

-RESEARCH ARTICLE-

**MODERATING EFFECT OF INFORMATION SYSTEM BETWEEN THE ASSOCIATION OF MANAGEMENT INNOVATION, TECHNOLOGY INNOVATION, AND ORGANIZATIONAL PERFORMANCE: A CASE FROM IRAQ MANUFACTURING INDUSTRY**

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## Abstract

Competitiveness and long-term survival are among organizations' objectives for their continued existence. Nonetheless, this is not the case because information systems propel organizations toward improved performance. Information systems cannot survive without adequate resources and capabilities. Studies have already been undertaken primarily focused on issues that affect the information system, but the innovation perspective has received little attention. Consequently, this study examines the moderating effect of information systems on the relationship between managerial innovation, technological innovation, and organizational performance in the Iraqi manufacturing sector. Quantitative research methodology and cross-sectional research design were employed. The data was acquired from 600 managers using a method of simple sampling. The major findings revealed that technological innovation, management innovation, and organizational performance and information systems are directly related.

Similarly, the information system had a substantial impact on organizational performance. Information system considerably moderates the relationship between technology innovation, management innovation, and organizational success, as indicated by the interaction effect. These findings contributed to the existing body of literature and provided policymakers and owners with practical insights into the role of information systems in enhancing organizational performance.

**Keywords:** management innovation, technology innovation, organizational performance, information system, Iraq.

## 1. INTRODUCTION

In the current period, the major objective of an organization is to achieve a competitive performance advantage. According to (Khan et al., 2019), companies employ a variety of approaches and tactics to attain exceptional performance. Current research indicates that organizational performance is required to achieve a competitive advantage (Almeida et al., 2017). Implementing and promoting an information system enables the business to generate greater value and performance (Marsat et al., 2022). The information system expansion can help satisfy the current generation's needs so that future generations are not deprived of meeting their own needs (Brundtland, 1987). A system of information has numerous aspects. Typically, information systems are integrated with economic and organizational success. In several research investigations, information system variables are utilized to assess the firm's capability and performance and its long-term viability, and their major effects have been identified. Successful deployment of an information system enables the company to increase its capacity for large-scale finance (Gundry et al., 2014) and to establish long-term goals. Proper and effective deployment of an information system enables a company's long-term survival and achievement of long-

term goals (Gundry et al., 2014). Moreover, organizations can perform better with fewer resources (Gundry et al., 2014; H. Li et al., 2012).

Information system has the greatest impact on organizational performance (Kaydos, 2020; Swanson, 1994) and has a significant effect of information system on organizational performance (W. Lee, 2017). Information System development is a primary goal for both company and non-business companies. Nevertheless, (Magon et al., 2018) many corporate enterprises cannot deploy IS, while some businesses have the capability and sufficient resources to apply IS (W. Lee, 2017). (Jansson et al., 2017) several research papers have examined the factors that affect information systems, observing only the conventional determinants. However, these studies have paid little attention to new predictors, such as management and technological innovation (Okhunov et al., 2021). These are crucial and significant IS components (Kassen, 2022). According to numerous research findings, innovation determinants were essential in improving the information system and organizational performance (Le Anh et al., 2021).

Existing research has explored the relationship between information systems, managerial innovation, technological innovation, and organizational performance. These studies demonstrate the relationship between performance disagreement and information systems (Geng et al., 2017). Because of the global trading system, firms focus more on innovative undertakings and technologies (Anwar et al., 2019). According to recent research (Ortiz-Villajos et al., 2018), innovation is the most important component for long-term survival in dynamic markets. In addition, several innovations impact the company's information system and organizational performance. These innovations include eco-innovation, social, product, marketing, and product innovation (Nemlioglu et al., 2017). (Nemlioglu et al., 2017). The technological innovation of Wirtz et al. (2016) and the management innovation of Expósito et al. (2019) acknowledged that the information system is crucial to the sustainability and growth of a company. Previous studies in corporate information systems paid little attention to technological and managerial innovation. Recent studies have examined the direct effects of these characteristics on organizational performance (González-Blanco et al., 2019). Unanswered questions concern the interaction and moderating effects of various variables. Therefore, we decided to investigate the impact of technology innovation and management innovation on organizational performance when an information system moderator is included in the conceptual framework of this study.

However, since the 1990s, managers, and academics have focused on implementing innovations, internal procedures, and non-technological and technologically driven motives for firms in response to various environmental issues. Specialized management, processes, and management must be implemented in the company to respond appropriately and adapt to its environment (Almeida et al., 2017). Undoubtedly, technological and managerial innovation can help improve an information system's performance, but the two innovations are complementary. According to Gary Hamel

(2006), management innovation is the most important driver of organizational performance. Similarly, in a worldwide environment, technological innovation is crucial for performance (Yang et al., 2018). Prior research focused on technology and management innovation (Hervas-Oliver et al., 2018; Walker et al., 2011) as well as the effects of these variables on information system and organizational performance.

To fill a vacuum in prior research, the current study investigated the relationship between technology and management innovation with information systems and organizational performance in various ways. As the manufacturing sector in Iraq significantly impacts the country's economic and social development, we collected actual data from manufacturing sectors to analyze this study. Previous research has primarily focused on other sectors, while manufacturing has received little attention (Kareem, Aziz, et al., 2021; Kareem, Dauwed, et al., 2021), even though it has played a significant role in Iraq's economic and social development. According to Bajae et al. (2021)'s research, removing significant barriers such as a lack of support for the information system and a deficiency of resources, which are the primary factors obstructing the organizational performance of Iraq's manufacturing sector, are the most valuable factors that can help to grow the manufacturing sector. Due to these considerations, we introduced two additional variables, technological innovation, and management innovation, which can enhance the performance of Iraq's industrial sector's information system and organizational structure. In addition, the earlier research gave insufficient attention to testing the relationship between technological innovation, information technology (IT), managerial innovation, and organizational success. Prior research concentrated mostly on testing the direct effects of managerial and technology innovation on organizational performance, with little attention dedicated to testing their interactive effects. For the relationship between information systems and organizational performance, the current study employed two theories: "Value creating theory" and "value-destroying theory" (Yu et al., 2021).

Moreover, the "resource-based view theory" is also employed to demonstrate that the innovations contribute to the firm's enhanced performance (Olavarrieta et al., 2008). Based on a gap in the literature, this study aims to examine the moderating influence of information systems alongside the relationship between technological innovation, managerial innovation, and organizational performance in Iraq's industrial sector. This research consists of five chapters: (1) introduction, (2) literature review, (3) methodology, (4) analysis, and (5) discussions.

