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UNRAVELING THE KEY FACTORS OF SUCCESSFUL ERP POST IMPLEMENTATION IN THE INDONESIAN CONSTRUCTION CONTEXT

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ABSTRACT

Aim/Purpose	This study aims to evaluate the success of ERP post-implementation and the factors that affect the overall success of the ERP system by integrating the Task Technology Fit (TTF) model into the Information System Success Model (ISSM).
Background	Not all ERP implementations provide the expected benefits, as post-implementation challenges can include inflexible ERP systems and ongoing costs. Therefore, it is necessary to evaluate the success after ERP implementation, and this research integrates the Task Technology Fit (TTF) model into the Information System Success Model (ISSM).
Methodology	For data analysis and the proposed model, the authors used SmartPLS 3 by applying the PLS-SEM test and one-tailed bootstrapping. The researchers distributed questionnaires online to 115 ERP users at a construction company in Indonesia and successfully got responses from 95 ERP users.

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Contribution The results obtained will be helpful and essential for future researchers and Information System practitioners – considering the high failure rate in the use of ERP in a company, as well as the inability of organizations and companies to exploit the benefits and potential that ERP can provide fully.

Findings The results show that Perceived Usefulness, User Satisfaction, and Task-Technology Fit positively affect the Organizational Impact of ERP implementation.

Recommendations for Practitioners The findings can help policymakers and CEOs of businesses in Indonesia's construction sector create better business strategies and use limited resources more effectively and efficiently to provide a considerably higher probability of ERP deployment. The findings of this study were also beneficial for ERP vendors and consultants. The construction of the industry has specific characteristics that ERP vendors should consider. Construction is a highly fragmented sector, with specialized segments demanding specialist technologies. Several projects also influence it. They can use them to identify and establish several alternative strategies to deal with challenges and obstacles that can arise during the installation of ERP in a firm. Vendors and consultants can supply solutions, architecture, or customization support by the standard operating criteria, implement the ERP system and train critical users. The ERP system vendors and consultants can also collaborate with experts from the construction sector to develop customized alternatives for construction companies. That would be the most outstanding solution for implementing ERP in this industry.

Recommendations for Researchers Future researchers can use this combined model to study ERP post-implementation success on organizational impact with ERP systems in other company information systems fields, especially the construction sector. Future integration of different models can be used to improve the proposed model. Integration with models that assess the level of Information System acceptance, such as Technology Acceptance Model 3 (TAM3) or Unified Theory of Acceptance and Use of Technology 2 (UTAUT2), can be used in future research to deepen the exploration of factors that influence ERP post-implementation success in an organization.

Impact on Society This study can guide companies, particularly in the construction sector, to maintain ERP performance, conduct training for new users, and regularly survey user satisfaction to ensure the ERP system's reliability, security, and performance are maintained and measurable.

Future Research It is increasing the sample size with a larger population at other loci (private and state-owned) that use ERP to see the factors influencing ERP post-implementation success and using mixed methods to produce a better understanding. With varied modes, it is possible to get better results by adding unique factors to the research, and future integration of other models can be used to improve the proposed model.

Keywords evaluation, enterprise resource planning, information system success model, task technology fit, organizational impact

INTRODUCTION

Indonesia's construction industry is the country's fourth most significant contributor to the Gross Domestic Product (GDP), experiencing a yearly expansion of 10% (Hapsari et al., 2022). Moreover, within the Southeast Asian landscape, it assumes a pivotal role as one of the paramount markets for construction investment (Market Research Indonesia, 2022). The construction industry has several distinct characteristics and needs to be more cohesive and organized (Gavali & Halder, 2020). Several existing processes in construction organizations result from several long-term, ad hoc industrial activities.

According to Hapsari et al. (2022), multiple researchers have agreed that the construction industry faces various challenges. These include limitations in budget, inadequate experience or knowledge of involved parties, and ineffective coordination and communication among key stakeholders. The primary obstacle to the successful implementation of construction in infrastructure development projects is the lack of communication among project participants, as stated by Susanti et al. (2019). To ensure timely and cost-effective project completion, both coordination and communication are crucial across multiple construction departments, including estimating, operation, procurement, accounting, engineering, purchasing, contracting, and equipment, as Gavali and Halder (2020) emphasized.

Furthermore, as Gavali and Halder (2020) stated, the lack of coordination and communication leads to conflicts between departments, negatively impacting the project. To address this issue, the construction industry utilizes Enterprise Resource Planning (ERP) systems for seamless communication between the front and back offices. These systems are essential for decision-making in ongoing and future projects (Gavali & Halder, 2020). By integrating and processing vast amounts of information, ERP systems enable businesses to handle and manage data efficiently (Eka Widjaja et al., 2020; Jaya & Suroso, 2022). With ERP systems, project processes become visible, reliable, and accessible from remote locations, simplifying project monitoring and saving time on documentation tasks.

However, implementing ERP systems is expensive and requires significant effort, with a range of millions of dollars involved. Successful implementation requires effective collaboration (Vargas & Comuzzi, 2020). While implementing ERP systems does not mark the process's conclusion (Willis & Willis-Brown, 2002), post-implementation ERP presents inevitable challenges (Caldwell, 1998). According to Caldwell (1998), numerous companies experience a temporary decline in productivity lasting from three to nine months after the ERP system is operational in the period after its implementation. Organizations face several risks when using, maintaining, and upgrading ERP systems, including unsophisticated user behavior, inflexible system design, and business needs (Peng & Nunes, 2009). Many ERP implementations fail to provide the expected benefits due to challenges such as ongoing costs and lack of system flexibility (Gavali & Halder, 2020). Reduced risk increases the likelihood of ERP after implementation success. As a result, analyzing the ERP system is required to pinpoint the essential criteria for ERP post-implementation performance (Al-Okaily et al., 2021).

PT XYZ is a state-owned construction company with over 63 years of experience. PT XYZ received the most significant cash capital injection from the Indonesian government compared to other state-owned companies, which amounted to 42% of the total state equity participation (PMN) budget in 2023 (Kompas TV, 2022). PMN separates state assets into capital in companies, state-owned enterprises, privately-owned enterprises, foreign companies, or international institutions. The funds are used for the development of Toll Road infrastructure in Indonesia. In addition to getting the most significant percentage of funds from PMN, PT XYZ previously also successfully held investment cooperation to accelerate toll road development in Indonesia with the Indonesia Investment Authority (INA).

PT XYZ implemented an ERP system in 2018 to improve operational activities. Using ERP in the company is expected to accelerate the process of data into high-quality information (Jaya & Suroso, 2022) so that it can directly assist PT XYZ in integrating financial reports and human resource processes, streamlining the procurement process, and optimizing the execution of ongoing projects (Gavali & Halder, 2020). Observing that the continued implementation has consumed considerable resources, PT XYZ requires an assessment to measure the ERP post-implementation success level to determine that the costs and time incurred are proportional to the results (Pringgandani et al., 2018).

Therefore, PT XYZ wants to know whether the resources spent on this ERP are balanced with the results obtained.

To deal with this problem, PT XYZ requires a thorough assessment to ascertain the effectiveness of ERP post-implementation and identify the key factors influencing the overall success of the ERP system. The company can use the results of this evaluation as input and material in updating any modules into ERP. Developing ERP modules requires a massive number of resources, so there needs to be a mature consideration with valid data related to this issue.

Several methods can be used to evaluate ERP, namely, DeLone and McLean's Information System Success Model (ISSM) (DeLone & McLean, 1992) and Task Technology Fit (TTF). ISSM has undergone consistent updates up until the present (DeLone & McLean, 2003, 2016). Its effectiveness has been demonstrated in evaluating ERP systems, as it elucidates user satisfaction and intention to utilize information systems (Cheng, 2019; Kala Kamdjoug et al., 2020; Ouiddad et al., 2020). Furthermore, according to the TTF model, as long as technology adequately facilitates users in accomplishing their tasks, users will persist in utilizing the technology (Goodhue, 1998; Goodhue & Thompson, 1995). TTF has also proven successful in measuring ERP success in an organization (Goodhue & Thompson, 1995; C. Park, 2019). Goodhue and Thompson (1995) developed the idea for a conceptual model called the TTF model, which investigates the links between tasks, technology, and performance. According to Goodhue (1998), the TTF model evaluates users' assessment of information systems by having them reflect on their experiences and how well they did while utilizing the system to complete a task. Both the ISSM and the TTF model share the common objective of providing practitioners with information to ensure that the desired technology positively impacts users, aligns with the work environment, achieves intended purposes, and enhances task/work performance and overall success (Gebauer et al., 2010; Goodhue & Thompson, 1995).

In the literature on ERP success measurement, the ISSM model is widely acknowledged as a theoretical underpinning (Al-Okaily et al., 2021; Banafo Akrong, Shao, & Owusu, 2022; Cheng, 2019; Jaya & Suroso, 2022; Kala Kamdjoug et al., 2020; Kautsar & Budi, 2020; Ouiddad et al., 2020). ISSM was modified by Banafo Akrong, Shao, and Owusu (2022) by introducing environmental values and investigating their impact on the parameters that contribute to the success and utilization of the customized ERP system. Cheng (2019) conducted studies that explored the antecedents of cloud ERP continuation using a combination of the ISSM theory and the TTF theory. At the same time, Cheng (2019) focused on the ancestors of cloud ERP continuation, Wu and Tian (2021) integrated the ISSM and TTF models to investigate the influence of essential factors on the intention to use enterprise social networks continuously. For other research, this model can be modified using other frameworks (Hafifah et al., 2019), such as Technology Acceptance Model (TAM) to describe the user's desire for and happiness with e-learning (Mohammadi, 2015), ERP critical success factor and TAM model to analysis ERP System in state-owned enterprise (Kautsar & Budi, 2020), and GAM to describe the utilization of MOOCs (Aparicio et al., 2019). The primary objective of both the ISSM and the TTF model is to provide practitioners with valuable insights to ensure that the necessary technology has a positive impact on users, aligns with the working atmosphere, achieves intended objectives, and enhances work/task efficiency and overall achievement (Gebauer et al., 2010; Goodhue & Thompson, 1995). This research aims to assess the effectiveness of ERP post-implementation and analyze the factors influencing the overall success of the ERP system by incorporating the TTF model within the ISSM framework. Combining these theories facilitates a comprehensive understanding of ERP system utilization and performance outcomes.

