Contents lists available at GrowingScience

Uncertain Supply Chain Management

homepage: www.GrowingScience.com/uscm

The relationship between management information system quality and organizational performance: Extending the Delone-Mclean model

Fahad Aldhaban[a*]

[a]*MIS Department, College of Business Administration, University of Business and Technology, Jeddah 21448, Saudi Arabia*

A B S T R A C T

This study extends the Dellon-McLean model by including training quality as a key factor in the success of Management Information Systems (MIS) in the banking sector of Saudi Arabia. The aim of the study is to investigate the relationship between quality of information, systems quality, training quality and organizational performance. A structured questionnaire was used to collect data from employees in the banking sector. The results show a significant positive relationship between information quality, system quality, training quality, and organizational performance. Training quality emerged as the most important determinant of organizational performance. The findings suggest that organizations should invest in improving training quality to improve their MIS and improve overall organizational outcomes. This information helps to understand the factors affecting MIS success and provides useful implications for organizations seeking to optimize their information systems.

Article history:
Received March 28, 2024
Received in revised format April 28, 2024
Accepted May 27 2024
Available online
May 27 2024

Keywords:
Information System
System Quality
Training Quality
Organizational Performance

1. Introduction

Furthermore, the system's quality is critical for improving operational efficiency and organization (Ali, Omar, et al., 2016; Cengel et al., 2022), whereas the training's quality is critical for developing staff skills and competencies, which has a positive effect on the business's overall performance (Kuruppu et al., 2021). Nonetheless, in today's rapid and competitive business climate, efficient information management has become critical for businesses trying to attain and sustain high levels of performance (Alawamleh et al., 2021; Alhaj et al., 2023). The Management Information System, also known as (MIS) is a critical instrument that helps businesses gather, process, store, and communicate information that assists with making decisions and accomplish strategic goals (Al Tarawneh et al., 2023; Matlala et al., 2024). MIS covers a diverse set of technology, procedures, and people that collaborate to organize and evaluate data as well as information inside a company (Aggarwal et al., 2023). Organizations may use MIS to increase operational efficiency, decision making decisions capabilities, and overall performance (Alhaj et al., 2023; Hatamlah et al., 2023; Salhab et al., 2023). The purpose of this study is to look into and examine the relationship between quality of information, system quality, training quality, and company outcomes. The paper is divided into six basic components. The first portion provides an overview of the topic matter and its relevance, while the second section investigates the existing literature and previous studies in this sector. The third portion of the study offers the conceptual framework and elucidates the predicted relationships between variables, as well as the methodology of the study and data analysis procedures, while the fifth component displays and scrutinizes the research findings. The study concludes in the fife part, which provides the final results and recommendations.

* Corresponding author
E-mail address f.aldhaban@ubt.edu.sa (F. Aldhaban)

ISSN 2291-6830 (Online) - ISSN 2291-6822 (Print)

doi: 10.5267/j.uscm.2024.5.029

2. Literature Review

2.1 Organizational performance

The concepts of company growth, advancement, and survival are all interconnected with the notion of performance in business (Hasan et al., 2021; Hezabr et al., 2023). The complex construct of organizational performance has four components: customer, financial, market, and human aspects (Pfeffer, 2010). Traditionally, business performance has been measured by various factors such as client satisfaction, client retention, economic performance (including revenue, profits, market position, cash-to-cash cycle time, and earnings per share), management-employee organizational effectiveness, and other indicators. These factors reflect the accomplishment of tasks, quality output, output, time to market, level of creativity, leadership competency, companionship, and the utility role of management. The performance of a business is a critical consideration for both a business for profit and nonprofit businesses (Hezabr et al., 2023; Oudat et al., 2024). Furthermore, the assessment of firms, their actions, and their environments heavily relies on the paramount importance of business performance. Enhancing corporate performance is a prerequisite for the strategic management of organizations aiming to achieve optimal performance (Jawabreh et al., 2023). Performance is a comprehensive notion that includes all actions inside companies of all sizes and structures (Mohammad Kanan, Hala Dababat, et al., 2023). Organizational performance encompasses several key factors, including the quality of work, the decision-making effectiveness of staff, process improvement and development, staff-leader relationships, the range of services and products, innovations, market share, problem-solving abilities and expertise of staff, and the use of new methods and contemporary techniques in developing products. Organizational performance refers to the degree to which an organization meets the requirements of both its internal operations and the expectations of stakeholders, enabling its ongoing existence and growth (Ali et al., 2023; Hezabr et al., 2023; Oudat et al., 2024). Organizational performance refers to an organization's ability to effectively utilize its available resources in order to achieve its goals and objectives (Li et al., 2022). Experts agree that a performance measurement system is crucial for businesses as it provides information on the efficiency of internal operations, assists in developing strategic plans, and evaluates the achievement of organizational objectives (Hatamlah et al., 2023; Shan et al., 2022).Various authorities across different industries are focused on organizational performance, which has an impact on strategic planners, operations, finance, legal, and organizational growth. Furthermore, it refers to the process of analyzing a company's production in relation to its goals and objectives. The corporate group calculates three main outcomes: financial success, shareholder value performance (and, in certain instances, production capacity performance), and market performance. Operational circumstances and the performance of the organization are interconnected with the overall success of the business. Work performance in this context pertains to the manner in which management and staff fulfill their responsibilities related to the technological infrastructure and the implementation of technical resources to ensure the company's profitability. This study investigates market expansion, product innovation, and customer happiness as metrics for assessing organizational effectiveness.