## 2. THEORETICAL AND EMPIRICAL REVIEW

Two factors in the literature review are independent: management innovation and technology innovation. The information system is the moderating variable, and organizational performance is the dependent variable. Numerous previous research has been undertaken on these variables, but no definitive conclusion has been reached

regarding their relationships. For example, managerial innovation is difficult to define (Zhu et al., 2012). In contrast to technological innovation, management innovation is defined as "new actions and procedures in management and administration" (Zhu et al., 2012). Some scholars define MI as a reference to cutting-edge methods and frameworks, demonstrating that no one definition of MI exists (Whittington et al., 2002). However, some academics believe that management innovation is something that a business takes from the outside, perhaps from its competitors (Zbaracki, 1998). MI refers to current management approaches to enhance corporate outcomes. It is the "development and execution of state-of-the-art management practice, method, framework, or procedure" (Birkinshaw et al., 2008) to accomplish organizational objectives (p. 829).

Typically, it addresses alterations in managerial roles and techniques (G Hamel, 2006). Thus, management innovation is associated with shifts in management practices, such as strategy creation, decision-making, work allocation, and employee motivation (Gary Hamel, 2006). These changes are considered inherent to businesses and take the shape of innovative management techniques, methods, and the format and application of management innovation. Particularly effective in highly competitive and dynamic markets like China, management innovation improves a company's internal operations, enhancing its organizational performance (Yang et al., 2018). Schumpeter outlines several categories: product, marketing, organizational, and organizational innovations. Some innovations (typical of executive practices) benefit a company's bottom line more than others (Nemlioglu et al., 2017), mostly because they include research and development and new approaches to old challenges. Additionally, management innovation helps implement new concepts and technologies into business processes (Hollen et al., 2013).

Innovation in management has been regarded as a crucial weapon for organizational productivity and growth. In the context of Structural Equation Modeling (SEM), this facilitates efficient adaptation to external challenges. In dynamic circumstances, management innovation can increase corporate performance to a significant degree (Seo et al., 2016). Management innovation benefits firms in various ways and also plays a crucial role in enhancing organizational performance. Moreover, (Hinterhuber et al., 2017) said that a modern management system employs a variety of rules and processes to make more efficient use of resources, hence assisting businesses in achieving sustainable worldwide competitiveness. Leaders of organizations appreciate the significance of management innovation and frequently encourage it.

Consequently, they give adequate attention to implementing management innovation across all divisions (Mol et al., 2009). It is impossible to overestimate the senior management team's inventive role in boosting products and procedures and increasing earnings (Haneda et al., 2018). The unique integration of many organizational strategies contributes to achieving high performance through management innovation. Moreover, management innovation appears to be a crucial factor in the performance of firms (D. Li

et al., 2018). According to proponents of management innovation, the strategy significantly increases profitability (Zhang et al., 2019).

On the other side, it has been demonstrated that as an organization's information system is improved, its operational performance also improves (Khosravi et al., 2019; Stata, 1989). This argument was bolstered by the fact that technical developments enabled the development of an information system (Allen, 2000) that enhances performance (Nawab et al., 2015). In the study (López-Nicolás et al., 2011), a positive and statistically significant relationship was observed between innovation and information systems, and it was concluded that firms with an effective information system do excellent operations. In contrast, a significant negative correlation was discovered by (Tarafdar et al., 2007). These previously reported studies indicate that information systems improve organizational performance in businesses that employ efficient technology. Therefore, it is claimed that the information system moderates the relationship between technological innovation and operational performance. The following hypotheses are presented:

**H1:** Management innovation has a positive and significant impact on the organizational performance of the manufacturing industry in Iraq.

**H2:** The information system significantly moderates the relationship between management innovation and the organizational performance of the manufacturing industry in Iraq.

In addition to the relationship between management innovation, information systems, and organizational performance, technology innovation is an essential indication of organizational performance. For example, (Samson et al., 1999) define it as the execution of a concept for a particular product or service and the implementation of new components in a business's organizational system and service operation. According to reports, firms use material technologies to address technological issues (Saunila, 2014). A corporation can define general tasks and activities to accelerate the development of an application. In addition, they recognized the technological trajectory as a potential instrument of technology contributing to the formation of the technological paradigm. We appreciate the situation in which management innovation increases performance by supporting long-term viability. Technology innovation efforts are a top priority for many organizations' upper management in today's competitive business environment. Enterprises that incorporate cutting-edge technology in their goods and services would perform better in the turbulent markets of the present day (Coccia, 2017). According to the research-based value (RBV) school of thought in strategic management (Anwar, 2018; Olavarrieta et al., 2008), a corporation can maintain a competitive edge in an uncertain market if it has access to services and talents that are difficult to replicate.

New products and services are essential to an organization's growth and profitability (Camisón et al., 2014), and technological innovation can facilitate their creation. In a turbulent economy, these enterprises emerge as market leaders whose superior

informational and technical resources serve them effectively. Technology innovation, especially in growing areas, could help a company reach its goal of high profits (Y. Li et al., 2006). Even in the face of high levels of unpredictability, technological advancement enables organizations to rapidly ascend to the top of their industry and acquire a profitable market share. In contrast, research indicates that low levels of technological innovation may hamper a company's capacity to expand its client base and increase its income (Ordanini et al., 2010). Technological innovation is feasible for a specific organization (Miller et al., 2007), and its adoption has been proven to improve performance in various other industries, including service and manufacturing (Sirilli et al., 1998). Compared to other types of innovation, technology innovation has a considerably bigger impact on organizational performance (Ryu, 2016). It is well-recognized that technological innovation plays an essential role in determining organizational performance (Hervas-Oliver et al., 2018).

On the other hand, it was demonstrated that when an organization's information system is expanded based on technological innovation, its organizational performance is enhanced (Kim et al., 2006). This notion was bolstered by the fact that information system is a key indicator for enhancing technology innovation and performance (Allen, 2000). (Hutahayan, 2020). The study (Avgerou et al., 2004) revealed a further positive and statistically significant correlation. It concluded that when an organization has a proper technological innovation process, the information system becomes a crucial indication for functioning.

In contrast, a significant negative correlation was discovered by (Fichman, 2004). These previously described studies demonstrate that firms with effective information can outperform their competitors in terms of organizational performance. Therefore, it is claimed that the information system moderates the relationship between technological innovation and organizational success. The following hypotheses are also proposed:

**H3:** Technology innovation has a positive and significant impact on the organizational performance of the manufacturing industry in Iraq.