Information systems' deliberate, sustainable behavior can be explained using the TTF and ISSM models. These two models, however, take opposite stances. The TTF model neglects the quality criteria (system quality, information quality, and service quality) that significantly affect user satisfaction when forecasting ERP usage (Wu & Tian, 2021). Chuenyindee et al. (2022) contended that TTF is inadequate to appraise a good technology related to user behavior. On the other hand, the ISSM model has a disadvantage in the lack of consideration given to the compatibility between technology features and IS tasks, as pointed out by Wu and Tian (2021). Therefore, the authors developed a model by integrating TTF into ISSM to complement each other's shortcomings. With the integration of this model, the authors aim to see the impact of ERP on organizations as contained in the research question (RQ) in this study, namely:

RQ: What factors influence the success of ERP post-implementation at PT XYZ?

The following parts make up the study's structure. The discussion of the literature review and hypothesis formulation comes first. A description of the research technique used in this study follows. The study findings are then given, and a detailed research discussion follows. Finally, the study presents its findings, consequences, and recommendations for additional research.

THEORETICAL BACKGROUND

ENTERPRISE RESOURCE PLANNING (ERP)

ERP software unifies multiple company functions into the same database and architecture so that the data obtained by users is always consistent and accurate (Gavali & Halder, 2020). In the construction field, an abundance of coordination and communication dramatically affects the success of a project. Integrated systems are needed, and ERP is an integrated system facilitating interaction between front and back offices, which rely on each other to make informed decisions regarding new or ongoing endeavors (Rahayu et al., 2020). ERP makes these processes more visible to all divisions and departments and can be accessed transparently, reliably, and remotely to make it convenient to use and monitor projects, which obviously can save much time in documentation (Gavali & Halder, 2020). Therefore, ERP eliminates silos between functions/departments within the organization (Rahayu et al., 2020).

ERP offers numerous benefits to organizations, including increased profitability and performance growth, heightened competitiveness in the workplace, enhanced information quality and data exchange, software standardization, and decision-making support (Motiwalla & Thompson, 2011; Nkasu et al., 2022). The specific advantages of implementing ERP include the elimination of departmental silos, reduction of data duplication, improved transparency through real-time information sharing, easy access to data due to central repository location, increased organizational flexibility and worker efficiency, and improved planning, decision-making, and empowerment (Gavali & Halder, 2020; Rahayu et al., 2020).

ERP SYSTEM CHALLENGES

Construction companies, in particular, employ ERP systems to improve customer response, develop supply chain alliances, boost organizational adaptability, strengthen decision-making skills, reduce the project's completion duration, and cut expenditures (Tambovcevs, 2012). Nonetheless, the construction industry has several distinct characteristics that ERP vendors should consider. Construction is a highly fragmented sector, with specialized segments demanding specialist technologies. Several projects also influence it.

Although ERP has many advantages, ERP implementation has a high risk of failure and impacts the organization's core business (Shafi et al., 2019). Some user issues with ERP that are frequently reported are as follows: the user interface is difficult to understand, lack of help or feedback when problems occur, excess of fragmented information and data, trouble locating necessary information on the screen, missing data, including news, and imprecise notifications of errors, overly complex menus, problem in interface customization, and information and contextual data organization issues (Asif et al., 2022). Therefore, in its implementation, comprehensive supporting factors are needed: support from the organization's top leadership, business process alignment, involvement of potential users and affected parties, socialization and training of potential users, and support from vendors (Dissanayake & Thelijjagoda, 2022).

Implementing an ERP system is essential to ensure that planning progresses comprehensively and systematically, adapting to the organization's evolving requirements. The system's deployment to satisfy organizational and managerial expectations might be challenging due to ERP systems' uncertain, quick change. Based on existing literature (Hasan et al., 2019; Zach et al., 2014), it has been observed that the implementation of ERP systems in large-scale projects has encountered significant challenges, resulting in incomplete deployments because of wrong time and cost estimation. The literature revealed that a substantial number of ERP implementation endeavors had engaged failures primarily attributed to erroneous cost and time estimations; mainly, according to Zach et al. (2014), most organizations had insufficient financial resources.

Even though ERP systems are widely used and highly built, a substantial percentage of implementations fail (Chakravorty et al., 2016; Leu & Lee, 2017; Zerbino et al., 2017). Based on a survey conducted on ERP implementation, it was found that among 117 business organizations, 40% of ERP projects failed to achieve their intended goals in terms of business performance (Garg & Chauhan, 2015). Additionally, a study involving 64 "Fortune 500" corporations revealed that 25% encountered subpar performance of their ERP systems in the years following implementation (Ha & Ahn, 2014). Without question, businesses today, everywhere in the world, are continuously looking for ways to improve the organizational benefits of ERP and achieve the anticipated return on investment.

In terms of the whole implementation process, the post-implementation phase is crucial. It is important to note that the difficulties associated with ERP system development do not disappear after the system is up and running, as pointed out by Ali and Miller (2017). The post-implementation or exploitation stage is where the main issues begin, according to Willis & Willis-Brown (2002), who expand on the idea that the ERP system's "go-live" period does not mark the end of the ERP journey. Testing the system's efficacy, validating its stability, assuring data integrity, analyzing the system's utilization, and, most significantly, measuring and evaluating the benefits received from deployment are all part of the post-implementation stage.

Multiple academics have presented various study methods for measuring success factors (Amade et al., 2022; Asif et al., 2022; Dezdar & Ainin, 2011; Epizitone & Olugbara, 2020; Garg & Chauhan, 2015; Garg & Garg, 2014; Gavali & Halder, 2020; Jaya & Suroso, 2022; Kautsar & Budi, 2020; Zach et al., 2014), limited empirical studies have delved into the factors contributing to post-implementation success in ERP systems (Hasan et al., 2019). Therefore, it is crucial to focus specifically on the success factors of ERP post-implementation. These systems are vital in generating supportive information for organizational decision-making, resulting in time and cost efficiencies to attain desired performance targets (Atrushi et al., 2020). Additionally, ERP systems facilitate inter-departmental information sharing throughout the organization, enhancing overall business performance (Pan et al., 2007). Consequently, a comprehensive and conceptual research model must encompass various aspects and their impact, including decision support in the post-implementation phase. Hence, there is a need for an in-depth study that thoroughly examines the factors influencing the success of ERP post-implementation.

DeLone and McLean's Information System Success Model (ISSM)

The ISSM was initially developed by DeLone and McLean (1992), who proposed that system quality and information quality play pivotal roles in influencing user satisfaction and the intention to utilize information systems continuously. Since its inception, ISSM has been used to study the mobile information system's continuance behavior and continuance intention (Wu & Tian, 2021). According to research by Lin et al. (2019), ISSM has been widely used to assess willingness to use in various information systems after adding variables.

The ISSM encompasses six dimensions: information quality, system quality, service quality, intention to use/use, user satisfaction, and net benefits (Aldholay et al., 2018; DeLone & McLean, 1992, 2003, 2016). Delone and McLean previously refined the model by adding a new variable, service quality. It has been established through subsequent modifications that system, information, and service quality are the primary determinants influencing usage and user satisfaction. In contrast, usage and user satisfaction are the main factors that influence net benefits (DeLone & McLean, 2003). ISSM has developed dimensions on net benefits, namely personal and organizational impact (Hafifah et al., 2019).

Research has used ISSM to measure the success of adopting IS, including in ERP systems (Al-Okaily et al., 2021; Banafo Akrong, Yunfei & Owusu, 2022; Jaya & Suroso, 2022; Kala Kamdjoug et al., 2020; Kautsar & Budi, 2020). In its application, this model can be modified using other frameworks (Hafifah et al., 2019), such as the Technology Acceptance Model (TAM) to describe the user's desire for and happiness with e-learning (Mohammadi, 2015), ERP CSF and TAM to analysis ERP Systems in state-owned enterprises (Kautsar & Budi, 2020), GAM to describe the utilization of MOOCs (Aparicio et al., 2019), and Cheng (2019) employed the TTF model to investigate the factors that influence the continuation of cloud ERP usage.

Previous researchers explained that in the system, the intention to use dimension could be approached by measuring the dimensions of perceived usefulness to see the benefits and effectiveness of ERP (Al-Okaily et al., 2021; DeLone & McLean, 2016; Wu & Tian, 2021; Yuce et al., 2019; Yuduang et al., 2022). Similarly, Zhou (2016) found that system quality, information quality, and service quality are the main factors that impact user continuance usage of location-based services. According to Pang et al. (2020), the quality of the system, the quality of information, and the quality of service all play a role in the success of the exchange of knowledge systems. It can also affect continuance use intention and user satisfaction. In this study, the authors used the following six dimensions of the ISSM as follows: Information Quality (IQ), Service Quality (SQ), System Quality (SYQ), User Satisfaction (US), Perceived Usefulness (PU), and Organizational Impact (OI).

Task Technology Fit (TTF)

The TTF framework is one of the methodologies employed to evaluate the effectiveness of technology in facilitating work implementation within an organization (C. Park, 2019). Additionally, the TTF framework can gauge ERP implementation achievement within an organization (Hafifah et al., 2019). However, Task Technology Fit requires integration with other frameworks to measure dimensions not yet in Task Technology Fit (Ong et al., 2022). Figure 1 shows five dimensions in the framework: technology characteristics, task characteristics, utilization, performance impacts, and task technology fit (Goodhue, 1998; Goodhue & Thompson, 1995; Laumer & Eckhardt, 2012). In this study, the authors used the dimensions of technology characteristics and task characteristics as independent variables affecting task-technology fit as a mediator to look at system utilization and performance impacts. In the authors' proposed model, the utilization dimension is equivalent to the intention to use (approximated by PU), while performance impacts are net benefits matched by OI.