2.2 Management Information system

A Management Information System (MIS) is a system that is created to supply management with precise and decision-focused information that is necessary for controlling, planning, and assessing organizational operations (Matlala et al., 2024). It denotes a cohesive system that provides accessible information to assist organizational management, operations, and decision-making activities (Alawamleh et al., 2021). MIS encompasses the activities of gathering and manipulating data, which includes the storage and transmission of pertinent information that aids in management operations. Alawamleh et al. (2021) offered a comprehensive explanation of MIS, asserting that it is the arrangement of interconnected hardware, software, personnel, and other resources that enables the efficient gathering and analysis of data to generate essential information (related to users, storage, updating, and retrieval) in a timely, cost-effective, and sufficient manner. The three essential dimensions of management information systems are organizational, managerial, and technological. According to Mohammad Kanan et al. (2023), achieving optimal performance requires a careful balance of three essential features. MIS is commonly understood as the process of transforming data, which refers to the raw facts and numbers of an organization, into information that is essential for making informed decisions. Information derived from both internal and external sources is converted into a format that can be communicated to managers at different levels. This information aids in making timely and efficient decisions for the organization's planning, directing, and overall management of operations (Aldulaimi et al., 2022). The primary emphasis of MIS (Alawamleh et al., 2021; Matlala et al., 2024) is in the use of information systems rather than the generation of information. In recent years, there has been a significant rise in the utilization of Management Information Systems (MIS) across several sectors, including enterprises, people, and even governments (M Kanan et al., 2023). The adoption of Management Information Systems (MIS) has been driven by several causes, including the significant expansion of the information economy, the advent of highly competitive digital businesses, and advancements in technology, particularly in telecommunications, which have facilitated a global market without boundaries.

2.3 Delone & Mclean Is Success Model

In 1992, DeLone & McLean developed the IS Success Model, which comprises six interconnected parameters for assessing the effectiveness of information systems. The model has six characteristics or variables: quality of the system, quality of the information, satisfaction, usage, individual effects, and organization impact (DeLone & McLean, 2003). The assessment of

the success factors of information systems cannot be conducted in isolation, but rather must be evaluated as a cohesive unit. There is a relationship between variables where changes in one variable will have an impact on the other variables. According to Figure 1, the system's quality and the quality of the information have an impact on the user's utilization of information systems and their pleasure while using them. The variables pertaining to the use and contentment with information systems will mutually influence each other and ultimately affect the individual, leading to enhanced individual performance. Enhanced individual performance will provide positive effects on the company. The quality of information systems is determined by several factors, including data accuracy, user-friendliness, convenience, user awareness, system capabilities, accuracy, flexibility, efficiency, reliability, and sophistication, system integration, and good response time and turnaround time (Ali, Omar, et al., 2016). The quality of information may be assessed based on its relevance, utility, informativeness, clarity, consistency, accuracy, novelty and absence of ambiguity (Ali, Bakar, et al., 2016).

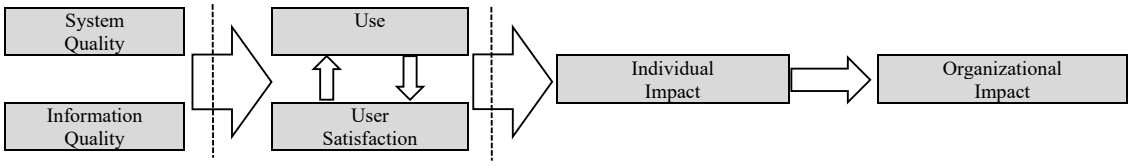

Fig. 1. DeLone & McLean IS success model (1992)

In 2003, DeLone and McLean revised the IS Success Model, which is depicted in Figure 2. The quality of service is an extra component that impacts consumers' utilization of information systems and their pleasure while using them. The measurement of service quality may be assessed by considering factors such as assurance, empathy, and responsiveness (DeLone & McLean, 2003).