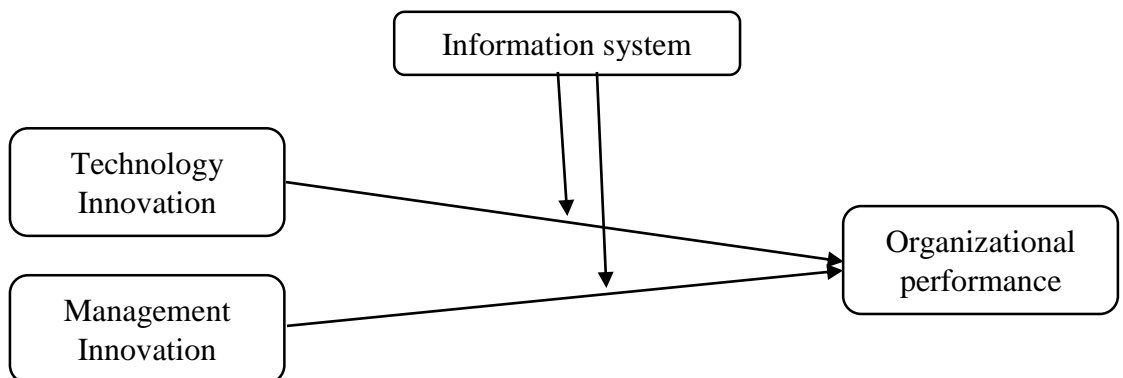
**H4:** The information system significantly moderates the relationship between technological innovation and the organizational performance of the manufacturing industry in Iraq.

In contrast, strategic planning and long-term goals are the responsibility of upper-level management. In this era of globalization, businesses use various techniques to improve performance. Market intelligence (MI) has emerged as a critical approach, especially in developing economies (Krašnicka et al., 2018). Managers are beginning to focus on the strategies (such as innovation, business knowledge, and training) that can build performance practices (Pereira et al., 2021) due to the increasing significance of organizational activities in commercial companies.

Organizational performance appears to be crucial for an ecosystem's health, and it substantially impacts company success. Therefore, CEOs use fresh pursuits and eco-friendly methods to meet their demands more effectively (Hornig et al., 2017). MI is particularly beneficial for gaining a competitive advantage and long-term viability among a company's many objectives (Stata, 1989). Modern businesses, for example, seek financial success and positive social and environmental consequences. Many of these outcomes are essential to a company's long-term success, and they all necessitate efficient organizational procedures supported by MI (Zhu et al., 2012). Senior management requires continuous innovation diffusions to link internal plans and strategies to environmental and demand changes (Hornig et al., 2017). MI is more important than ever in securing a company's long-term viability (Erzurumlu et al., 2013). Previous research has demonstrated that the information system is essential for improving organizational performance. Consequently, the following theory is proposed:

**H5:** Organizational performance having effective information is significantly higher than their counterparts.

The last part of the literature review became the basis for constructing the research framework. In the preceding phase of the literature study, it was determined that technology innovation, management innovation, and information systems are linked with organizational performance, but these relationships are inconsistent. In addition, past research has mostly concentrated on the direct influence of management, technology, and information systems on organizational performance. In contrast, the indirect moderating effect has received less attention. Diverse authors have stated in the literature that product information system companies are more inventive, which could result in improved organizational performance. The study framework is expanded to include the moderating effect of information systems on the relationships between technology innovation, management innovation, and organizational performance, as predicted in Figure 1.



**Figure 1.** Conceptual Framework



### 3. RESEARCH METHODOLOGY

This study aimed to examine the moderating effects of information systems on the relationship between management innovation, technological innovation, and organizational performance. The quantitative research methodology was employed. This study utilized a cross-sectional research approach. The "quantitative research approach" is more valid and trustworthy than the "qualitative research technique." We gathered information from the management of Iraqi industrial companies.

The population and individuals who managed Iraqi manufacturing companies were considered the unit of study. The selection of manufacturing sector managers was based on their comprehensive organizational understanding. The "Convenient sampling method" was employed to obtain data from managers. The data was acquired using a questionnaire distributed to 600 organizational performance managers who manufacturing companies actively employed. We returned 400 questionnaires. The questionnaire was adapted from previous studies that included self-administered questions. Nine items were utilized to measure technology innovation, five to measure management innovation, and five to measure organizational performance. We adopted these things based on the findings of (Zhang et al., 2019). In addition, based on the results of (Hair et al., 2012), we chose five items to quantify IS. These questions were measured using the "five-point liberty scale," which ranged from 1 (indicating "strongly disagree") to 5 (indicating "strongly agree").

### 4. DATA ANALYSIS AND FINDINGS

#### 4.1 Contract Reliability and Validity Model

In this section of the investigation, [Table.1](#) demonstrates the dependability of the data using the "two validity criteria" (convergent validity and discriminant validity) as a measurement model. Concurrent validity refers to the extent to which identical constructs correspond to one another (Hair et al., 2012). Using a group of measures allows for the creation of convergent validity. This includes Cronbach alpha, factor loading, average variance extracted (AVE), and composite reliability (CR). In the questionnaire, load the items used by the intelligent PLS. To accept the factor, the minimum load value of the items must be more than or equal to 0.50. (Hair et al., 2012). At a minimum, the division that was another validator (CR) must be (0.70). (Hair et al., 2012). The AVE of the previous indication must be at least (0.5) or greater. Moreover, the recommended minimum value for Cronbach's alpha is 0.7 (Hair et al., 2012). The above predictor results are displayed in [Table.1](#), and [Figure.2](#) demonstrates that the instrument meets the criteria for convergent validity.

**Table 1. Convergent Validity**

	<b>Cronbach's Alpha</b>	<b>CR</b>	<b>AVE</b>
Organizational performance	0.823	0.866	0.788
Management Innovation	0.847	0.894	0.734
Technology innovation	0.867	0.870	0.704
Information system	0.832	0.883	0.703