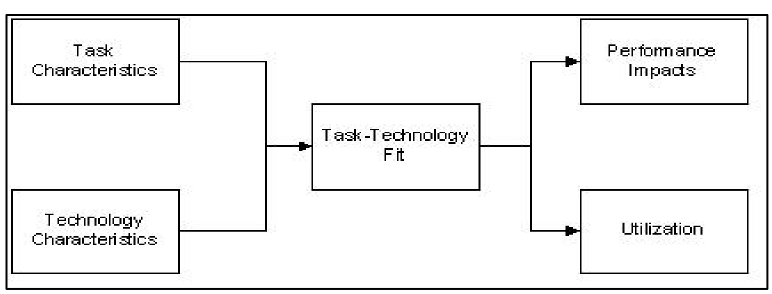

Figure 1. TTF framework (Goodhue, 1998; Goodhue & Thompson, 1995)

ISSM and TTF

The ISSM concept is a core theoretical framework in the ERP success measurement literature (Cheng, 2019; Kala Kamdjoug et al., 2020; Ouiddad et al., 2020). However, the majority of research has focused on measuring the performance of information systems in terms of individual impact rather than considering the overall organizational impact (Al-Okaily et al., 2021; Ghobakhloo & Tang, 2015; Harr et al., 2019), particularly within the ERP context (Ifinedo et al., 2010). The Task Technology Fit model is commonly used in the professional sector. TTF is utilized to measure technological suitability for a particular task, according to Yen et al. (2010). Every framework has benefits and drawbacks that are balanced and strengthened by merging. Because the ISSM and TTF frameworks are complementary, their integration helps study the impact of usage contribution and IS correction.

Furthermore, defects in both theories can be efficiently rectified by integrating them. In this regard, the ISSM pays little attention to how closely technology traits match work criteria (Anaama et al., 2022). The ISSM model has a disadvantage in the lack of consideration given to the compatibility between technology features and IS tasks, as pointed out by Wu and Tian (2021). On the other hand, the TTF model neglects the quality criteria (system quality, information quality, and service quality) that directly influence user satisfaction when forecasting ERP (Wu & Tian, 2021). TTF theories need to consider system quality, information quality, or service quality in terms of ERP Systems and individual satisfaction. Chuenyindee et al. (2022) contended that TTF is inadequate to appraise a good technology related to user behavior. Both the ISSM and the TTF model share the common objective of providing practitioners with information to ensure that the desired technology positively impacts users, aligns with the work environment, achieves intended purposes, and enhances task performance and overall success (Gebauer et al., 2010; Goodhue & Thompson, 1995). The combinatorial factors in both theories help our understanding of ERP System utilization and performance outcomes.

FORMULATION OF HYPOTHESES AND RESEARCH MODEL

FORMULATION OF HYPOTHESES

By incorporating the TTF model into the ISSM, this study aims to assess the effectiveness of ERP post-implementation and analyze the factors influencing the overall success of the ERP system by integrating the TTF model within the ISSM framework. The researchers created sixteen hypotheses based on these criteria, described in more detail in the section below.

User Satisfaction (US)

This dimension of user satisfaction measures how other dimensions can affect user satisfaction in completing tasks and the intensity of the use of information systems so that they can support organizational goals (Laumer & Eckhardt, 2012). This dimension is influenced by three quality dimensions, with a positive impact if the results on the three dimensions are high (Hafifah et al., 2019). This dimension positively affects the organizational impact dimension, requiring high satisfaction and willingness of information system users to maximize the positive impact on the organization (Motiwalla & Thompson, 2011). US is crucial because if users do not tend toward satisfaction, the utilization of IS will be less than optimal. In addition, this dimension does not necessarily affect each individual in the organization (Harr et al., 2019). Al-Okaily et al. (2021) state that the US affects organizational impact in their research with the ISSM model.

Information Quality (IQ)

This dimension measures the quality of information an information system produces (Hafifah et al., 2019). IQ evaluates whether the data produced by IS is relevant to what is needed, appropriate for when it is required, and accurate according to reality (Gavali & Halder, 2020).

Users will view the system as a helpful tool that may expand their capabilities if they believe it consistently gives correct and up-to-date information material so that they feel their specific demands are met (Chen et al., 2015; Cheng, 2019; Sun & Mouakket, 2015). Also, it demonstrated that user satisfaction with the system is likely to increase when they perceive the information to be up-to-date, precise, comprehensive, consistent, and relevant, coupled with a user-friendly and intelligible layout (DeLone & McLean, 2016; Pang et al., 2020).

Users may have lower expectations regarding the quality of information and believe that the system cannot adequately support their job tasks if these two information sources are discordant. Because IQ affects organizational performance, researchers include this dimension in the measurement model (Lin et al., 2019; Pang et al., 2020). In addition, Jaya and Suroso (2022) and Al-Okaily et al. (2021) prove that IQ is important in predicting IS success in an organization. Thus, we hypothesize that:

H1. IQ positively affects PU on ERP usage

H2. IQ positively influences US on ERP usage

H3. IQ positively influences TF on ERP usage

Service Quality (SQ)

SQ measures whether technical support for user problems is well resolved and whether users feel served with help, such as guidance, when initially using it (C. Park, 2019). Service quality is critical and is one of the success factors for implementing a new information system because users who are still adapting to new information systems are easier to provide resistance if they find it difficult (Pang et al., 2020). Sound system quality also affects user interest in other information systems and impacts the maximum utilization of new information systems (Pang et al., 2020).

For instance, providing high-quality service through the ERP system can raise user satisfaction and ERP benefits as perceived by the user. In other words, customers are satisfied with ERP services and feel that ERP is appropriate and consistent with their task requirements when they believe that ERP can offer important support. Thus, we hypothesize that:

H4. SQ positively influences PU on ERP usage

H5. SQ positively influences US on ERP usage

H6. SQ positively influences TF on ERP usage

System Quality (SYQ)

SYQ aims to measure the reliability of IS in processing given commands (C. Park, 2019). This dimension's assessments include response speed, user comfort, stability, and interface suitability (Lin et al., 2019). The elements in this dimension affect the efficiency of information systems, so the more powerful the SYQ, the more favorable the organizational performance (Pang et al., 2020). When users access the ERP system, and it is found that the system experiences slow response and has a poor interface, then users are unable to get into the system. Users have a high expectation of utilizing an ERP system of superior quality. Meeting this expectation can lead to user satisfaction.

Based on the mentioned above, Cheng (2019) and Al-Okaily et al. (2021) prove that SYQ affects perceived usefulness in ISSM, and Tam and Oliveira (2016), Lin et al. (2019), Wu and Tian (2021) and Al-Okaily et al. (2021) also prove that SYQ affects user satisfaction in measurements with ISSM. It has also been confirmed by the findings of previous studies conducted by Wu and Tian (2021), Tam and Oliveira (2016), Lin et al. (2019), and Cheng (2019), that SYQ positively influences TF ERP usage. Thus, we hypothesize that:

H7. SYQ positively influences PU on ERP usage

H8. SYQ positively influences US on ERP usage

H9. SYQ positively influences TF on ERP usage

Perceived Usefulness (PU)

This dimension comes from the expectation confirmation theory (ECT), which affects information system user satisfaction (Pang et al., 2020). PU measures the actual performance of the information system based on the user's perspective and compares it to their initial expectations of the system (Laumer & Eckhardt, 2012). High expectations encourage users to use information systems, and increased user satisfaction enables users to use these information systems regularly (Pringgandani et al., 2018).

The three dimensions of quality influence this dimension and have a positive effect if the results in the quality dimension are high. Besides that, this dimension also affects the user satisfaction dimension (Laumer & Eckhardt, 2012). Al-Okaily et al. (2021) and Cheng (2019) prove that PU is proven to affect user satisfaction with the ISSM approach. Thus, we hypothesize that:

H10. PU positively influences US on ERP usage

Technology Characteristic (TH)

This dimension of technological characteristics measures the completeness of the nonfunctional needs of the information system being implemented. Some examples of these broken needs are security, feature completeness, and performance resilience (Hafifah et al., 2019). These must-have technological characteristics are adjusted to the aspects of the information system used, extensive information systems such as ERP, where each organization will implement different modules (Laumer & Eckhardt, 2012). The combination of technology and task characteristics affects the use and performance of information systems (C. Park, 2019). Thus, we hypothesize that:

H11. TH positively influences TF on ERP usage

Task Characteristic (TC)

This dimension helps measure activities carried out by users to perform tasks and information needed to support organizational goals (Hafifah et al., 2019). These activities are estimated based on the complexity and variety of work and, together with the TH dimension, affect the dimensions of task technology fit (Lin et al., 2019). Complex tasks are not supported by information systems that are comfortable for users, making users reluctant to use the information system so that the work results are not maximized (Ong et al., 2022). Thus, we hypothesize that:

H12. TC positively influences TF on ERP usage

Task-Technology Fit (TF)

This dimension is the ultimate goal of the Task Technology Fit framework. This dimension has two predictor variables, namely TH and TC. In addition, previous research proved that TF could be influenced by three independent variables from ISSM (IQ, SYQ, SQ) (Lin et al., 2019). The integration of these two measurement models determines how much the user wants to continue using this information system and the sustainability of the benefits of implementing the information system (C. Park, 2019). Moreover, according to Cheng (2019) and Ong et al. (2022), TF is also proven to affect PU in their research. Thus, we hypothesize that:

H13. TF positively influences PU on ERP usage

Organizational Impact (OI)

The author of the ISSM model explained that the ultimate goal of ISSM is to see the net benefits or benefits obtained, which can be approached by individual and organizational impacts (DeLone & McLean, 2003, 2016). In this study, the authors used the OI approach as the ultimate goal to see the effect of ERP on the organizational scale of PT XYZ. This dimension is influenced by perceived usefulness, user satisfaction (Motiwalla & Thompson, 2011), and task technology fit (Gavali & Halder, 2020; Lin et al., 2019).

Based on specific empirical research on the relationship between perceived usefulness and organizational impacts, such as those by S. Park et al. (2011) and Abrego-Almazán et al. (2017), perceived usefulness affects the organization. Undoubtedly, an ERP that completes duties is viewed as more effective and essential, and it is predicted that a functional ERP can boost user satisfaction and organizational performance. Then, Al-Okaily et al. (2021) demonstrated that PU affects organizational impact in their research.