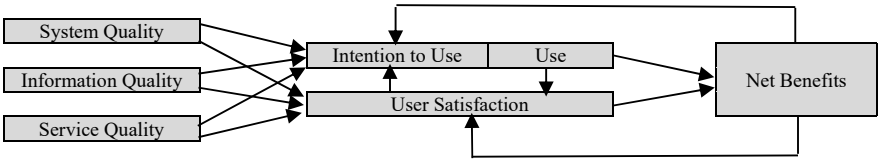

Fig. 2. DeLone & McLean IS success model (2003)

2.4 Hypotheses development

2.4.1 System Quality and Organizational performance

System quality refers to the desired attributes or features of the system, as specified by the system itself (Kanan, 2023). System quality refers to whether a system possesses the necessary capability to serve the specific task at hand. It encompasses factors such as efficiency integration with different systems, performance, stability, and simplicity of use (Bossen et al., 2013; DeLone & McLean, 2003). Multiple studies consistently demonstrate a favorable correlation between the quality of a system and the performance of an organization (Ali, Bakar, et al., 2016; Ali, Omar, et al., 2016; Saleh et al., 2019). This is corroborated by the discovery that a high level of system quality results in a more significant organizational influence (Cengel et al., 2022). These studies emphasize the significance of system quality in improving the performance of organizations. Multiple studies have investigated the correlation between the quality of a system and the performance of an organization, yielding varied outcomes. In their study, Liu and Roland Weistroffer (2017) discovered that the correlation between system quality and system usage was not consistently significant. Additionally, they concluded that there is no association between system quality and intentions to use. Indicating that the quality of a system may not necessarily result in enhanced performance. These findings emphasize the necessity for more study in order to have a comprehensive understanding of the correlation between system quality and organizational success.

H_1: *System Quality is a significant positive predictor of organizational performance.*

2.4.2 Information Quality and Organizational performance

Information quality pertains to the value of the system's output, as perceived by the user of the system. Typically, the assessment of information quality is based on its correctness, timeliness, completeness, relevance, and consistency. Moreover, the significance of information quality as a key determinant of overall performance in information systems, especially in the realm of web-based systems, has been demonstrated in several studies (DeLone & McLean, 2003; Kanan, 2023; Sabeh et al., 2021). Recent research has indicated a direct correlation between the quality of information and the overall success of a company. (Ali, Bakar, et al., 2016; Ali, Omar, et al., 2016; Feki, 2022) discovered a favorable correlation between the quality of information systems and organizational performance. Similarly, a study conducted by Kanan (2023) found a notable and

beneficial impact of information quality on the performance of the supply chain. The results align with existing research on the favorable influence of total quality management, or TQM, on operational efficiency in manufacturing firms (Bytyçi et al., 2023).

H_2: *Information Quality is a significant positive predictor of organizational performance.*

2.4.3 Training Quality and Organizational performance

Training quality encompasses the degree to which a training program successfully achieves its intended goals, taking into account its effectiveness, efficiency, and overall excellence. It includes different elements such as the alignment of the content with the learners' needs, the competence and efficacy of the trainers, the involvement and interaction in the training sessions, the clarity and attainment of training goals, the usefulness and applicability of the information given, and the improvement of participants' abilities and knowledge. High-quality training programs are defined as those that effectively fulfill learners' expectations, provide meaningful and practical knowledge, and have a beneficial impact on personal and organizational growth (AL-Qudah et al., 2014; Sandbakk et al., 2023). Recent research has regularly shown a direct relationship between the quality of training and the effectiveness of a company. The studies conducted by Bolarinwa (2020) and Ermawati and Syahlani (2021) both concluded that training and development had a beneficial effect on organizational performance. Bolarinwa's research notably emphasized the significance of off-the-job training and human resources development. (Kuruppu et al., 2021) discovered a robust and favorable correlation between training and employee performance within the garment industry. The results indicate that making investments in top-notch training might result in enhanced business performance.

H_3: *Training Quality is a significant positive predictor of organizational performance.*

3.1 Research methodology

A research design is a comprehensive blueprint that delineates the methodologies used for data collection and analysis. SPSS and SmartPLS are used for the purpose of conducting descriptive statistics and estimating models. A questionnaire is used to gather primary data. The questionnaire consists of four sections: (1) organizational performance, (2) system quality, (3) information quality, and (4) training quality. Items in Sections 2–4 are assessed using a seven-point Likert scale. The gathered data are first subjected to descriptive analysis to facilitate straightforward interpretation. Next, the replies are sorted according to their frequency. Cronbach's alpha is a statistical metric used to assess the extent to which the items in a test or questionnaire are internally consistent, meaning they are connected with each other. The optimal alpha value is between 0.7 and 0.9. Cronbach's alpha is a metric used to assess the reliability of a measurement, rather than being a statistical test (Hair Jr, Hult, Ringle, Sarstedt, Danks, & Ray, 2021). Reliability refers to the extent to which the items being measured are assessing a shared notion (Hair Jr, Hult, Ringle, Sarstedt, Danks, & Ray, 2021). The research uses the survey methodology to get primary data from the public. The study focuses on the demographic of information technology (IT) professionals employed in the banking sector in Saudi Arabia. The questionnaire is distributed to 550 respondents in a probabilistic manner.

3.1 Framework of the study

A theoretical framework has been developed to test the hypotheses.

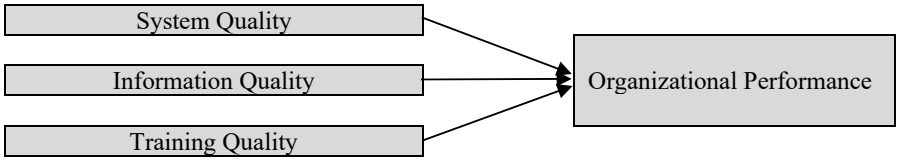

Fig. 3. Theoretical Framework

3.2 Instrument Variable Research

Likert scale questionnaires (ranging from 1 to 5) were used as a tool in this research. Using a Likert scale, people are asked to rate their level of agreement with a set of assertions. Here are the details for each scale: 1 for very disagree, 2 for disagree, 3 for neutral, 4 for agree, and 5 for very agree. To examine the effect of MIS on business output, a research tool is provided in Table 2.