## 4.2 Discriminant Validity

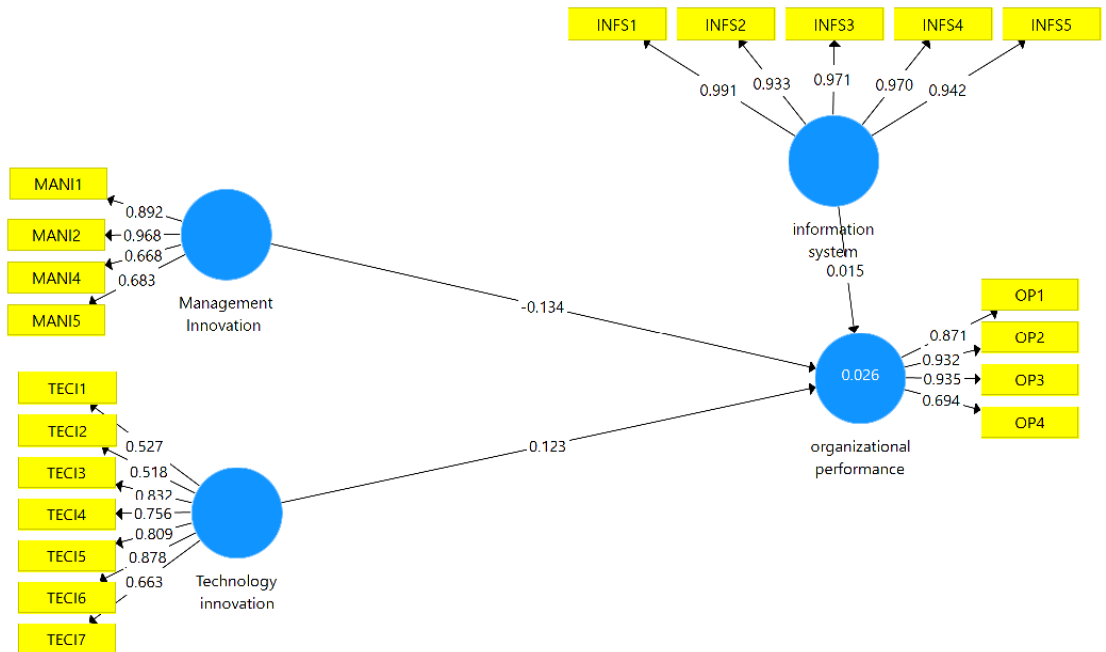
In this study, discriminant validity was also an important suggested validity test. This was determined via Fornell & Larcker's cross-loadings, the Heterotrait monotrait correlation ratio (HTMT), and cross-loadings (Hair et al., 2012; Henseler et al., 2015). The first method demonstrated that indicators, and not other constructs, were the cause of high variation. Therefore, the construct indicates discriminating validity when the value of the AVE square root is bigger than diagonal values (Chin, 1998), which indicates a stronger association. According to Henseler et al. (2015), each indication was significantly more loaded due to cross-loading than transverse loads. As a result, discriminant validity is more appropriate for each building in the sample, as the AVE for each building is greater than the square correlation along with other structures, as well as the loading of each indicator in each building, which has increased relative to cross loading in other structures. Minimum AVE value of 0.50 or more. According to Henseler et al. (2015), the discriminant should be identified within two constructs if HTMT is less than (0.90). Table.3 predicts that all correlations between the constructs are less than 0.90, indicating that the construct has discriminant validity.

**Table 2. Fornell and Larcker**

	<b>Organizational performance</b>	<b>Information system</b>	<b>Technology innovation</b>	<b>Information system</b>
Organizational performance	0.881			
Management Innovation	0.556	0.870		
Technology innovation	0.442	0.531	0.890	
Information system	0.534	0.567	0.594	0.820

**Table 3. HTMT Criteria**

	Organizational performance	Information system	Technology innovation	Information system
Organizational performance				
Management Innovation	0.452			
Technology innovation	0.234	0.231		
Information system	0.452	0.452	0.231	



**Figure 2.** Assessment of Measurement Model

### 4.3 Hypothesis Testing

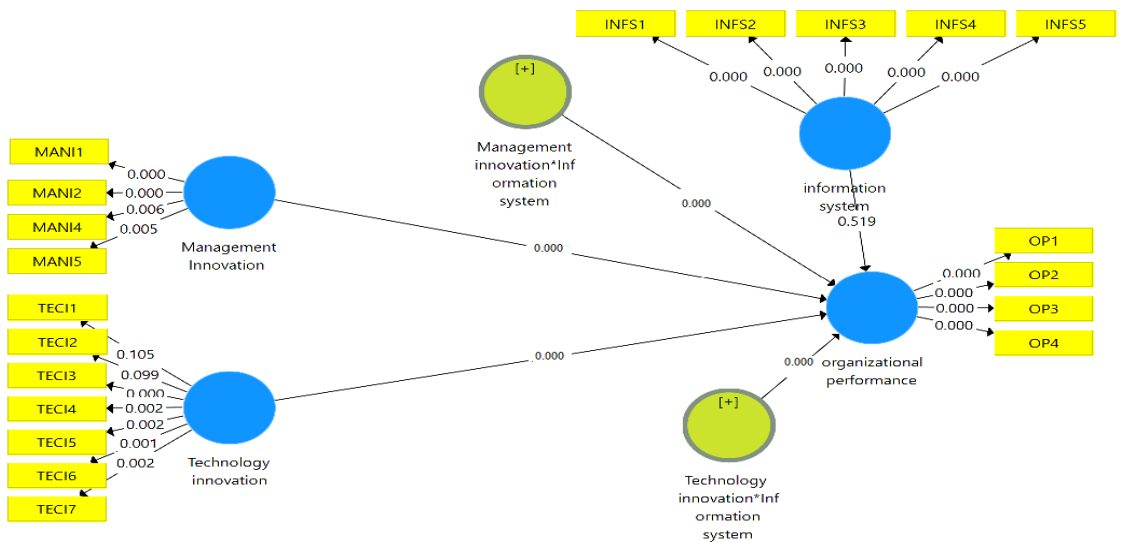
The Bootstrapping path coefficients are provided in [Table.4](#) comprise the values of P and T, the sample mean, and the sample standard deviation mean. T statistic values must be greater than 1.96, and P must be less than 0.05. These values are acceptable standards ([Hair et al., 2012](#)). In the following [Table](#), the P value of 0.000 indicates that technological innovation positively links to organizational performance. The T value of 5.708, which is more than 1.96, confirms the proposed hypothesis. In addition, the P value for management innovation is 0.000, and the T statistic value is 6,175, which is

larger than 1.96, indicating a positive and statistically significant association between management innovation and organizational performance.

Moreover, the association between information systems and organizational performance has a P value of 0.000 and a T value of 5.55, indicating a substantial and positive relationship. In addition, the interaction effect (technology innovation x information system) has a large and favorable impact on organizational performance.

**Table 4. Structural Model**

	Original Sample	Standard Deviation	T Statistics	P Values
Technology innovation -> Organizational performance	0.108	0.019	5.708	0.000
Management Innovation -> Organizational performance	0.183	0.03	6.175	0.000
Information system -> Organizational performance	0.221	0.04	5.557	0.000
Technology Innovation x Information system -> Organizational performance	0.405	0.069	5.841	0.000
Management innovation x Information system -> Organizational performance	0.323	0.041	7.817	0.000



**Figure 3. Assessment of Structural Model**

The moderating implications also show that the information system moderates the association between technological innovation and organizational performance in a favorable and significant way. Innovation in management consistently yields the same results. These findings imply that IS is a significant moderator between technology innovation, management innovation, and organizational performance. The results are displayed in [Table.4](#) and [Figure.3](#).