The dimension of user satisfaction positively affects the organizational impact, requiring high satisfaction and willingness of information system users to maximize the positive impact on the organization (Motiwalla & Thompson, 2011). User satisfaction is crucial because if users do not tend toward satisfaction, the utilization of IS will be less than optimal. In addition, this dimension does not necessarily affect each individual in the organization (Harr et al., 2019). Al-Okaily et al. (2021) state that the US affects organizational impact in their research with the ISSM model. Implementing information systems such as ERP is very influential on organizational performance, so it must be ensured that the information system implemented positively impacts the organization. Thus, we hypothesize that:

H14. PU positively influences OI on ERP usage

H15. US positively affects OI on ERP usage

H16. TF positively influences OI on ERP usage

Research Model

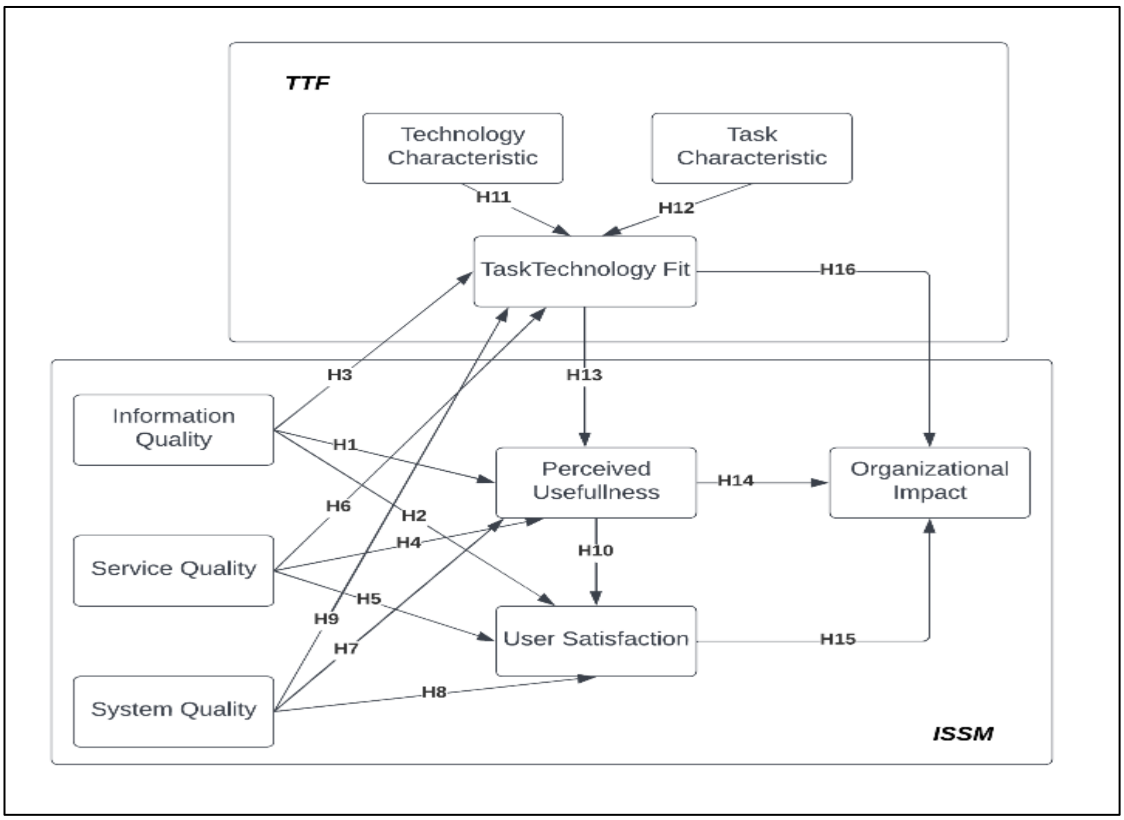

Figure 2. Hypotheses of investigation

The authors developed a model by integrating TTF into ISSM. TTF and ISSM are models for explaining information systems' intentional, sustainable behavior. However, these two models have different perspectives. TTF does not consider quality factors (SYQ, IQ, and SQ) directly affecting US predicting ERP usage (Wu & Tian, 2021). Chuenyindee et al. (2022) asserted that TTF is inadequate to evaluate a good technology related to user behavior. Meanwhile, according to Wu and Tian (2021), one limitation of the ISSM is the insufficient emphasis placed on the alignment between technology characteristics and tasks in IS. The authors propose 16 research hypotheses in this study, as illustrated in Figure 2.

RESEARCH METHODOLOGY

RESEARCH DESIGN

This research used a survey as the data collection instrument. Furthermore, the researchers used the Structural Equation Modeling (SEM) approach (Ullman & Bentler, 2012) to observe the relationship between one or more independent/dependent variables. For data analysis, the researchers employed SmartPLS 3 (Ringle et al., 2022), an application based on partial least squares (PLS). The investigation involved utilizing the PLS-SEM test (Hair et al., 2019) and one-tailed bootstrapping (Kock, 2014). Additionally, the authors followed the two-stage analysis approach suggested by Hair et al. (2019), which includes evaluating the measurement model (validity and reliability) and assessing the structural model (hypothesis testing).

This study aims to evaluate the success of ERP post-implementation in which there was one endogenous variable, OI. Based on Figure 3, the study had nine variables: IQ, SQ, SYQ, PU, US, TC, TH, TF, and OI. Sixteen relationships have been developed as hypotheses for estimating the relationship between variables.

An inquiry was constructed using prior scholarly investigations to assess the research framework, as indicated in Table 1, and the complete list of questionnaires with indicators and reference sources can be seen in Appendix A.

Table 1. Survey indicator

Indicators	The Research Literature
Information Quality System Quality Service Quality	Cheng, 2019; DeLone & McLean, 1992, 2003, 2016; Laumer & Eckhardt, 2012; Wu & Tian, 2021; Yuce et al., 2019
User Satisfaction	Al-Okaily et al., 2021; Cheng, 2019; DeLone & McLean, 1992, 2003, 2016; Laumer & Eckhardt, 2012
Perceived Usefulness	Al-Okaily et al., 2021; DeLone & McLean, 2016; Gumasing et al., 2022; Yuduang et al., 2022
Organizational Impact	Al-Okaily et al., 2021; DeLone & McLean, 2003, 2016
Task Characteristic Technology Characteristic	Laumer & Eckhardt, 2012; Wu & Tian, 2021
Task Technology Fit	Laumer & Eckhardt, 2012; Wu & Tian, 2021; Yuce et al., 2019

RESEARCH INSTRUMENTS

This investigation employed a closed-ended survey employing a 5-point Likert scale (1: strongly disagree, 2: disagree, 3: undecided, 4: agree, 5: strongly agree) to assess the cause-and-effect connection between the variables delineated in Figure 1 of the research model. The research survey was bifurcated into two sections. The first part contained respondent information such as department/section/division of workplace, gender, age, educational background, and PT XYZ's employment period. The second part contained 95 question items used as indicators to estimate the nine latent variables in the research model. The question items used in the second part were derived from the literature reviewed by the authors and previous studies with sufficient modifications. The complete list of questionnaires can be seen in Appendix A. Figure 3 showcases the research model employed by the authors to evaluate the nine latent variables.

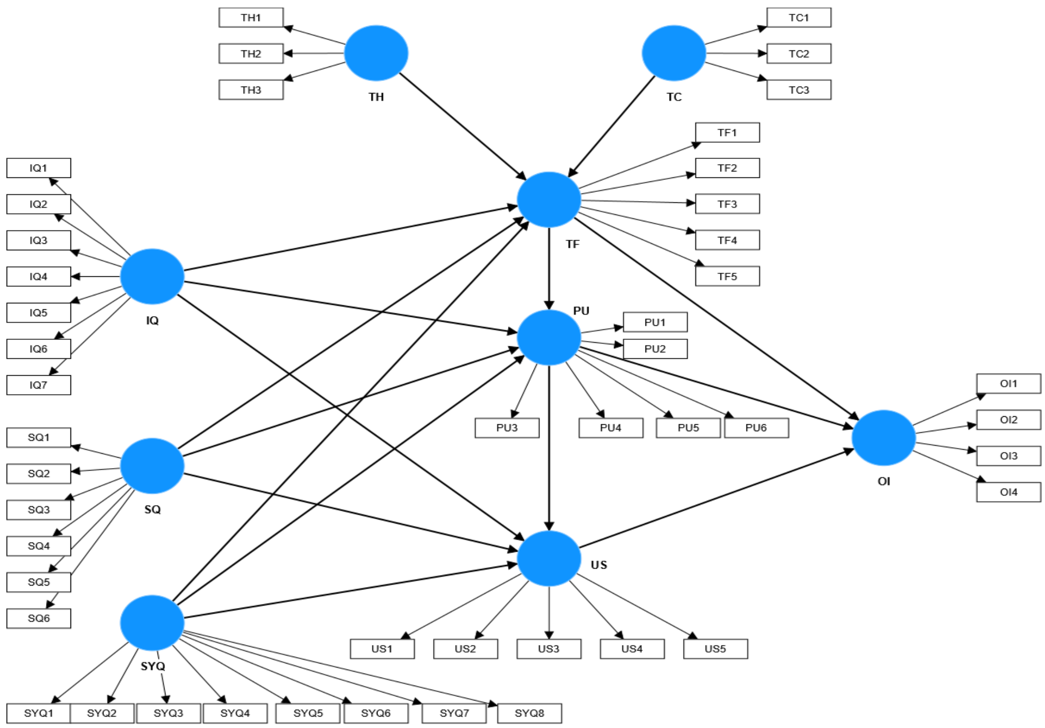

Figure 3. Preliminary research model

SAMPLE CHARACTERISTICS

The researchers distributed questionnaires online to 115 ERP users at PT XYZ for this study. The duration of data collection was November 2-8, 2022. The authors guarantee the confidentiality of respondents' answers to obtain objective results and successfully get responses from 95 ERP users. To check whether the sample obtained meets the minimum sample of the population, the researchers use Slovin's formula in Equation 1, which is used with a confidence interval of 95% or 5% of margin error (Tejada et al., 2012).

The determination of the sample size is conducted using Slovin's formula. It should be noted that Slovin's formula is applicable solely for estimating a population proportion with a confidence coefficient of 95%. Furthermore, it is ideal only when the population percentage is anticipated to be near 0.5 (Tejada et al., 2012). Slovin's formula denotes the sample size by *n* and is provided by:

$$n = \frac{N}{1+Ne^2} \qquad \text{(Equation 1)}$$

Here, *n* represents the number of samples, *N* denotes the population size, and *e* signifies the degree of error or margin of error. So, with a population of 115 ERP users, a confidence level of 95%, and a degree of error of 5%, the minimum sample size that must be met in this study is 89. Thus, the researchers state that the samples obtained in the study have completed the minimum sample size threshold.