Table 1
Instrument of the study

Variables of the study	Indicator	Sources
Organizational performance	1 To what degree does MIS affect our timely service to clients? 2 To what degree does MIS affect our internal data delivery? 3 To what degree does MIS have an influence on our outside information delivery? 4 To what degree does the influence of MIS on the client complaints To what degree does MIS affect our ability to retain customers? 6 To what degree does the influence of MIS on our satisfaction with clients 7 To what degree does MIS effect our replenishing time	(Ali, Bakar, et al., 2016; Ali, Omar, et al., 2016)
System Quality	1. Our organization's management information system is easily accessible. 2. Our organization's MIS is adaptable. 3. Our organization's management information system (MIS) may relate to other systems. 4 Our organization's MIS meets users' expectations. 5 Our organization's MIS can be reliably exploited. 6 Our organization's MIS may be accessed. 7 Our organization's MIS can be simply employed.	(Ali, Bakar, et al., 2016; Ali, Omar, et al., 2016)
Information Quality	1. Our organization's MIS offers reliable information. 2 Our organization's MIS improves user trust in information processing. 3. Our organization's MIS delivers exact information. 4 Our organization's management information system (MIS) offers updated information. 5. Our organization's MIS delivers dependable information. 6 Our organization's MIS delivers comprehensive information. 7 Our organization's MIS offers simple information.	(Ali, Bakar, et al., 2016; Ali, Omar, et al., 2016)
Training Quality	1. Our company's training program strives for excellence. How pleased are you with the MIS training program? 2. Our company strives to exceed expectations. To what degree did the MIS training fulfill your needs? 3. Our company prioritizes excellent training materials. How successful were the MIS training materials? 4. Our company focuses engaging sessions. Were the MIS instruction classes engaging? 5. Our organization invests in skill development. To what degree did the MIS training improve your skills? 6.Our company appreciates competence. How would you assess the skill of the MIS trainers? 7. Our company prioritizes clear goals. Were the MIS training goals clear and met?	(AL-Qudah et al., 2014)

4. Empirical analysis and results

4.1 The measurement (outer) model

The first stage in producing outcomes using Partial Least Squares (PLS) involves assessing the data using the measurement model. The authors (Hair Jr, Hult, Ringle, Sarstedt, Danks, Ray, et al., 2021) provided a framework consisting of four phases to assess the measurement model. The reliability of the indicators was assessed based on indicator loadings of 0.70. Next, the composite reliability (CR) was evaluated to analyze the internal consistency. A CR value of 0.70 or more was considered satisfactory. The assessment of convergent validity is conducted by examining the average variance extracted (AVE), which should be equal to or greater than 0.50. Regarding discriminant validity, Fornell and Larcker (1981) said that it requires each latent component's average variance extracted (AVE) to be greater than the greatest squared correlation between that factor and any other latent factor. Put simply, the square root of the average variance extracted (AVE) for each construct should be higher than the correlations with other latent constructs (Hair Jr, Hult, Ringle, Sarstedt, Danks, Ray, et al., 2021). Discriminant validity may be evaluated by many methods, including the Heterotrait-Monotrait (HTMT) ratio approach, the Fornell-Larcker correlation matrix method, and the cross-loading method. It is important to note that the HTMT correlation matrix, proposed by (Henseler et al., 2015), is very effective in identifying issues related to discriminant validity. It is frequently used by researchers and is considered the most popular method. Regarding this matter, it is evident from Fig. 4 and Tables 2–4 that all the outcomes meet the recommended standards and are considered satisfactory. Therefore, the measurement model has been validated and may now proceed to the structural model.

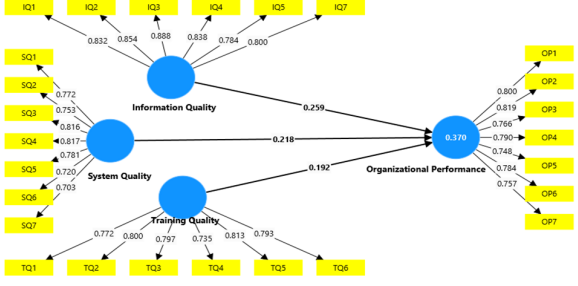

Fig. 4. Measurement Model.