## 5. DISCUSSION

This study examined whether an information system can mediate managerial innovation, technological innovation, and organizational performance in Pakistan's manufacturing industry. In developed markets, numerous studies have investigated the relationship between management innovation and organizational performance ([Mazaheri et al., 2021](#)) and technology innovation and organizational performance ([Yang et al., 2018](#)). Nonetheless, this study attempts to test the idea using data collected in a developing nation. As a result, we confirm that overall management and technological innovation have positively impacted corporate efficiency in developing economies. We discover a positive, statistically significant association between an organization's information system and organizational performance, thereby providing a suitable response to the opposing hypotheses ([Yang et al., 2018](#)). In addition, our findings strongly support the resource base view hypothesis, which demonstrates that a company's better performance and long-term competitive advantage are contingent on its access to unique and valuable resources ([Ferina et al., 2021](#)). We also demonstrated that an innovative business could flourish in a competitive market and sustain market leadership over time. We argue that technology innovation as a capability promotes an organization's internal structure and procedures, enhancing its performance. In addition, this study assesses the core tenet of the upper echelon theory, which holds that an organization's leadership has a decisive impact on its success and consequences ([Massaro, 2022; Tidd et al., 2020](#)). This study argues that adopting a more creative mentality can increase organizational performance in developing economies. According to our research, both management and technological innovation had a major impact on organizational performance. ([Tidd et al., 2020](#)) examined the effect of market volatility on organizational performance and discovered that managerial and technological innovation were significant predictors. In addition, [Wu \(2010\)](#) observed that management innovation helps organizations in various ways, greatly increasing their performance and output. Additional data indicates that management innovation contributes to improved organizational performance by encouraging the creative exploitation of previously untapped resources.

Moreover, management innovation is a crucial aspect of organizational effectiveness ([Birkinshaw et al., 2008](#)). Our findings are consistent with the results of ([Cheng et al., 2014](#)), who stated that incremental advancements in IT innovation could significantly impact business operations from the perspective of technological innovation. In addition, the data demonstrate that technological innovation and management innovation have

beneficial and substantial effects on information systems. These findings are corroborated by prior investigations (Allen, 2000; Fichman, 2004; Fukas et al., 2021). Our results indicate that managerial and technological innovation contribute significantly to the information systems of enterprises, following the conclusions of (Gary Hamel, 2006), who suggested that despite MI's seeming complexity, it can significantly improve a company's long-term competitive advantage. In the current era of globalization, businesses apply IS using various methods. Even though management innovation has been acknowledged as a critical factor, especially in growing fields, it is not the only choice. Comparing our findings to those of Yang et al. (2018), we find that they concur that technology innovation and management innovation play an important role in enhancing the information systems and competitive advantage of firms. In addition, (Aral et al., 2007) emphasized that technological innovation increases the longevity of corporate value by improving several internal and external processes.

In addition, the information system has a substantial and favorable impact on organizational performance, backed by prior research with similar conclusions (Zhang et al., 2019). Based on these findings, it is investigated if the information system significantly increases organizational performance. According to Kheterpal (2011), information systems enable firms to sustain a high level of performance. Moreover, Rumbayan et al. (2012) stated that information systems boost the performance of enterprises during difficult times. Therefore, managers are strongly encouraged to enhance their organization's information system, as it can significantly contribute to its competitive performance (Prasad et al., 2015).

Moreover, information systems contribute to the success of a business (Susanto & Meiryani, 2019). Information systems moderates the association between management innovation and organizational performance and the relationship between technological innovation and organizational performance, verifying the study's hypotheses 6 and 7. R. C. Lee (2012) elaborated that managers with innovative skills and competencies get crucial resources that configure the information system and ultimately result in an excellent performance. In conclusion, our study indicated that the information system is a powerful moderator between management innovation and organizational performance, as well as technology innovation and organizational performance, in the Iraqi manufacturing industry.

## 6. CONCLUSIONS

The primary objective of this study is to investigate the relationship between technological innovation and management innovation, and organizational performance, with the information system serving as a moderating variable. The researcher employed "Structural Equation Modelling" (SEM) to analyze data received from textile company management. The findings reveal that management and technological innovation have a beneficial relationship with operational and information system performance. In this

study, the resource-based view theory is employed. In addition, the results of this study demonstrated a significant relationship between information systems and operational performance, which was confirmed by the resource-based view. Innovation and information systems have a significant impact and are advantageous to operational execution. This study demonstrates that a company's unique assets positively correlate with its success.

Moreover, information systems serve as a moderator between innovation metrics and operational performance. The results demonstrated that information systems are highly advantageous for enhancing operational data, therefore confirming the value creation idea. The results also corroborate the resource-based perspective hypothesis, as internal technological and management innovation capabilities are crucial performance indicators. Innovation indicators are more useful for an information system to attain superior operational performance in Iraq's rising economy. The Iraqi textile sector must implement these innovation strategies in various divisions to improve performance. This study revealed that innovation indicators (technology innovation and managerial innovation) are the primary predictors of operational success for an information system. Companies are encouraged to implement both types of innovations to improve performance. For long-term survival in the global market, managers and CEOs of organizations are advised to focus on certain performance measures.

## **7. IMPLICATIONS AND FUTURE DIRECTIONS**

Our study guides managers and practitioners to build their information system plans and policies and enhance performance based on empirical evidence. In developing economies, enhancing information systems results in increased operational efficiency. Instead of focusing on mass manufacturing using conventional methods, this paper argues that businesses should emphasize technological and managerial innovation to enhance operational performance and information systems. Companies operating in developing nations are encouraged to place a greater emphasis on management and technological innovation. To attain greater competitive advantage and excellent performance, businesses should implement management and technological innovation. The findings of this study will aid employees and management in making more informed decisions. As a result of globalization, promoting technological and managerial innovation is crucial. Traditional techniques of production no longer produce sufficient outcomes. Thus, particularly in uncertain markets, innovations are necessary for long-term survival.

While this study makes a substantial contribution to the field, it also includes weaknesses that can be addressed in future research. In our study, we focused on the two primary categories of innovation: technological innovation and management innovation. Other factors, such as marketing and process innovation, may also affect the organization's performance. In future research, a substantial amount of effort might be devoted to this

topic to examine each invention's many effects. Similarly, we employ a restricted number of KPIs to assess operational performance. Future research should investigate additional performance evaluation factors, such as customer and non-operational performance. Is the relationship between creativity and performance moderated by the information system? It can be explored in future studies. Future researchers should consider financial capital to better their discoveries and findings. Future research can expand on this topic by incorporating more innovation variables, which may improve both the information system and the performance of businesses. In addition, the researchers may examine data from many industries, such as services, manufacturing, and SMBs.