In Table 2, the authors describe the distribution of the samples obtained. Most respondents came from the Toll Road Development department/division/section (44.21%). In addition, the majority of respondents in this study were male (87.40%). Moreover, a significant portion of the participants falls within the age ranges of 31-40 years, constituting 51.60%, and 20-30 years, comprising 32.60% of the total respondents. For educational background, 80% of respondents had a Diploma IV/S1 educational background. As for the working period, most respondents have worked for 5-10 years at PT XYZ.

Table 2. Summary of respondent characteristics

Category		Amount	%
Department/Division/Section	PJT	42	**44.21**
	AK	4	**4.21**
	OPT	5	**5.26**
	EPC	7	**7.37**
	HKI	7	**7.37**
	Building	1	**1.05**
	SIT	11	**11.58**
	DSU	13	**13.68**
	PBI	1	**1.05**
	PBK	1	**1.05**
	RJT	3	**3.16**
Gender	Male	83	**87.40**
	Female	12	**12.60**
Age (years)	20–30	31	**32.60**
	31–40	49	**51.60**
	41–50	13	**13.70**
	>51	2	**2.10**
Education	High School/Equivalent	2	**2.10**
	Diploma III	3	**3.20**
	Diploma IV/S1	80	**80.00**
	S2/Magister	14	**14.70**
	S3/ Doctoral	0	**0.00**
Working Period (years)	<5	20	**21.10**
	5–10	54	**56.80**
	11–20	19	**20.00**
	>20	2	**2.10**

Data Analysis And Results

Measurement Model Assessment

Four methods of evaluation for the PLS-SEM measurement model were proposed by Hair et al. (2017) and Hair et al. (2019): measuring loadings, validity based on discrimination, validity based on convergence, and internally consistent reliability.

The initial step in assessing the measurement approach is to verify that the factor of load value in the research model is above 0.7 (Hair et al., 2017). Measure the construct's reliability, CR value, and Cronbach alpha or CA value to evaluate the measurement method's reliability (Hair et al., 2017). In order to meet the criteria for the reliability test, the values of CR and CA should surpass 0.7 (Hair et al., 2017). Cronbach's alpha underestimates PLS-SEM because of its sensitivity to the number of elements on the scale (Hair et al., 2019). To assess the internal consistency of all constructs, it is suggested to determine composite reliability (CR). Values of CR below 0.7 are considered unacceptable by Hair et al. (2019).

In line with Fornell and Larcker (1981), establishing the validity comes after conducting the reliability test, wherein the Average Variance Extracted (AVE) outcome is examined. The AVE value of each construct needs to exceed 0.5, while the item loading should be at least 0.707, as Hair et al. (2019) suggested. By employing an iterative approach to eliminate indicators with a loading factor of 0.70, one can determine the values of CA (Composite Reliability), CR (Construct Reliability), and AVE.

Reflective Indicator Loadings

The reflective indicator loading that must be met in SEM is >0.700 (Hair et al., 2019). Hair et al. (2017) use indicators of a reflective construct to evaluate the same construct in a novel way. The accompanying signs on a project are more common as the outside loadings increase. According to Hair et al. (2017), the outer loading of an indicator is recommended to exceed 0.708, although, in many cases, a value of 0.700 is considered acceptable. Hair et al. (2017) also suggest removing reflective indicators when their outer loading is 0.40. However, if the outer loading falls between 0.40 and 0.70, further examination is required to determine if there is an increase in the average variance extracted (AVE).

Appendix B shows that several indicators do not meet the requirements (IQ4, PU5, SYQ1, and SYQ2), so these indicators were eliminated from the research model.

After eliminating invalid indicators, the results of reflective indicator loading were obtained by the requirements and were at a value of >0.700, as shown in Appendix C. In addition, based on Appendix D, changes in average variance extracted (AVE) occur in variables suspected of using indicators (Hair et al., 2019).

Discriminant Validity

Discriminant validity evaluates the degree to which a latent variable demonstrates dissimilarity or distinction from other variables and is calculated using the HTMT, Fornell-Larcker, and Cross-Loading methods (Hair et al., 2019). If the HTMT value is above 0.900, the variables are similar (lack of discriminant validity) (Hair et al., 2019). In Appendix E, five variable correlations still have a value above 0.900, including PU-OI, TH-OI, TH-PU, TH-TF, and US-TF. Therefore, the authors reassessed the indicators used in the study to eliminate those suspected to be similar.

The authors used the method to see the similarity of indicators by correlating problematic indicators, namely PU-OI, TH-OI, TH-PU, TH-TF, and US-TF. Based on Appendix F, some indicators have a strong correlation/influence, so they were suspected to be similar. Therefore, the authors eliminated several indicators alleged to be equal, including PU6, TH2, TH3, OI3, TF1, and TF3. The model was retested to determine reflective indicator loading and discriminant validity.

Based on Appendix G, discriminant validity has been achieved where no variable has an HTMT value above 0.900. The highest HTMT value that the authors found was between US and TF at 0.899, and the smallest HTMT value was in the relationship between TC and IQ at 0.515.

The authors also looked at the Fornell-Larcker test in Appendix H to strengthen discriminant validity. It can be seen that no values exceed the average root variance extracted (AVE) set. For example, the OI value of IQ is 0.627, which is lower than the root AVE of IQ of 0.822. Thus, with these two tests, the authors stated that the research model had discriminant validity.

Convergent Validity

Model validity is a subject linked to convergence validity, which states that variables from trials that are similar or identical concepts should have strong ties to one another (Hair et al., 2019). The authors of this study assessed the appropriateness of the combination using SmartPLS to measure the Average Variance Extracted (AVE) (Hair et al., 2019). Thus, the AVE limit that the variables in the model must achieve must be above 0.500 or determine 50% of the variance (Hair et al., 2019). The AVE values above 0.500 for all variables are observable in Table 3.

Table 3. Reflective indicator loadings, internal consistency reliability, and convergent validity

Dimen-sions	Indicator	Loading	Alpha	CR	AVE	Dimen-sions	Indicator	Loading	Alpha	CR	AVE
IQ	**IQ1**	0.850	0.903	0.926	0.676	**US**	**US1**	0.868	0.940	0.954	0.806
	IQ2	0.895					**US2**	0.900			
	IQ3	0.816					**US3**	0.920			
	IQ5	0.716					**US4**	0.904			
	IQ6	0.795					**US5**	0.896			
	IQ7	0.849				**PU**	**PU1**	0.911	0.925	0.947	0.817
SQ	**SQ1**	0.779	0.904	0.926	0.676		**PU2**	0.933			
	SQ2	0.811					**PU3**	0.899			
	SQ3	0.771					**PU4**	0.873			
	SQ4	0.854				**TC**	**TC1**	0.881	0.822	0.894	0.738
	SQ5	0.850					**TC2**	0.901			
	SQ6	0.864					**TC3**	0.792			
SYQ	**SYQ3**	0.811	0.909	0.929	0.687	**TH**	**TH1**	1	-	-	-
	SYQ4	0.864				**TF**	**TF2**	0.864	0.858	0.914	0.779
	SYQ5	0.813					**TF4**	0.878			
	SYQ6	0.825					**TF5**	0.905			
	SYQ7	0.865				**OI**	**OI1**	0.890	0.890	0.932	0.821
	SYQ8	0.792					**OI2**	0.940			
							OI4	0.887			

Internal Consistency Reliability

To evaluate the consistency of findings across indicators, Composite Reliability (CR) was performed. The authors considered Cronbach's Alpha (Alpha) and CR in this methodology. Hair et al. (2019) argued that Alpha and CR values were expected to be >0.700. Table 3 presents the study's Alpha and CR reports; all variables had values above 0.700. IQ had an Alpha of 0.903 and a CR of 0.913. SQ had a value of 0.904 and 0.906 on Alpha and CR. Furthermore, SQ had an Alpha value of 0.909 and a CR of 0.910. For PU, Alpha is 0.925, and CR is 0.927. US had an Alpha value of 0.940 and a CR of 0.941. In Table 3, TTF, TC had an Alpha value of 0.822 and a CR of 0.835. TF had a CR of 0.858 and a CR of 0.859. As a result, OI had an Alpha value of 0.890 and a CR of 0.891. Thus, Figure 4 displays the authors' research model for estimating the hypothesis.

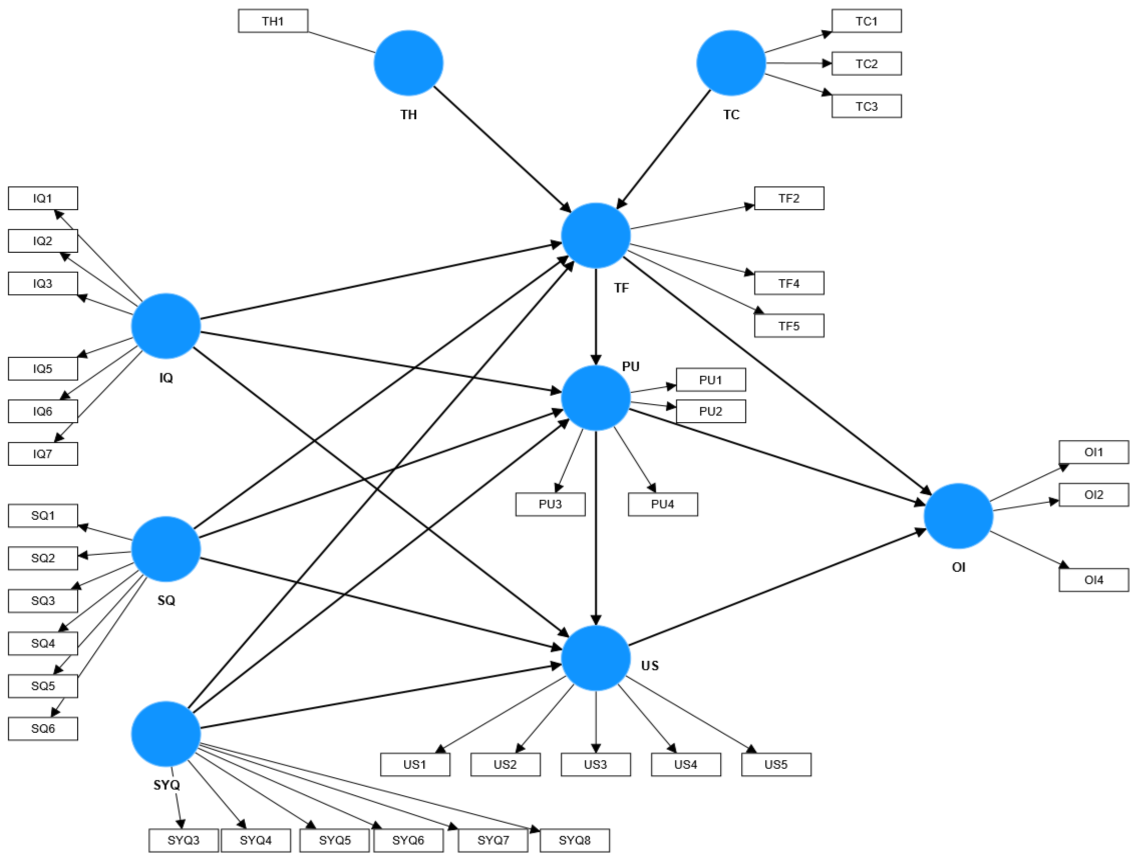

Figure 4. The valid and reliable research model

Structural Model Assessment

The authors investigated the significance of the direct effect or hypothesis in the structural model by analyzing the path coefficient (β), t-value, and p-value. The results of the bootstrapping procedure using 5,000 samples can be seen in Table 4, which describes the hypothesis, relationship, path, t-value, and p-value. Table 4 shows that the authors investigated 16 hypotheses across nine dimensions, with ten accepted and six rejected. If the p-value is less than 0.10 and the t-value is more than 1.96, the factors prove influential, and the hypothesis is accepted.