Table 2
Summary of reflective measurement model results

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Information Quality	0.912	0.914	0.932	0.694
Organizational Performance	0.893	0.895	0.916	0.610
System Quality	0.883	0.885	0.909	0.589
Training Quality	0.876	0.883	0.906	0.617

Table 3
Fornell-Larcker correlation matrix

	Information Quality	**Organizational Performance**	**System Quality**	**Training Quality**
Information Quality	0.833			
Organizational Performance	0.569	0.781		
System Quality	0.785	0.554	0.767	
Training Quality	0.725	0.531	0.695	0.785

Table 4
Items' Outer Loadings

Items	**Information Quality**	**Organizational Performance**	**System Quality**	**Training Quality**
IQ1	0.832			
IQ2	0.854			
IQ3	0.888			
IQ4	0.838			
IQ5	0.784			
IQ7	0.800			
OP1		0.800		
OP2		0.819		
OP3		0.766		
OP4		0.790		
OP5		0.748		
OP6		0.784		
OP7		0.757		
SQ1			0.772	
SQ2			0.753	
SQ3			0.816	
SQ4			0.817	
SQ5			0.781	
SQ6			0.720	
SQ7			0.703	
TQ1				0.772
TQ2				0.800
TQ3				0.797
TQ4				0.735
TQ5				0.813
TQ6				0.793

4.2 Structural Model Analysis

The last stage in the PLS-SEM structural model involves examining the proposed connections by executing the PLS bootstrapping procedure. While route coefficients have great significance in PLS analysis, a study conducted by Hair Jr, Hult, Ringle, Sarstedt, Danks, and Ray (2021) determined that if pathways are deemed unimportant or exhibit contradictory indications to the expected direction, the prior hypothesis should be discarded. Alternatively, the proposed causal link is empirically supported by significant evidence from the observed routes. When evaluating route coefficients, it is recommended to use the bootstrapping approach with a minimum bootstrap sample size of 5,000. Additionally, the number of instances should be equal to the quantity of observation in the original sample (Hair Jr, Hult, Ringle, Sarstedt, Danks, Ray, et al., 2021). Therefore, the present research conducted 5,000 resampling iterations using a sparse bootstrap sample size comparable to the initial sample size of 307. This was done to generate moderate errors and get t-values. The standardized path coefficients and their significant values were used to investigate the hypotheses, as shown in Table 5 and Figure 5, for the structural routes.

Table 5
Result of hypotheses

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T Value	P values	Hypotheses Decision
Information Quality → Organizational Performance	0.259	0.262	0.077	3.346	0.001	Supported
System Quality → Organizational Performance	0.218	0.221	0.078	2.805	0.005	Supported
Training Quality → Organizational Performance	0.192	0.189	0.091	2.118	0.034	Supported

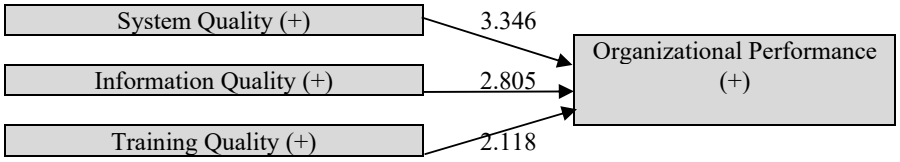

Fig. 5. Structural Model Analysis

5. Research discussion

The objective of our research is to analyze the influence of several components of the Management Information System, or MIS - namely Information Quality, System Quality, and Training Quality - on the overall performance of organizations in the banking industry of Saudi Arabia. According to the analysis of our research, we put up the following different hypotheses: The study found a strong and statistically significant correlation between the quality of information and the performance of the organization. The T value was 3.346 and the p-value was 0.001. These results are consistent with the research conducted by Ali, Bakar, et al. (2016), Ali, Omar, et al. (2016), and Feki (2022), which showed that better Information Quality is associated with enhanced decision-making and organizational performance. The correlation between the quality of the system and Organizational Performance is statistically significant, with a positive association (T Value = 2.805, P = 0.005). DeLone and McLean (2003) as well as Ali, Bakar, et al. (2016), Ali, Omar, et al. (2016), and Saleh et al. (2019) have provided support for the notion that System Quality has a beneficial influence on business performance in relation to effectiveness and efficiency.

The correlation between Training Quality and Organizational Performance is statistically significant (T Value = 2.118, P = 0.034). These findings align with the studies conducted by Bolarinwa (2020) and Ermawati & Syahlani (2021), which suggest that a greater level of Training Quality is associated with enhanced employee capabilities and positive organizational results. These studies provide concrete evidence supporting the connections between Information Quality, System Quality, Training Quality, and the performance of organizations in the field of Management Information Systems (MIS) within the banking industry.

Table 6
The *R-Squared*

	R-square	R-square adjusted
Organizational Performance	0.370	0.363

Table 6 displays the R-squared and modified R-squared values for the regression model that predicts organizational effectiveness using the variables of Information Quality, System Quality, and Training Quality. R-squared (R^2): This metric quantifies the percentage of variability in the variable that is dependent (Organizational Performance) that can be accounted for by the three independent variables (Information Quality, System Quality, and Training Quality) in the model. The R-squared value of 0.370 suggests that about 37% of the variation in Organizational Performance can be accounted for by the model. The adjusted R-squared value is a statistical measure that accounts for the number of predictors in a model, providing a more accurate assessment of the model's explanatory power than the regular R-squared value. The method penalizes the inclusion of superfluous predictors that do not enhance the model's ability to explain the data. The modified R-squared value of 0.363 indicates that, taking into account the number of variables, about 36.3% of the variability in organizational efficiency can be accounted for by the model. In summary, these results suggest that the model, which incorporates Information Quality, System Quality, and Training Quality as predictors, accounts for a moderate level of the variation in company performance.