## REFERENCES

- Allen, J. P. (2000). Information systems as technological innovation. *Information Technology & People*, 13(3), 210-221. doi: <https://doi.org/10.1108/09593840010377644>
- Almeida, M. F. L. d., & Melo, M. A. C. d. (2017). Sociotechnical regimes, technological innovation and corporate sustainability: from principles to action. *Technology Analysis & Strategic Management*, 29(4), 395-413. doi: <https://doi.org/10.1080/09537325.2016.1215419>
- Anwar, M. (2018). Business model innovation and SMEs performance—does competitive advantage mediate? *International Journal of Innovation Management*, 22(07), 1850057. doi: <https://doi.org/10.1142/S1363919618500573>
- Anwar, M., Shah, S. Z. A., Khan, S. Z., & Khattak, M. S. (2019). Manager's personality and business model innovation. *International Journal of Innovation Management*, 23(07), 1950061. doi: <https://doi.org/10.1142/S1363919619500610>
- Aral, S., & Weill, P. (2007). IT assets, organizational capabilities, and firm performance: How resource allocations and organizational differences explain performance variation. *Organization Science*, 18(5), 763-780. doi: <https://doi.org/10.1287/orsc.1070.0306>
- Avgerou, C., Ciborra, C., & Land, F. (2004). *The social study of information and communication technology: Innovation, actors, and contexts*: Oxford University Press, Inc. Retrieved from <https://dl.acm.org/doi/abs/10.5555/1027508>
- Bajae, L. S., & Mohamed, A. T. (2021). Organizational Values and their Impact on Strategic Behavior: An exploratory study in the Iraqi General Company for Textile and Leather Industries. *Review of International Geographical Education Online*, 11(9), 681-694. Retrieved from <https://web.s.ebscohost.com/abstract?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=21460353&AN=155852796&h>



- Birkinshaw, J., Hamel, G., & Mol, M. J. (2008). Management innovation. *Academy of Management Review*, 33(4), 825-845. doi: <https://doi.org/10.5465/amr.2008.34421969>
- Brundtland, G. H. (1987). *Report of the World Commission on environment and development: "our common future."*: UN
- Camisón, C., & Villar-López, A. (2014). Organizational innovation as an enabler of technological innovation capabilities and firm performance. *Journal of Business Research*, 67(1), 2891-2902. doi: <https://doi.org/10.1016/j.jbusres.2012.06.004>
- Cheng, C. C., Yang, C.-I., & Sheu, C. (2014). The link between eco-innovation and business performance: A Taiwanese industry context. *Journal of Cleaner Production*, 64, 81-90. doi: <https://doi.org/10.1016/j.jclepro.2013.09.050>
- Chin, W. W. (1998). Commentary: Issues and opinion on structural equation modeling. In (Vol. 22, pp. vii-xvi): JSTOR. Retrieved from <https://www.jstor.org/stable/249674>.
- Coccia, M. (2017). Sources of technological innovation: Radical and incremental innovation problem-driven to support competitive advantage of firms. *Technology Analysis & Strategic Management*, 29(9), 1048-1061. doi: <https://doi.org/10.1080/09537325.2016.1268682>
- Erzurumlu, S. S., & Erzurumlu, Y. O. (2013). Development and deployment drivers of clean technology innovations. *The Journal of High Technology Management Research*, 24(2), 100-108. doi: <https://doi.org/10.1016/j.hitech.2013.09.001>
- Expósito, A., & Sanchis-Llopis, J. A. (2019). The relationship between types of innovation and SMEs' performance: A multi-dimensional empirical assessment. *Eurasian Business Review*, 9(2), 115-135. doi: <https://doi.org/10.1007/s40821-018-00116-3>
- Ferina, I. S., Mulyani, S., Afia, N. N., & Poulus, S. (2021). The Zero Fraud Implementation through the Innovation of Information Technology and Organizational Culture. *Journal of Southwest Jiaotong University*, 56(1), 325-334. doi: <https://doi.org/10.35741/issn.0258-2724.56.1.30>
- Fichman, R. G. (2004). Going beyond the dominant paradigm for information technology innovation research: Emerging concepts and methods. *Journal of the Association for Information Systems*, 5(8), 1. Retrieved from <https://aisel.aisnet.org/jais/vol5/iss8/1/>
- Fukas, P., & Thomas, O. (2021). Innovation by Information Technology Recombination: How Artificial Intelligence Progressive Web Apps Foster Sustainable Development. *INFORMATIK 2021*, 1370-1382. Retrieved from <https://www.researchgate.net/profile/Philipp-Fukas/publication/358525633>
- Geng, R., Mansouri, S. A., & Aktas, E. (2017). The relationship between green supply chain management and performance: A meta-analysis of empirical evidences in Asian emerging economies. *International Journal of Production Economics*, 183, 245-258. doi: <https://doi.org/10.1016/j.ijpe.2016.10.008>

- González-Blanco, J., Coca-Pérez, J. L., & Guisado-González, M. (2019). Relations between technological and non-technological innovations in the service sector. *The Service Industries Journal*, 39(2), 134-153. doi: <https://doi.org/10.1080/02642069.2018.1474876>
- Gundry, L. K., Kickul, J. R., Iakovleva, T., & Carsrud, A. L. (2014). Women-owned family businesses in transitional economies: key influences on firm innovativeness and sustainability. *Journal of Innovation and Entrepreneurship*, 3(1), 1-17. doi: <https://doi.org/10.1186/2192-5372-3-8>
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2012). Partial least squares: the better approach to structural equation modeling? *Long Range Planning*, 45(5-6), 312-319. doi: <http://dx.doi.org/10.1016/j.lrp.2012.09.011>
- Hamel, G. (2006). The Why, What, and How of Management Innovation. *Harvard Business Review*, 84(2), 72. Retrieved from <https://hbr.org/2006/02/the-why-what-and-how-of-management-innovation>
- Hamel, G. (2006). The why, what, and how of management innovation. *Harvard Business Review*, 84(2), 72. Retrieved from <http://he-product-images.s3.amazonaws.com/docs/R0602Cf2.pdf>
- Haneda, S., & Ito, K. (2018). Organizational and human resource management and innovation: which management practices are linked to product and/or process innovation? *Research Policy*, 47(1), 194-208. doi: <https://doi.org/10.1016/j.respol.2017.10.008>
- 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(1), 115-135. doi: <https://doi.org/10.1007/s11747-014-0403-8>
- Hervas-Oliver, J.-L., Sempere-Ripoll, F., Boronat-Moll, C., & Rojas-Alvarado, R. (2018). On the joint effect of technological and management innovations on performance: increasing or diminishing returns? *Technology Analysis & Strategic Management*, 30(5), 569-581. doi: <https://doi.org/10.1080/09537325.2017.1343462>
- Hinterhuber, A., & Liozu, S. M. (2017). Is innovation in pricing your next source of competitive advantage? 1. In *Innovation in Pricing* (pp. 11-27): Routledge, 11-27. Retrieved from <https://www.taylorfrancis.com/chapters/edit/10.4324/9781315184845-2>.
- Hollen, R. M., Van Den Bosch, F. A., & Volberda, H. W. (2013). The role of management innovation in enabling technological process innovation: An inter-organizational perspective. *European Management Review*, 10(1), 35-50. doi: <https://doi.org/10.1111/emre.12003>
- Hornig, J.-S., Liu, C.-H., Chou, S.-F., Tsai, C.-Y., & Chung, Y.-C. (2017). From innovation to sustainability: Sustainability innovations of eco-friendly hotels in Taiwan. *International Journal of Hospitality Management*, 63, 44-52. doi: <https://doi.org/10.1016/j.ijhm.2017.02.005>

