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Exploring the Role of Technological Innovation and Digital Transformation in Enhancing the Competitiveness of IT SMEs in Saudi Arabia

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Abstract
The competitiveness of small and medium-sized enterprises (SMEs) in the Information Technology (IT) sector is increasingly determined by their ability to innovate and embrace digital transformation. In the context of Saudi Arabia's Vision 2030, which aims to diversify the economy and reduce dependence on oil, IT SMEs are positioned as crucial players in driving economic growth, fostering innovation, and creating high-quality jobs. This study explores the role of technological innovation and digital transformation in enhancing the competitiveness of IT SMEs in Saudi Arabia. Through a mixed-methods approach, combining quantitative surveys and qualitative interviews with IT SME leaders, the study examines factors such as innovation capability, access to digital infrastructure, the regulatory environment, and leadership in driving competitiveness. The findings indicate that digital transformation significantly mediates the relationship between innovation and competitiveness, underscoring the importance of strategic investment in technology. The study also highlights the challenges IT SMEs face, including limited access to cutting-edge technology, regulatory complexities, and the need for skilled personnel. Practical recommendations are provided for IT SMEs to align their strategies with the objectives of Vision 2030, and for policymakers to create a more supportive environment for innovation and digital transformation. This study contributes to the body of knowledge on SME competitiveness in emerging economies and provides actionable insights for business leaders and policymakers in Saudi Arabia.
Keywords:

1. Introduction

The global business environment is undergoing a rapid transformation, driven by technological advancements and the increasing importance of digitalization. In this evolving landscape, small and medium-sized enterprises (SMEs) play a critical role in driving innovation, creating employment, and contributing to economic growth. This is particularly true in the Information Technology (IT) sector, where the pace of change is relentless, and the need for continuous innovation is paramount. In Saudi Arabia, the government's Vision 2030 initiative has set ambitious goals for economic diversification, with a strong emphasis on fostering innovation and digital transformation across various sectors, including IT.

Vision 2030 is a strategic framework designed to reduce Saudi Arabia's reliance on oil and to diversify its economy by promoting other sectors such as tourism, entertainment, and technology. Within this framework, SMEs, particularly those in the IT sector, are seen as key drivers of economic growth and job creation. The IT sector, with its potential for high-value job creation and innovation, is critical to achieving the objectives of Vision 2030. IT SMEs are expected to lead the way in developing new technologies, improving digital services, and enhancing the overall competitiveness of the Saudi economy on a global scale.

However, achieving and maintaining competitiveness in the IT sector requires more than just access to the latest technologies; it requires a strategic focus on technological innovation and digital transformation. Technological innovation involves the development and application of new technologies to create better products, services, or processes, while digital transformation refers to the integration of digital technologies into all aspects of an organization's

operations. Both are essential for IT SMEs to remain competitive in a rapidly changing market environment.

1.1 The Importance of IT SMEs in Saudi Arabia's Economic Diversification

The IT sector in Saudi Arabia has experienced significant growth over the past decade, driven by government initiatives, increasing demand for digital services, and the rapid pace of technological change. SMEs in this sector play a critical role in driving innovation, developing new products and services, and creating employment opportunities. However, the competitive landscape for IT SMEs is becoming increasingly complex, with new challenges emerging as technology continues to evolve.

Saudi Arabia's Vision 2030 outlines a plan to transform the Kingdom into a global investment powerhouse and a hub for technological innovation. As part of this vision, the government has launched several initiatives to support the growth of IT SMEs. These initiatives include investments in digital infrastructure, regulatory reforms aimed at making it easier for SMEs to operate, and programs designed to foster entrepreneurship and innovation. The objective is to create an environment where IT SMEs can thrive and contribute to the Kingdom's economic development.

Despite these supportive measures, IT SMEs in Saudi Arabia face several challenges that can hinder their competitiveness. These challenges include limited access to cutting-edge technology, difficulties in securing funding for innovation, and navigating a regulatory environment that is still evolving to meet the needs of the digital economy. Moreover, the global nature of the IT sector means that Saudi IT SMEs must compete not only with local firms but also with international players who may have more resources and experience. To overcome these challenges, IT SMEs in Saudi Arabia must focus on enhancing their innovation capabilities and embracing digital transformation.