6. Research implications

6.1 Theoretical implications

This study expands upon the Delone-Mclean Model by including a new factor, Training Quality, to get a deeper understanding of how it affects the connections between Information Quality, System Quality, and organizational efficiency in the banking industry of Saudi Arabia. This extension expands upon the existing framework of the Delone-Mclean Model, which has been extensively used to evaluate the effectiveness of information systems. Incorporating Training Quality into the model introduces a novel aspect to our understanding of the impact of MIS (Management Information System) on Organizational Performance. Ensuring the training quality is essential for equipping personnel with the requisite skills and knowledge to successfully use the system's offered information. By including Training Quality, our objective is to provide a more thorough examination of the elements that contribute to the achievement of Management Information Systems (MIS) in the banking industry.This expansion has several theoretical ramifications. First and foremost, it emphasizes the need of seeing Training Quality as a crucial element in the achievement of MIS. Prior studies have mostly concentrated on Information Quality and

System Quality, neglecting the substantial impact that Training Quality has on improving organizational performance. By including Training Quality into the model, we enhance our comprehension of the many elements that influence the effectiveness of Management Information Systems (MIS) in businesses. Furthermore, our expansion of the Delone-Mclean Model emphasizes the need of modifying current theoretical frameworks to accommodate changing technical and organizational environments. With the growing dependence of companies on modern information systems, particularly in the banking industry, it is crucial to revise theoretical models to appropriately include these developments. Our study demonstrates the adaptability of the Delone-Mclean Model and its capacity to include additional factors that are pertinent to modern organizational environments.

6.2 The practical implications

The practical ramifications of our study have great importance for financial institutions in Saudi Arabia and other regions. By expanding the Delone-Mclean Model to include Training Quality, we provide valuable insights that may assist firms in enhancing the efficiency of their MIS systems and boosting overall organizational performance.

Improved Training Programs: Organizations may use our research to create and execute more efficient training programs for their staff. Organizations may guarantee that staff have the requisite skills and knowledge to successfully use the information given by MIS by prioritizing the enhancement of Training Quality. Consequently, this might result in enhanced work performance and organizational results. Our study emphasizes the significance of Information Quality, System Quality, and Training Quality in the achievement of optimized Information Systems. Organizations may use this data to pinpoint areas that want enhancement in their information systems. For instance, they may allocate funds towards enhancing their systems to optimize Information Quality or allocate resources towards more training programs to elevate Training Quality. Strategic Decision-Making: Companies may enhance their approach to making decisions regarding information systems by comprehending the crucial aspects that impact the effectiveness of Management Information Systems (MIS). Organizations have the ability to allocate resources to areas that will provide the most significant results in terms of organizational performance, hence enhancing the strategic and efficient decision-making processes.

Competitive Advantage: Enhancing the caliber of training programs and information systems may provide firms with a competitive edge in the market. Through the appropriate use of Management Information Systems (MIS), firms may improve their operational efficiency, customer service, and overall performance, gaining a competitive advantage over their rivals.

Enhancing the quality of training may result in increased levels of satisfaction among employees and retention. Employees who perceive that they have received sufficient training and assistance are more inclined to be actively involved and dedicated to their job, resulting in reduced rates of staff turnover and a more reliable workforce.

7. Conclusions, limitations and future research

In conclusion, the study enhances the Delone-Mclean Model by including Training Quality as a crucial element in the effectiveness of Management Information Systems (MIS) in the Saudi Arabian banking industry. Our research revealed a substantial correlation between Information Quality, System Quality, and Training Quality with Organizational Performance. Notably, Training Quality emerged as a very influential predictor.

The consequences of our results have significant ramifications for both theory and practice. The incorporation of Training Quality into the model emphasizes its significance in augmenting the efficiency of Management Information Systems (MIS) and promoting organizational results. Our research emphasizes the need of firms allocating resources towards enhancing the quality of training programs. This is crucial in order to guarantee that workers have the requisite skills and knowledge to properly use information systems.

Although our work has made valuable contributions, it is important to highlight some limitations. Initially, our study only examined the banking industry in Saudi Arabia, which may restrict the applicability of our results to other sectors or geographical areas. Subsequent investigations might examine the suitability of our model in other settings to verify its resilience. Furthermore, our analysis was based on cross-sectional data, which imposes constraints on our capacity to establish causal links between variables. Longitudinal studies have the potential to provide a deeper understanding of how the linkages between Information Quality, System Quality, Training Quality, and organizational efficiency evolve over time.

Further research might further examine how contextual elements, such as organizational culture or technology infrastructure, moderate the connections between MIS elements and organizational effectiveness. Furthermore, further research might explore the impact of other factors, such as leadership style or staff motivation, on the efficacy of Management Information Systems (MIS) in firms.