- Hutahayan, B. (2020). The mediating role of human capital and management accounting information system in the relationship between innovation strategy and internal process performance and the impact on corporate financial performance. *Benchmarking: An International Journal*, 27(4), 1289-1318. doi: <https://doi.org/10.1108/BIJ-02-2018-0034>
- Jansson, J., Nilsson, J., Modig, F., & Hed Vall, G. (2017). Commitment to sustainability in small and medium- sized enterprises: The influence of strategic orientations and management values. *Business Strategy and the Environment*, 26(1), 69-83. doi: <https://doi.org/10.1002/bse.1901>
- Kareem, H. M., Aziz, K. A., Maelah, R., Yunus, Y. M., Alsheikh, A., & Alsheikh, W. (2021). The influence of accounting information systems, knowledge management capabilities, and innovation on organizational performance in Iraqi SMEs. *International Journal of Knowledge Management (IJKM)*, 17(2), 72-103. doi: <https://doi.org/10.4018/IJKM.2021040104>
- Kareem, H. M., Dauwed, M., Meri, A., Jarrar, M. t., Al-Bsheish, M., & Aldujaili, A. A. (2021). The Role of Accounting Information System and Knowledge Management to Enhancing Organizational Performance in Iraqi SMEs. *Sustainability*, 13(22), 12706. doi: <https://doi.org/10.3390/su132212706>
- Kassen, M. (2022). Blockchain and e-government innovation: Automation of public information processes. *Information Systems*, 103, 101862. doi: <https://doi.org/10.1016/j.is.2021.101862>
- Kaydos, W. (2020). *Operational performance measurement: increasing total productivity*. 1st Edition, 264: CRC press
- Khan, S. Z., Yang, Q., & Waheed, A. (2019). Investment in intangible resources and capabilities spurs sustainable competitive advantage and firm performance. *Corporate Social Responsibility and Environmental Management*, 26(2), 285-295. doi: <https://doi.org/10.1002/csr.1678>
- Kheterpal, S. (2011). Clinical research using an information system: the multicenter perioperative outcomes group. *Anesthesiology Clinics*, 29(3), 377-388. doi: <https://doi.org/10.1016/j.anclin.2011.06.002>
- Khosravi, P., Newton, C., & Rezvani, A. (2019). Management innovation: A systematic review and meta-analysis of past decades of research. *European Management Journal*, 37(6), 694-707. doi: <https://doi.org/10.1016/j.emj.2019.03.003>
- Kim, D., Cavusgil, S. T., & Calantone, R. J. (2006). Information system innovations and supply chain management: channel relationships and firm performance. *Journal of the academy of marketing science*, 34(1), 40-54. doi: <https://doi.org/10.1177/0092070305281619>
- Kraśnicka, T., Głód, W., & Wronka-Pośpiech, M. (2018). Management innovation, pro-innovation organisational culture and enterprise performance: testing the mediation effect. *Review of Managerial Science*, 12(3), 737-769. doi: <https://doi.org/10.1007/s11846-017-0229-0>

- Le Anh, T., Nguyen, T., & Tran, L. (2021). Relationships between innovation, its antecedents, and organisational performance: evidences from auditing service industry. *Knowledge Management Research & Practice*, 1-15. doi: <https://doi.org/10.1080/14778238.2021.1967216>
- Lee, R. C. (2012). Does the success of information systems really matters to firm performance? *IBusiness*, 4(02), 98. doi: <http://dx.doi.org/10.4236/ib.2012.42012>
- Lee, W. (2017). Sustainability of nonprofit human service organizations in a neighborhood context. *Nonprofit Management and Leadership*, 28(1), 11-24. doi: <https://doi.org/10.1002/nml.21264>
- Li, D., Zhao, Y., Zhang, L., Chen, X., & Cao, C. (2018). Impact of quality management on green innovation. *Journal of Cleaner Production*, 170, 462-470. doi: <https://doi.org/10.1016/j.jclepro.2017.09.158>
- Li, H., Yin, X., Ji, J., et al. (2012). Microstructural investigation to the controlled release kinetics of monolith osmotic pump tablets via synchrotron radiation X-ray microtomography. *International Journal of Pharmaceutics*, 427(2), 270-275. doi: <https://doi.org/10.1016/j.ijpharm.2012.02.017>
- Li, Y., Zhao, Y., & Liu, Y. (2006). The relationship between HRM, technology innovation and performance in China. *International Journal of Manpower*, 27(7), 679-697. doi: <https://doi.org/10.1108/01437720610708284>
- López-Nicolás, C., & Meroño-Cerdán, Á. L. (2011). Strategic knowledge management, innovation and performance. *International Journal of Information Management*, 31(6), 502-509. doi: <https://doi.org/10.1016/j.ijinfomgt.2011.02.003>
- Magon, R. B., Thomé, A. M. T., Ferrer, A. L. C., & Scavarda, L. F. (2018). Sustainability and performance in operations management research. *Journal of Cleaner Production*, 190, 104-117. doi: <https://doi.org/10.1016/j.jclepro.2018.04.140>
- Marsat, S., Pijourlet, G., & Ullah, M. (2022). Does environmental performance help firms to be more resilient against environmental controversies? International evidence. *Finance Research Letters*, 44, 102028. doi: <https://doi.org/10.1016/j.frl.2021.102028>
- Massaro, A. (2022). State of the Art and Technology Innovation. 1-49. doi: <https://doi.org/10.1002/9781119716907.ch1>
- Mazaheri, M., & Nazi, M. (2021). Innovation Management, Innovation Standards and its Importance. *Science Cultivation*, 12(1), 38-45. Retrieved from [http://www.sciencecultivation.ir/article\\_247554.html?lang=en](http://www.sciencecultivation.ir/article_247554.html?lang=en)
- Miller, D. J., Fern, M. J., & Cardinal, L. B. (2007). The use of knowledge for technological innovation within diversified firms. *Academy of Management Journal*, 50(2), 307-325. doi: <https://doi.org/10.5465/amj.2007.24634437>
- Mol, M. J., & Birkinshaw, J. (2009). The sources of management innovation: When firms introduce new management practices. *Journal of Business Research*, 62(12), 1269-1280. doi: <https://doi.org/10.1016/j.jbusres.2009.01.001>