Six hypotheses from this study were rejected, and the tests resulted in ten failed theories being accepted. The six left hypotheses state that IQ does not affect US or TF (H2 and H3). In addition, the SQ dimension did not influence the three predicted variables: PU, US, and TF (H4-H6). Finally, TC did not affect the TF of ERP usage (H12).

Then, of the ten accepted hypotheses, six were obtained with $p < 0.01$: H8, H9, H10, H11, H13, and H14. At $p < 0.05$, there were three accepted hypotheses, namely H1, H15, and H16. Finally, H7 was accepted with $p < 0.10$ in the authors' statistical test. So, from this test, the variables that affected PU were IQ, SQ, and TF. Meanwhile, the variables that influenced US in using ERP were SQ and PU. SQ and TC were proven to affect the TF variable. Then, in seeing the impact of ERP on PT XYZ, the OI variable was influenced by PU, TF, and US in using ERP.

Table 4. Research hypothesis test results

Hypothesis	Relationship	Path (β)	t-value	p-value	Result
H1	IQ → PU	0.202	1.684	0.046	Accepted **
H2	IQ → US	0.048	0.437	0.331	**Rejected**
H3	IQ → TF	0.015	0.169	0.433	**Rejected**
H4	SQ → PU	0.030	0.199	0.421	**Rejected**
H5	SQ →US	0.054	0.414	0.339	**Rejected**
H6	SQ → TF	0.052	0.555	0.289	**Rejected**
H7	SQ → PU	0.201	1.306	0.096	Accepted ***
H8	SQ → US	0.439	3.609	0.000	Accepted *
H9	SQ → TF	0.382	3.978	0.000	Accepted *
H10	PU → US	0.384	3.746	0.000	Accepted *
H11	TC → TF	0.538	7.491	0.000	Accepted *
H12	TC → TF	-0.003	0.044	0.482	**Rejected**
H13	TF → PU	0.461	4.361	0.000	Accepted *
H14	PU → OI	0.403	3.901	0.000	Accepted *
H15	US → OI	0.248	1.963	0.025	Accepted **
H16	TF → OI	0.265	2.182	0.015	Accepted **

Note: * $p < 0.01$; ** $p < 0.05$, *** $p < 0.10$

DISCUSSION

We can note that of the 16 hypotheses tested in this study, six rejected theories, such as H2, H3, H4, H5, H6, and H12, as shown in Table 4. Six of the ten accepted hypotheses were obtained at a significance level of 1%, three at a significance level of 5%, and one at a significance level of 10%. The study's findings are summarized as follows.

The statistical analysis revealed that the IQ (p-value = 0.046; p < 0,05) provided by the ERP system positively influenced the perceived ease of users in operating ERP, which implies that H1 was supported. This finding supported research by Jaya and Suroso (2022) and Al-Okaily et al. (2021). This outcome suggests that users may have a negative impression of the ERP system if presented with erroneous, meaningless, haphazard, or unconnected data. On the other hand, users will be pleased with the information they receive when the ERP system provides exhaustive, precise, fresh, and reliable data. Similar conclusions have been drawn from prior studies (Wibowo et al., 2023; Wu & Tian, 2021), suggesting that information quality is a good predictor of value.

The findings of correlations between IQ and US, as well as IQ and TF, were quite surprising. No connection was discovered between IQ and US, as well as IQ and TF. The data indicated that IQ was not statistically significant concerning the US (p-value = 0.331; p > 0.10) and TF (p-value = 0.433; p > 0.10). As a result, H2 and H3 were not approved. According to the findings, SQ and PU were the most essential constructs in describing satisfaction in the ERP system. Furthermore, the most crucial constructs in understanding the task technology fit in the ERP System were SQ and TC. A plausible reason could be that in developing countries with relatively inadequate IT infrastructure compared to developed countries, the lack of sufficient technical guidance provided by IS (Information Systems) departments may lead to ERP users investing additional time and effort in verifying poor quality or irrelevant information. That possibly will have a detrimental impact on their productivity and user experience. ERP users may believe that businesses are unable to offer them high-quality information. Furthermore, insufficient information quality hampers the exchange of information and the establishment of shared understanding. Consequently, organizations should prioritize real-time information updates within ERP systems, ensuring accuracy while avoiding unnecessary information recommendations to users.

Another notable element of our findings was that in hypotheses H4, H5, and H6, we discovered that SQ did not affect the PU (p-value = 0.421; $p > 0.10$), US (p-value = 0.339; $p > 0.10$), and TF (p-value = 0.289; $p > 0.10$). These findings contradicted the findings of Pang et al. (2020) and Tam and Oliveira (2016) but were consistent with past research such as Wu and Tian (2021). According to Wu and Tian (2021), SQ had no substantial effect on PU, US, or TF. This conclusion is likely the result of the following factors. A potential reason could be that users perceive ERP systems as lacking utility or not beneficial. In terms of accuracy and speed, the service is not valuable enough, leaving users dissatisfied with the services provided, and users believe that ERP is not appropriate and consistent with their task requirements, although believing that ERP can provide vital support. They believe the ERP system does not address all areas of their work responsibilities.

Next, the statistical analysis revealed that the SYQ did not affect the PU (p-value = 0.096; $p > 0.10$), US (p-value = 0.000; $p > 0.01$), and TF (p-value = 0.000; $p > 0.01$), which supports H7, H8, and H9. The results of our investigations supported previous findings on SYQ and their positive effects on PU (Al-Okaily et al., 2021; Cheng, 2019), US (Al-Okaily et al., 2021; Lin et al., 2019; Tam & Oliveira, 2016; Wu & Tian, 2021), and TF (Cheng, 2019; Lin et al., 2019; Tam & Oliveira, 2016; Wu & Tian, 2021). This finding aligns with Seddon's (1997) research, which identified system quality as a crucial factor influencing usefulness and satisfaction. Having user-friendly hardware, software, and error-free systems is critical in achieving high user satisfaction and productivity levels. In essence, system quality significantly improves user performance, such as productivity and time saved on tasks, thereby contributing to overall happiness. The elements in this dimension affect the efficiency of information systems, so the higher the SYQ, the greater the organizational performance (Pang et al., 2020). When users access the ERP system, and it is found that the system experiences slow response and has a poor interface, then users cannot use the system. Users expect to use an ERP system with high quality. When this expectation is achieved, then user satisfaction may be performed.

Similar to other findings, an essential aspect of our results is that we observed the impact of PU on the US (p-value = 0.000; $p > 0.01$) and OI (p-value = 0.000; $p > 0.01$) in hypotheses H10 and H14. The results of our investigations supported previous findings on PU and their positive effects on the US (Al-Okaily et al., 2021; Cheng, 2019) and OI (Al-Okaily et al., 2021). This implies that users' expectations of the ERP system's usefulness play a crucial role in determining whether or not their performance improves. Thus, users' satisfaction levels rise when they recognize the system as valuable and beneficial. Similarly, perceiving the ERP system as valuable leads to improved internal effectiveness, decision-making processes, productivity, competitiveness, and lower operational expenses. Consequently, these improvements contribute to enhanced business performance.

On the other hand, TC did not affect the TF (p-value = 0.000; $p < 0.01$). This finding supported research by Wu and Lee (2017) and Wu et al. (2021). Users will believe that an ERP system is helpful if its functions can meet their work requirements. In other words, the ERP system should plan its future development in line with corporate and user demands and consider the alignment between users' task requirements and the features offered by the ERP system. This enables the provision of functionalities that better align with the users' needs and the organization's overall task requirements.

We also discovered that in H12, TC did not affect TF (p-value = 0.482; $p > 0.10$). This finding contradicts Wu and Tian (2021). According to Ong et al. (2022), complex tasks are not supported by information systems that are comfortable for users, making users reluctant to use the information system so that the work results are not maximized. When the functionalities of an ERP system effectively meet the requirements of users' tasks. When an ERP system's features fully accommodate users' needs, everyone involved in the workflow benefits. Users not only perceive the system as valuable but also display a willingness to sustain its usage, thereby impacting the overall success of the ERP. Consequently, organizations should align their future development strategies with users' needs, ensuring that the functionalities of the ERP system closely match their task requirements. This approach will provide functions that better align with users' task needs.

In H13, PU is positively influenced by TTF (p-value = 0.000; $p < 0.01$), which aligns with previous research findings (Al-Maatouk et al., 2020; Cheng, 2019; Crespo et al., 2023; Ong et al., 2022). It was observed that the ERP system used by the users effectively matched the requirements of their tasks, enabling them to complete their respective assignments. As individuals perceive technology as necessary for task completion, it becomes the most influential factor. This implies that individuals perceive improved performance when there is a strong alignment between the task and the utilized tool (Diar et al., 2018). A study conducted by Rai and Selnes (2019) demonstrated a 79% adoption rate of technology when it was considered suitable for users to accomplish their tasks.