Additionally, further study might prioritize the development and validation of metrics to assess the quality of training programs that are tailored to the banking industry or other particular businesses. This might assist firms in evaluating and enhancing their training programs to more effectively facilitate the use of information systems and increase overall organizational performance.

Our research enhances the existing literature by emphasizing the significance of Training Quality in the achievement of MIS and offering practical guidance for firms seeking to improve their information systems.

References

Aggarwal, K., Khoa, B. T., Sagar, K. D., Agrawal, R., Dhingra, M., & Dhingra, J. (2023). Marketing information system based on unsupervised visual data to manage transportation industry using signal processing. *Expert Systems*, e13384.

AL-Qudah, M. K. M., Osman, A., & Ali, B. J. A. R. (2014). Effect of human resource polarization, training and development, and human resource stimulation on the strategic planning of human resources: evidence from the Government Ministry in Jordan. *Advances in Environmental Biology*, 675-679.

Al Tarawneh, E., Alqaraleh, M. H., Ali, B., & Bani Atta, A. (2023). The Impact of the Efficiency and Effectiveness of ElectronicAccounting Information Systems on the Quality of Accounting Information. *nformation Sciences Letters*, *12*(3), 1685-1692. https://doi.org/http://dx.doi.org/10.18576/isl/120352

Alawamleh, H. A., ALShibly, M. H. A.-a., Tommalieh, A. F. A., Al-Qaryouti, M. Q. H., & Ali, B. (2021). The challenges, barriers and advantages of management information system development: Comprehensive review. *Academy of Strategic Management Journal*, *20*(5), 1-8.

Aldulaimi, S. H., Ali, B. J., Yas, Q. M., Abdeldayem, M. M., Aswad, A. R., & Hammad, A. M. (2022). Application of Big Data Analysis to Foresight the Future: A Review of Opportunities, Approaches, and New Research Directions. 2022 ASU International Conference in Emerging Technologies for Sustainability and Intelligent Systems (ICETSIS),

Alhaj, A., Zanoon, N., Alrabea, A., Alnatsheh, H., Jawabreh, O., Abu-Faraj, M., & Ali, B. J. (2023). Improving the Smart Cities Traffic Management Systems using VANETs and IoT Features. *Journal of Statistics Applications & Probability 12*(2), 405-414. https://doi.org/http://dx.doi.org/10.18576/jsap/120207

Ali, A., Ali, B. J., & Fatima, N. (2023). Pre and Post-COVID-19 Financial Performance of Oil and Gas Companies: An Absolute and Relational Study of Financial Variables. *International Journal of Sustainable Development and Planning*, *18*(1), 69-77. https://doi.org/doi.org/10.18280/ijsdp.180107

Ali, B., Bakar, R., & Omar, W. A. W. (2016). The critical success factors of accounting information system (AIS) and it's impact on organisational performance of Jordanian commercial banks. *International Journal of Economics, Commerce and Management*, *4*(4), 658-677.

Ali, B., Omar, W. A. W., & Bakar, R. (2016). Accounting Information System (AIS) and organizational performance: Moderating effect of organizational culture. *International Journal of Economics, Commerce and Management*, *4*(4), 138-158.

Bolarinwa, S. A. (2020). Cost Effect Implications of Training and Development on Organizational Performance of Selected Corporations. *LASU Journal of Employment Relations & Human Resource Management*, *2*(1), 50-73.

Bossen, C., Jensen, L. G., & Udsen, F. W. (2013). Evaluation of a comprehensive EHR based on the DeLone and McLean model for IS success: approach, results, and success factors. *International journal of medical informatics*, *82*(10), 940-953.

Bytyçi, I., Qerimi, A., & Qerimi, F. (2023). The impact of total quality management on operational performance. *Journal of Governance and Regulation*, *12*(1).

Cengel, O., Shaikh, A.-u. H., Almashaqbeh, H. A., & Raza, A. (2022). Impact of Quality System on Financial, Innovation, and Operational Performance of Business Projects in Pakistan SME's. *Propel Journal of Academic Research*, *2*(2), 23-38.

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: a ten-year update. *Journal of management information systems*, *19*(4), 9-30.

Ermawati, E., & Syahlani, D. H. (2021). The Influence of Training, Career Development and Performance Management on Employee Competencies, Employee Performance and Organizational Capability. Seventh Padang International Conference On Economics Education, Economics, Business and Management, Accounting and Entrepreneurship (PICEEBA 2021),

Feki, M. (2022). Effects of IS Quality on Firm Performance from the Perspective of a Business Executive: The Role of Business Strategy. *International Journal of Technology and Human Interaction (IJTHI)*, *18*(1), 1-17.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, *18*(1), 39-50.

Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial least squares structural equation modeling (PLS-SEM) using R: A workbook*. Springer Nature.

Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., Ray, S., Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). Evaluation of formative measurement models. *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R: A Workbook*, 91-113.

