: 10.35629/8028-1206284290.

S. Rajabi, S. El-Sayegh, and L. Romdhane, "Identification and assessment of sustainability performance indicators for construction projects," Environmental and Sustainability Indicators, vol. 15, no. June, p. 100193, 2022, doi: 10.1016/j.indic.2022.100193.

H. Xu et al., "Application of Artificial Neural Networks in Construction Management: A Scientometric Review," Buildings, vol. 12, no. 7. MDPI, Jul. 01, 2022. doi: 10.3390/buildings12070952.

R. A. Bahamid, S. I. Doh, M. A. Khoiry, M. A. Kassem, and M. A. Al-Sharafi, "The Current Risk Management Practices and Knowledge in the Construction Industry," Buildings, vol. 12, no. 7, Jul. 2022, doi: 10.3390/buildings12071016.

A. Serpell and H. Rubio, "Evaluating project management (PM) readiness in construction companies: cases from Chile," Procedia Comput Sci, vol. 219, pp. 1642–1649, 2023, doi: 10.1016/j.procs.2023.01.457.

A. T. Tessema, G. A. Alene, and N. M. Wolelaw, "Assessment of risk factors on construction projects in gondar city, Ethiopia," Heliyon, vol. 8, no. 11, p. e11726, 2022, doi: 10.1016/j.heliyon.2022.e11726.

D. Sihombing, "Development of construction project cost budget application using rapid application development method," Online, 2023.

A. Awad and A. R. Fayek, "A decision support system for contractor prequalification for surety bonding," Automation in Construction, vol. 21, no. 1. Elsevier B.V., pp. 89–98, 2012. doi: 10.1016/j.autcon.2011.05.017.

M. Hamidah et al., "Development of a protocol for Malaysian Important Plant Areas criterion weights using Multi-criteria Decision Making - Analytical Hierarchy Process (MCDM-AHP)," Glob Ecol Conserv, vol. 34, no. January, p. e02033, 2022, doi: 10.1016/j.gecco.2022.e02033.

H. Aulawi, F. Nuraeni, R. Setiawan, W. F. Rianto, A. Surya Pratama, and H. Maulana, "Simple Additive Weighting in the Development of a Decision Support System for the Selection of House Construction Project Teams," in 2023 International Conference on Computer

Science, Information Technology and Engineering (ICCoSITE), 2023, pp. 517–522. doi: 10.1109/ICCoSITE57641.2023.10127813.

C. Zhang, M. Hu, F. Di Maio, B. Sprecher, X. Yang, and A. Tukker, "An overview of the waste hierarchy framework for analyzing the circularity in construction and demolition waste management in Europe," Science of the Total Environment, vol. 803. Elsevier B.V., Jan. 10, 2022. doi: 10.1016/j.scitotenv.2021.149892.

S. Saad, W. S. Alaloul, S. Ammad, M. Altaf, and A. H. Qureshi, "Identification of critical success factors for the adoption of Industrialized Building System (IBS) in Malaysian construction industry," Ain Shams Engineering Journal, vol. 13, no. 2, p. 101547, 2022, doi: 10.1016/j.asej.2021.06.031.

A. Akhtar, B. Bakhtawar, and S. Akhtar, "EXTREME PROGRAMMING VS SCRUM: A COMPARISON OF AGILE MODELS," International Journal of Technology, Innovation and Management (IJTIM), vol. 2, p. 2022, doi: 10.54489/ijtim.v2i1.77.

D. J. C. Sihombing, "Analysis and development of the ProTrack application: construction timeline management using Extreme Programming Methodology," Online, 2023.

J. Chen, T. Yu, L. Yin, J. Tang, and H. Wang, "A unified time scale intelligent control algorithm for microgrid based on extreme dynamic programming," CSEE Journal of Power and Energy Systems, vol. 6, no. 3, pp. 583–590, Sep. 2020, doi: 10.17775/CSEEJPES.2019.00100.

T. Dingsøyr, S. Nerur, V. Balijepally, and N. B. Moe, "A decade of agile methodologies: Towards explaining agile software development," Journal of Systems and Software, vol. 85, no. 6. 2012. doi: 10.1016/j.jss.2012.02.033.

P. Serrador and J. K. Pinto, "Does Agile work? - A quantitative analysis of agile project success," International Journal of Project Management, vol. 33, no. 5, 2015, doi: 10.1016/j.ijproman.2015.01.006.

R. Santos et al., "A Comparative Analysis of Agile Teamwork Quality Instruments in Agile Software Development: A Qualitative Approach", doi: 10.18293/DMSVIVA2023-217.

S. Al-Saqqa, S. Sawalha, and H. Abdelnabi, "Agile software development: Methodologies and trends," International Journal of Interactive Mobile Technologies, vol. 14, no. 11, 2020, doi: 10.3991/ijim.v14i11.13269.

T. Dingsoeyr, D. Falessi, and K. Power, "Agile Development at Scale: The Next Frontier," IEEE Software, vol. 36, no. 2. IEEE Computer Society, pp. 30–38, Mar. 01, 2019. doi: 10.1109/MS.2018.2884884.

F. Almeida, J. Simões, and S. Lopes, "Exploring the Benefits of Combining DevOps and Agile," Future Internet, vol. 14, no. 2, Feb. 2022, doi: 10.3390/fi14020063.

R. Hasan, A.- Ta, and R. Razali, "Prioritizing Requirements in Agile Development : A Conceptual Framework," Procedia Technology, vol. 11, no. Iceei, pp. 733–739, 2013, doi: 10.1016/j.protcy.2013.12.252.