The findings depicted in Table 4 demonstrate a clear and significant positive correlation between US and OI (p-value = 0.025; $p < 0.05$), confirming hypothesis H15. This outcome highlights the observation made by DeLone and McLean (2003), who emphasized the influential role of satisfaction in determining the benefits for an organization. This result aligns with previous empirical studies (Al-Okaily et al., 2021; Wibowo et al., 2023), supporting this association. In conclusion, when users express a high degree of ERP, user satisfaction influences user performance. As a result, the company's performance is enhanced regarding productivity, competitiveness, decision-making processes, and internal efficiency.

From a methodological standpoint, this study integrates ISSM with the task technology fit model to illuminate the effectiveness of an organization's ERP system. This finding supported research by Lin et al. (2019) and Tam and Oliveira (2016). Our results reveal that having a positive TTF on OI (p-value = 0.015; $p < 0.05$) indicates that the impact of use on individual performance will be greater. The exact implications of hypothesis H15, if ERP system users believe that the service meets their task needs, they will gain power and continue to use this information system, resulting in the sustainability of the benefits of implementing the information system, as well as improved firm productivity, competitiveness, decision-making processes, and efficiency within the organization, boosting firm performance.

With the findings that the dimensions of PU, US, and TF positively affected organizations, such as based on the PU dimension, organizations can maintain the performance of the ERP system and conduct training for each new user. All personnel in charge of the system should also receive regular and consistent training from the organization. Using human resources in this system will be more optimal if all employees acquire the same qualified training and expertise so that users' expectations can always be met by the reality obtained from the ERP system. Various kinds of training need to be designed, for instance, general ERP architectural training, department training on particular tasks, feedback forums on training effectiveness, etc. Based on the US dimension, organizations can conduct regular user satisfaction surveys so that user satisfaction is constantly measured and expectations always increase. Then, based on the TF dimension, organizations can make an SLA so that the ERP system always has performance, security, and reliability that is maintained and measurable.

Conclusions, Implications, and Limitations

Conclusion

This research aims to assess the effectiveness of ERP post-implementation and analyze the factors influencing the overall success of the ERP system. Although this research is not commonly applied, it needs to be done to explore the benefits of using ERP, which affects the impact on the company so that the results obtained will be helpful and essential for researchers and IS practitioners in the future – considering the high failure rate in the use of ERP in a company, as well as the inability of organizations and companies to exploit the benefits and potential that ERP can provide fully.

The research model was developed and verified by integrating the ISSM and TTF models to provide a more complex understanding of the impact of ERP use on the PT XYZ company. The findings demonstrated strong support for the research model, confirming the validity of the authors' proposed model through the Structural Equation Modeling (SEM) approach. ERP post-implementation success was evaluated through nine dimensions: IQ, SYQ, SQ, PU, US, TH, TC, TF, and OI. The authors tested 16 hypotheses across nine dimensions, finding ten accepted and six rejected. The results of the accepted hypotheses showed that PU, US, and TF positively effect on organizational impact dimension.

IMPLICATIONS

In this study, there are two main implications, namely, theoretical and practical.

Theoretically, the authors propose a novel approach to measuring ERP post-implementation success by combining the ISSM and TTF models. The authors have examined the factors that influence the success of ERP implementation in the construction sector. The authors' proposed model explained how ERP impacted the organizational impact dimension. Additionally, with the model's specification of the dimension (PU), the authors proved how the system's perceived usefulness was influenced by exogenous variables and proved successful as a dimension that explained the intention to use/use the system. Ultimately, the model proposed by the authors can be grounded by other researchers in measuring ERP post-implementation success in an organization, encourage the continued growth of research on ERP usage in a company, and be of outstanding academic importance to research the entire subject of information systems. Therefore, future researchers can use this combined model to study ERP post-implementation success on organizational impact with ERP systems in other company information systems fields, especially the construction sector.

Practically, this research outlines the factors that should be the center of attention when implementing ERP. This study found that PU, US, and TF were predictive factors influencing the organizational impact of ERP use at PT XYZ company. The findings supported the notion that PU was the dimension that had the most substantial direct influence on OI with ERP systems. The results helped policymakers and CEOs of businesses in Indonesia's construction sector create better business strategies and use limited resources more effectively and efficiently to provide a considerably higher probability of ERP deployment. The findings of this study were also beneficial for ERP vendors and consultants. The construction of the industry has specific characteristics that ERP vendors should consider. Construction is a highly fragmented sector, with specialized segments demanding specialist technologies. Several projects also influence it. They can use them to identify and establish several alternative strategies to deal with challenges and obstacles that can arise during the installation of ERP in a firm. Vendors and consultants can supply solutions, architecture, or customization support by the standard operating criteria, implement the ERP system and train critical users. The ERP system vendors and consultants can also collaborate with experts from the construction sector to develop customized alternatives for construction companies. That would be the most outstanding solution for implementing ERP in this industry.

LIMITATIONS AND SUGGESTIONS

In this study, the authors highlighted three fundamental limitations and recommendations for further research. Firstly, there were limitations in sample size and the type of organizations studied. With a small sample size and organizational locus in this study, it is possible to have different results in another locus. The authors suggest increasing the sample size with a larger population at other loci (private and state-owned) that use ERP to see the factors influencing ERP post-implementation success.

Secondly, this study only ran quantitative methods for measuring success using mixed methods to produce a better understanding. With mixed methods, it is possible to get better results by adding unique factors to the research.

Thirdly, the authors integrated only two models (ISSM and TTF) in this study. Future integration of other models can be used to improve the proposed model. Integration with models that assess the level of IS acceptance, such as Technology Acceptance Model 3 (TAM3) or Unified Theory of

Acceptance and Use of The Technology 2 (UTAUT2), can be used in future research to deepen the exploration of factors that influence ERP post-implementation success in an organization.

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APPENDIX A: RESEARCH QUESTIONNAIRE

Dimensions		Questions	References
Respondent Information	**INF1**	Department/Division/Section	-
	INF2	Gender: Male/Female	-
	INF3	Age (in years): 20-30; 31-40; 41-50; >51	-
	INF4	Last education: SMA/equivalent; D3; D4/S1; S2; S3	-
	INF5	Work Period (in years): <5; 5-10; 11-20, >20	-
Information Quality (IQ)	**IQ1**	I can get accurate information from ERP	(DeLone & McLean, 1992, 2003, 2016), (Cheng, 2019)
	IQ2	I can get the data I need quickly with the help of ERP	(DeLone & McLean, 1992, 2003, 2016), (Cheng, 2019)
	IQ3	ERP can give me fresh, current, and adequate information	(DeLone & McLean, 1992, 2003, 2016), (Cheng, 2019)
	IQ4	The ERP provides information in an easily understandable format	(DeLone & McLean, 1992, 2003, 2016), (Laumer & Eckhardt, 2012)
	IQ5	The ERP's information is simple to interpret	(DeLone & McLean, 1992, 2003, 2016), (Laumer & Eckhardt, 2012)
	IQ6	The information from the ERP appears to be well-formatted, readable, and straightforward.	(DeLone & McLean, 1992, 2003, 2016), (Laumer & Eckhardt, 2012)
	IQ7	The ERP provides concise information	(DeLone & McLean, 1992, 2003, 2016), (Laumer & Eckhardt, 2012)
Service Quality (SQ)	**SQ1**	ERP has a problem-solving mechanism service	(DeLone & McLean, 1992, 2003, 2016), (Laumer & Eckhardt, 2012)
	SQ2	You feel safe in your activities with ERP	(DeLone & McLean, 1992, 2003, 2016), (Laumer & Eckhardt, 2012)
	SQ3	The ERP's service quality exceeds my expectations	(DeLone & McLean, 1992, 2003, 2016), (Wu & Tian, 2021)
	SQ4	Overall, the ERP offers good service quality	(DeLone & McLean, 1992, 2003, 2016), (Wu & Tian, 2021)
	SQ5	For me, the ERP offers dependable service	(DeLone & McLean, 1992, 2003, 2016), (Wu & Tian, 2021)
	SQ6	The ERP can answer my request quickly	(DeLone & McLean, 1992, 2003, 2016), (Wu & Tian, 2021)

Dimensions		Questions	References
System Quality (SYQ)	**SYQ1**	Using the ERP is simple	(DeLone & McLean, 1992, 2003, 2016), (Laumer & Eckhardt, 2012)
	SYQ2	Learning the ERP is simple	(DeLone & McLean, 1992, 2003, 2016), (Laumer & Eckhardt, 2012)
	SYQ3	The ERP satisfies business needs	(DeLone & McLean, 1992, 2003, 2016)
	SYQ4	The ERP has all the necessary features and capabilities	(DeLone & McLean, 1992, 2003, 2016), (Laumer & Eckhardt, 2012)
	SYQ5	The ERP always carries out its duties	(DeLone & McLean, 1992, 2003, 2016), (Laumer & Eckhardt, 2012)
	SYQ6	It is simple to modify the ERP user interface to suit one's strategy	(DeLone & McLean, 1992, 2003, 2016), (Laumer & Eckhardt, 2012)
	SYQ7	The ERP has full integration and consistency across all of its data	(DeLone & McLean, 1992, 2003, 2016), (Laumer & Eckhardt, 2012)
	SYQ8	The ERP is simple to alter, fix, or enhance	(DeLone & McLean, 1992, 2003, 2016), (Laumer & Eckhardt, 2012)
User Satisfaction (US)	**US1**	I am happy with the performance of our ERP system.	(DeLone & McLean, 1992, 2003, 2016), (Laumer & Eckhardt, 2012)
	US2	I am pleased with the accuracy of our ERP information.	(DeLone & McLean, 1992, 2003, 2016), (Pang et al., 2020)
	US3	I am content with the caliber of our ERP services.	(DeLone & McLean, 1992, 2003, 2016), (Al-Okaily et al., 2021)
	US4	I am happy with our ERP overall.	(DeLone & McLean, 1992, 2003, 2016), (Cheng, 2019), (Al-Okaily et al., 2021)
	US5	I am content with the features that ERP offers.	(DeLone & McLean, 1992, 2003, 2016), (Cheng, 2019)
Perceived Usefulness (PU)	**PU1**	ERP raises the level of user output.	(Al-Okaily et al., 2021; DeLone & McLean, 2016)
	PU2	ERP improves user output.	(Al-Okaily et al., 2021; DeLone & McLean, 2016)
	PU3	ERP increases user productivity	(Al-Okaily et al., 2021; DeLone & McLean, 2016)
	PU4	ERP is helpful for user work, and I find it user-friendly.	(Al-Okaily et al., 2021; DeLone & McLean, 2016)
	PU5	My communication with the ERP is understandable and transparent.	(Wu & Tian, 2021; Yuce et al., 2019)
	PU6	ERP raises the level of user output.	(Gumasing et al., 2022; Yuduang et al., 2022)
Task Characteristic (TC)	**TC1**	I require document storage and sharing at all times and locations.	(Laumer & Eckhardt, 2012; Wu & Tian, 2021)
	TC2	Whenever and anyplace information must be published.	(Laumer & Eckhardt, 2012; Wu & Tian, 2021)
	TC3	I must stay in constant contact with my coworkers wherever I go.	(Laumer & Eckhardt, 2012; Wu & Tian, 2021)
Technology Characteristic (TH)	**TH1**	ERP offers omnipresent services.	(Laumer & Eckhardt, 2012; Wu & Tian, 2021)
	TH2	ERP offers real-time services.	(Laumer & Eckhardt, 2012; Wu & Tian, 2021)
	TH3	ERP offers security services.	(Laumer & Eckhardt, 2012; Wu & Tian, 2021)