Hasan, H., Ali, B. J., Joseph, N., & Salem, M. (2021). An Investigation on Financial Development, Trade Openness and Economic Growth: Var Approach. *Journal of Contemporary Issues in Business and Government*, *27*(2), 4290-4295. https://doi.org/10.47750/cibg.2021.27.02.454

Hatamlah, H., Allahham, M., Abu-AlSondos, I., Mushtaha, A., Al-Anati, G., Al-Shaikh, M., & Ali, B. (2023). Assessing the Moderating Effect of Innovation on the Relationship between Information Technology and Supply Chain Management: An Empirical Examination. *Applied Mathematics & Information Sciences*, *17*(5), 889-895.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the academy of marketing science*, *43*, 115-135.

Hezabr, A. A., Qeshta, M. H., Al-Msni, F. M., Jawabreh, O., & Ali, B. J. (2023). Audit committee characteristics and firm performance: Evidence from the insurance sector in Oman. *International Journal of Advanced and Applied Sciences*, *10*(5), 20-27.

Jawabreh, O., Baadhem, A. M., Ali, B. J., Atta, A. A. B., Ali, A., Al-Hosaini, F. F., & Allahham, M. (2023). The Influence of Supply Chain Management Strategies on Organizational Performance in Hospitality Industry. *Appl. Math*, *17*(5), 851-858.

Kanan, M. (2023). Investigating the relationship between information quality, system quality, service quality, and supply chain performance in the manufacturing sector of Saudi Arabia: An empirical study. *Uncertain Supply Chain Management*, *11*(4), 1589-1598.

Kanan, M., Al-Khalili, R., Alshaibani, E., Saleh, Y., Assaf, R., Al-Mimi, A., & Bakir, A. (2023). Assessing Service Quality at Optical Centers in Palestine Using SERVQUAL: Measuring Ambiguity.

Kanan, M., Dababat, H., Saleh, Y., Zaid, A., Assaf, R., Zahran, S., Salahat, M. A., & Al-Sartawi, A. (2023). Impact Of Total Quality Management Practices on The Transformation to Entrepreneurial Universities in Palestine: The Moderating Role of Innovation. *Operational Research in Engineering Sciences: Theory and Applications*, *6*(3).

Kanan, M., Zerban, A., Abunar, S., El Harbi, A., Weheba, G., Ahmed, R. A., Abdultawwab, M., & Haddad, T. (2023). Online education and managing service quality with the challenges of COVID 19: the case of University of Business and Technology (UBT) Saudi Arabia). *Applied Mathematics and Information Sciences*, *17*(2), 201-207.

Kuruppu, C., Kavirathne, C., & Karunarathna, N. (2021). The impact of training on employee performance in a selected apparel sector organization in Sri Lanka. *Global Journal of Management and Business Research: A Administration and Management*, *21*(2), 5-12.

Li, Y., Zhao, S., Bai, L., & Ali, B. J. (2022). Institutional investor company social responsibility report and company performance. *Applied Mathematics and Nonlinear Sciences*, *7*(2), 641-654. https://doi.org/ https://doi.org/10.2478/amns.2021.2.00107

Liu, D., & Roland Weistroffer, H. (2017). Is system quality irrelevant to system use?-a literature review of the relationship between system quality and system use.

Matlala, M. E., Ncube, T. R., & Reneilwe, A. (2024). The role of Management Information Systems in enhancing organisational performance in the South African public sector. Mbali Conference 2023 Proceedings,

Oudat, M., Ali, B., Hazaimeh, H., & El-Bannany, M. (2024). The effect of financial risks on the performance of Islamic and commercial banks in UAE. *Frontiers in Applied Mathematics and Statistics*, *9*. https://doi.org/10.3389/fams.2023.1250227

Pfeffer, J. (2010). Building sustainable organizations: The human factor. *Academy of management perspectives*, *24*(1), 34-45.

Sabeh, H. N., Husin, M. H., Kee, D. M. H., Baharudin, A. S., & Abdullah, R. (2021). A systematic review of the DeLone and McLean model of information systems success in an E-learning context (2010–2020). *Ieee Access*, *9*, 81210-81235.

Saleh, S. M., Zolait, A. H., Ali, M. M., & Wali, E. A. (2019). Investigating the Role of Information System Quality and Managerial Competency on the Organization's Performance. 2019 International Conference on Innovation and Intelligence for Informatics, Computing, and Technologies (3ICT),

Salhab, H., Allahham, M., Abu-AlSondos, I., Frangieh, R., Alkhwaldi, A., & Ali, B. (2023). Inventory competition, artificial intelligence, and quality improvement decisions in supply chains with digital marketing. *Uncertain Supply Chain Management*, *11*(4), 1915-1924.

Sandbakk, S. B., Walther, J., Solli, G. S., Tønnessen, E., & Haugen, T. (2023). Training Quality—What Is It and How Can We Improve It? *International Journal of Sports Physiology and Performance*, *18*(5), 557-560.

Shan, R., Xiao, X., Dong, G., Zhang, Z., Wen, Q., & Ali, B. (2022). The influence of accounting computer information processing technology on enterprise internal control under panel data simultaneous equation. *Applied Mathematics and Nonlinear Sciences*, *aop*(aop), 1–9. https://doi.org/10.2478/amns.2022.2.0157