- Nawab, S., Nazir, T., Zahid, M. M., & Fawad, S. M. (2015). Knowledge management, innovation and organizational performance. *International Journal of Knowledge Engineering, 1*(1), 43-48. doi: <https://doi.org/10.7763/IJKE.2015.V1.7>
- Nemlioglu, I., & Mallick, S. K. (2017). Do managerial practices matter in innovation and firm performance relations? New evidence from the UK. *European Financial Management, 23*(5), 1016-1061. doi: <https://doi.org/10.1111/eufm.12123>
- Okhunov, M., & Minamatov, Y. (2021). Application of Innovative Projects in Information Systems. *European Journal of Life Safety and Stability (2660-9630), 11*, 167-168. Retrieved from <http://www.ejlss.indexedresearch.org/index.php/ejlss/article/view/234>
- Olavarrieta, S., & Friedmann, R. (2008). Market orientation, knowledge-related resources and firm performance. *Journal of Business Research, 61*(6), 623-630. doi: <https://doi.org/10.1016/j.jbusres.2007.06.037>
- Ordanini, A., & Rubera, G. (2010). How does the application of an IT service innovation affect firm performance? A theoretical framework and empirical analysis on e-commerce. *Information & Management, 47*(1), 60-67. doi: <https://doi.org/10.1016/j.im.2009.10.003>
- Ortiz-Villajos, J. M., & Sotoca, S. (2018). Innovation and business survival: A long-term approach. *Research Policy, 47*(8), 1418-1436. doi: <https://doi.org/10.1016/j.respol.2018.04.019>
- Pereira, L., Fernandes, A., Sempiterno, M., Dias, Á., Lopes da Costa, R., & António, N. (2021). Knowledge management maturity contributes to project-based companies in an open innovation era. *Journal of Open Innovation: Technology, Market, and Complexity, 7*(2), 126. doi: <https://doi.org/10.3390/joitmc7020126>
- Prasad, A., & Green, P. (2015). Organizational competencies and dynamic accounting information system capability: Impact on AIS processes and firm performance. *Journal of Information Systems, 29*(3), 123-149. doi: <https://doi.org/10.2308/isis-51127>
- Rumbayan, M., Abudureyimu, A., & Nagasaka, K. (2012). Mapping of solar energy potential in Indonesia using artificial neural network and geographical information system. *Renewable and Sustainable Energy Reviews, 16*(3), 1437-1449. doi: <https://doi.org/10.1016/j.rser.2011.11.024>
- Ryu, H. (2016). The relationship between non-technological innovation and technological innovation on firm performance. *Adv. Sci. Technol. Lett, 135*, 27-32. doi: <http://dx.doi.org/10.14257/astl.2016.135.08>
- Samson, D., & Terziowski, M. (1999). The relationship between total quality management practices and operational performance. *Journal of Operations Management, 17*(4), 393-409. doi: [https://doi.org/10.1016/S0272-6963\(98\)00046-1](https://doi.org/10.1016/S0272-6963(98)00046-1)

- Saunila, M. (2014). Innovation capability for SME success: perspectives of financial and operational performance. *Journal of Advances in Management Research*, 11(2), 163-175. doi: <https://doi.org/10.1108/JAMR-11-2013-0063>
- Seo, Y. W., & Chae, S. W. (2016). Market dynamics and innovation management on Performance in SMEs: Multi-agent simulation approach. *Procedia Computer Science*, 91, 707-714. doi: <https://doi.org/10.1016/j.procs.2016.07.060>
- Sirilli, G., & Evangelista, R. (1998). Technological innovation in services and manufacturing: results from Italian surveys. *Research policy*, 27(9), 881-899. doi: [https://doi.org/10.1016/S0048-7333\(98\)00084-5](https://doi.org/10.1016/S0048-7333(98)00084-5)
- Stata, R. (1989). Organizational learning-the key to management innovation. *MIT Sloan Management Review*, 30(3), 63. Retrieved from <https://www.proquest.com/openview/4a8df861a322ebbc6f1dace64759127>
- Swanson, E. B. (1994). Information systems innovation among organizations. *Management Science*, 40(9), 1069-1092. doi: <https://doi.org/10.1287/mnsc.40.9.1069>
- Tarafdar, M., & Gordon, S. R. (2007). Understanding the influence of information systems competencies on process innovation: A resource-based view. *The Journal of Strategic Information Systems*, 16(4), 353-392. doi: <https://doi.org/10.1016/j.jsis.2007.09.001>
- Tidd, J., & Bessant, J. R. (2020). *Managing innovation: integrating technological, market and organizational change*: John Wiley & Sons. Retrieved from <https://books.google.co.in/books?hl=en&lr=&id=5w4LEAAAQBAJ&oi=fnd&pg=PA1&dq=Tidd>
- Walker, R. M., Damanpour, F., & Devece, C. A. (2011). Management innovation and organizational performance: The mediating effect of performance management. *Journal of Public Administration Research and Theory*, 21(2), 367-386. doi: <https://doi.org/10.1093/jopart/muq043>
- Whittington, R., Pettigrew, A., & Thomas, H. (2002). Conclusion: doing more in strategy research. *Handbook of Strategy and Management*, 475-488.
- Wirtz, B. W., Pistoia, A., Ullrich, S., & Göttel, V. (2016). Business models: Origin, development and future research perspectives. *Long Range Planning*, 49(1), 36-54. doi: <https://doi.org/10.1016/j.lrp.2015.04.001>
- Wu, L.-Y. (2010). Which companies should implement management innovation? A commentary essay. *Journal of Business Research*, 63(3), 321-323. doi: <https://doi.org/10.1016/j.jbusres.2009.04.018>
- Yang, Y., Guo, L., Zhong, Z., & Zhang, M. (2018). Selection of technological innovation for service-orientated enterprises. *Sustainability*, 10(11), 3906. doi: <https://doi.org/10.3390/su10113906>
- Yu, X., Zhao, Z., Zhang, X., et al. (2021). Deep-learning-based open set fault diagnosis by extreme value theory. *IEEE Transactions on Industrial Informatics*, 18(1), 185-196. doi: <https://doi.org/10.1109/TII.2021.3070324>

- Zbaracki, M. J. (1998). The rhetoric and reality of total quality management. *Administrative science quarterly*, 43(3), 602-636. doi: <https://doi.org/10.2307/2393677>
- Zhang, Y., Khan, U., Lee, S., & Salik, M. (2019). The influence of management innovation and technological innovation on organization performance. A mediating role of sustainability. *Sustainability*, 11(2), 495. doi: <https://doi.org/10.3390/su11020495>
- Zhu, Q., Sarkis, J., & Lai, K.-h. (2012). Green supply chain management innovation diffusion and its relationship to organizational improvement: An ecological modernization perspective. *Journal of Engineering and Technology Management*, 29(1), 168-185. doi: <https://doi.org/10.1016/j.jengtecman.2011.09.012>