Dimensions		Questions	References
Task-Technology Fit (TF)	**TF1**	The features of ERP are sufficient to assist me in performing my job obligations.	(Laumer & Eckhardt, 2012; Wu & Tian, 2021)
	TF2	Does this ERP provide correct information? Do you receive the information you require on time?	(Yuce et al., 2019), (Laumer & Eckhardt, 2012)
	TF3	The ERP's features are suitable for assisting me in completing my job's tasks.	(Yuce et al., 2019), (Laumer & Eckhardt, 2012)
	TF4	Overall, the ERP's features are perfect for my job.	(Laumer & Eckhardt, 2012; Wu & Tian, 2021)
	TF5	Enhancing competitive edge with ERP	(Laumer & Eckhardt, 2012; Wu & Tian, 2021)
Organizational Impact (OI)	**OI1**	ERP boosts total productivity	(Al-Okaily et al., 2021; DeLone & McLean, 2003, 2016)
	OI2	ERP lowers business expenses	(Al-Okaily et al., 2021; DeLone & McLean, 2003, 2016)
	OI3	ERP facilitates better judgment.	(Al-Okaily et al., 2021; DeLone & McLean, 2003, 2016)
	OI4	The features of ERP are sufficient to assist me in performing my job obligations.	(Al-Okaily et al., 2021; DeLone & McLean, 2003, 2016)

APPENDIX B: REFLECTIVE INDICATOR LOADINGS PHASE 1

Indicator	Load	Indicator	Load
IQ1 <- IQ	0.834	**SYQ1 <- SYQ**	**0.326**
IQ2 <- IQ	0.882	**SYQ2 <- SYQ**	**0.572**
IQ3 <- IQ	0.790	SYQ3 <- SYQ	0.803
IQ4 <- IQ	**0.695**	SYQ4 <- SYQ	0.861
IQ5 <- IQ	0.756	SYQ5 <- SYQ	0.821
IQ6 <- IQ	0.808	SYQ6 <- SYQ	0.825
IQ7 <- IQ	0.834	SYQ7 <- SYQ	0.835
OI1 <- OI	0.859	SYQ8 <- SYQ	0.780
OI2 <- OI	0.925	TC1 <- TC	0.877
OI3 <- OI	0.900	TC2 <- TC	0.893
OI4 <- OI	0.893	TC3 <- TC	0.805
PU1 <- PU	0.878	TF1 <- TF	0.870
PU2 <- PU	0.911	TF2 <- TF	0.869
PU3 <- PU	0.882	TF3 <- TF	0.917
PU4 <- PU	0.876	TF4 <- TF	0.833
PU5 <- PU	**0.462**	TF5 <- TF	0.894
PU6 <- PU	0.857	TH1 <- TH	0.888
SQ1 <- SQ	0.778	TH2 <- TH	0.936
SQ2 <- SQ	0.810	TH3 <- TH	0.916
SQ3 <- SQ	0.771	US1 <- US	0.868
SQ4 <- SQ	0.854	US2 <- US	0.900
SQ5 <- SQ	0.850	US3 <- US	0.921

APPENDIX C: REFLECTIVE INDICATOR LOADINGS PHASE 2

Indicator	Load	Indicator	Load
IQ1 <- IQ	0.848	SYQ3 <- SYQ	0.811
IQ2 <- IQ	0.894	SYQ4 <- SYQ	0.865
IQ3 <- IQ	0.815	SYQ5 <- SYQ	0.813
IQ5 <- IQ	0.717	SYQ6 <- SYQ	0.825
IQ6 <- IQ	0.797	SYQ7 <- SYQ	0.865
IQ7 <- IQ	0.850	SYQ8 <- SYQ	0.792
OI1 <- OI	0.860	TC1 <- TC	0.877
OI2 <- OI	0.925	TC2 <- TC	0.893
OI3 <- OI	0.899	TC3 <- TC	0.805
OI4 <- OI	0.893	TF1 <- TF	0.870
PU1 <- PU	0.895	TF2 <- TF	0.870
PU2 <- PU	0.917	TF3 <- TF	0.917
PU3 <- PU	0.882	TF4 <- TF	0.833
PU4 <- PU	0.875	TF5 <- TF	0.894
PU6 <- PU	0.855	TH1 <- TH	0.888
SQ1 <- SQ	0.778	TH2 <- TH	0.936
SQ2 <- SQ	0.811	TH3 <- TH	0.916
SQ3 <- SQ	0.771	US1 <- US	0.868
SQ4 <- SQ	0.854	US2 <- US	0.900
SQ5 <- SQ	0.850	US3 <- US	0.920
SQ6 <- SQ	0.864	US4 <- US	0.903
		US5 <- US	0.896

APPENDIX D: AVE DIFFERENCES BEFORE AND AFTER INDICATOR ELIMINATION

	Before	After	Gap
IQ	**0.643**	**0.676**	**0.032**
OI	0.800	0.800	0.000
PU	**0.682**	**0.783**	**0.101**
SQ	0.676	0.676	0.000
SYQ	**0.560**	**0.687**	**0.127**
TC	0.738	0.738	0.000
TF	0.769	0.769	0.000
TH	0.834	0.834	0.000
US	0.806	0.806	0.000

APPENDIX E: DISCRIMINANT VALIDITY TEST USING HTMT PHASE1

	IQ	OI	PU	SQ	SYQ	TC	TF	TH	US
IQ									
OI	0.685								
PU	0.760	**0.902**							
SQ	0.871	0.643	0.771						
SYQ	0.884	0.790	0.836	0.884					
TC	0.515	0.682	0.623	0.618	0.644				
TF	0.722	0.895	0.887	0.740	0.860	0.667			
TH	0.684	**0.920**	**0.901**	0.724	0.863	0.719	**0.989**		
US	0.757	0.849	0.868	0.754	0.871	0.584	**0.904**	0.898	

APPENDIX F: CORRELATION OF PU AND OI, TH AND TF, TH AND OI, US AND TF & TH AND PU INDICATORS

	PU1	PU2	PU3	PU4	PU5	**PU6**	Average
OI1	0.737	0.657	0.614	0.629	0.128	0.671	0.573
OI2	0.676	0.690	0.663	0.664	0.170	0.669	0.589
OI3	0.638	0.700	0.692	0.598	0.248	0.725	0.600
OI4	0.616	0.643	0.608	0.646	0.231	0.655	0.567
Average	0.667	0.673	0.644	0.634	0.194	**0.680**	

	TF1	TF2	TF3	TF4	TF5	Average
TH1	0.662	0.670	0.715	0.773	0.711	0.706
TH2	0.709	0.704	0.743	0.690	0.745	0.718
TH3	0.809	0.747	0.740	0.680	0.745	**0.744**
Average	0.727	0.707	0.733	0.714	0.734	

	OI1	OI2	**OI3**	OI4	Average
TH1	0.610	0.698	0.745	0.715	0.692
TH2	0.713	0.734	0.712	0.678	**0.709**
TH3	0.681	0.635	0.673	0.601	0.648
Average	0.668	0.689	**0.710**	0.665	

	US1	US2	US3	US4	US5	Average
TF1	0.668	0.744	0.692	0.716	0.667	**0.697**
TF2	0.649	0.716	0.674	0.681	0.688	0.682
TF3	0.724	0.677	0.710	0.715	0.671	**0.699**
TF4	0.578	0.577	0.601	0.600	0.562	0.584
TF5	0.643	0.656	0.683	0.661	0.626	0.654
Average	0.652	0.674	0.672	0.675	0.643	

	PU1	PU2	PU3	PU4	PU5	**PU6**	
TH1	0.586	0.628	0.562	0.632	0.351	0.713	0.579
TH2	0.711	0.701	0.622	0.700	0.287	0.744	0.628
TH3	0.675	0.694	0.635	0.687	0.185	0.714	0.598
	0.657	0.674	0.606	0.673	0.274	**0.724**	

Appendix G: Discriminant Validity Test Using HTMT Stage 2

	IQ	OI	PU	SQ	SYQ	TC	TF	TH	US
IQ									
OI	0.690								
PU	0.742	0.880							
SQ	0.871	0.637	0.721						
SYQ	0.884	0.792	0.808	0.884					
TC	0.515	0.660	0.577	0.618	0.644				
TF	0.706	0.884	0.858	0.765	0.874	0.690			
TH	0.516	0.789	0.692	0.600	0.660	0.694	0.878		
US	0.757	0.848	0.834	0.754	0.871	0.584	0.899	0.722	

Appendix H: Discriminant Validity Test Using Fornell-Larcker Criterion At Phase 2

	IQ	OI	PU	SQ	SYQ	TC	TF	TH	US
IQ	**0.822**								
OI	0.627	**0.906**							
PU	0.679	0.799	**0.904**						
SQ	0.791	0.573	0.662	**0.822**					
SYQ	0.809	0.714	0.744	0.802	**0.829**				
TC	0.453	0.568	0.508	0.534	0.559	**0.859**			
TF	0.632	0.773	0.764	0.676	0.772	0.586	**0.883**		
TH	0.499	0.745	0.666	0.571	0.629	0.633	0.814	**1**	
US	0.706	0.776	0.779	0.698	0.807	0.520	0.807	0.701	**0.898**

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