1.2 The Role of Technological Innovation and Digital Transformation

In the rapidly changing IT sector, competitiveness is increasingly defined by an enterprise's ability to innovate and embrace digital transformation. Technological innovation and digital transformation are not just about adopting new technologies; they are about fundamentally rethinking business models, processes, and customer engagement strategies. For IT SMEs, this means leveraging digital technologies to improve operational efficiency, enhance customer experiences, and create new value propositions.

Technological innovation involves the development of new technologies and their application in creating new products, services, or processes. For IT SMEs, innovation capability is a critical determinant of competitiveness. Firms that invest in research and development (R&D), adopt new technologies, and foster a culture of innovation are better positioned to succeed in the digital economy. In Saudi Arabia, the government has recognized the importance of technological innovation for achieving the goals of Vision 2030. Several initiatives have been launched to support innovation in SMEs, including funding for R&D, innovation hubs, and partnerships with research institutions.

Digital transformation, on the other hand, involves the integration of digital technologies into all aspects of a business's operations. This includes everything from using cloud computing and big data analytics to improve decision-making, to adopting e-commerce platforms and digital marketing strategies to reach new customers. Digital transformation enables IT SMEs to operate more efficiently, respond more quickly to market changes, and offer more personalized and innovative products and services to their customers.

1.3 Research Objectives

Given the critical role of technological innovation and digital transformation in enhancing the competitiveness of IT SMEs, this study aims to explore how these factors influence the competitiveness of IT SMEs in Saudi Arabia. The primary objectives of this study are:

- To explore the role of technological innovation in enhancing the competitiveness of IT SMEs in Saudi Arabia.
- To examine the impact of digital transformation on the competitiveness of IT SMEs.
- To identify strategies that IT SMEs can use to align their technological and digital initiatives with the goals of Vision 2030.

By achieving these objectives, the study aims to contribute to the body of knowledge on SME competitiveness in the IT sector and provide practical recommendations for IT SMEs in Saudi Arabia.

1.4 Research Questions

To guide the research, the following questions have been formulated:

- How does technological innovation influence the competitiveness of IT SMEs in Saudi Arabia?
- What role does digital transformation play in enhancing the competitiveness of IT SMEs?
- How can IT SMEs in Saudi Arabia align their technological and digital initiatives with the objectives of Vision 2030?

These questions are designed to explore the critical factors that contribute to the competitiveness of IT

SMEs and how these factors can be leveraged to achieve success in the digital economy.

1.5 Significance of the Study

This study is significant for several reasons. First, it contributes to the understanding of how technological innovation and digital transformation influence the competitiveness of IT SMEs in Saudi Arabia. By exploring these factors, the study provides valuable insights that can inform both academic research and practical applications.

Second, the study highlights the importance of aligning technological and digital initiatives with the broader economic goals of Vision 2030. As Saudi Arabia seeks to diversify its economy and reduce its dependence on oil, IT SMEs have a critical role to play in driving innovation and creating high-value jobs. By examining how these enterprises can enhance their competitiveness through innovation and digital transformation, the study provides practical recommendations for policymakers and business leaders.

Finally, the study offers strategies for IT SMEs to navigate the challenges of digital transformation and leverage technological innovation to gain a competitive edge. These strategies are intended to help IT SMEs in Saudi Arabia thrive in an increasingly digital and globalized economy, contributing to the broader goals of economic diversification and growth.

2. Literature Review

The competitiveness of small and medium-sized enterprises (SMEs) in the Information Technology (IT) sector is deeply rooted in their ability to innovate and adapt to rapidly changing technological landscapes. This literature review delves into the theoretical frameworks that underpin the study of technological innovation and digital transformation, examines the role of these factors in enhancing SME competitiveness, and explores the challenges and opportunities faced by IT SMEs in Saudi Arabia.

2.1 Theoretical Framework

Understanding the competitiveness of IT SMEs requires a multi-faceted approach, incorporating various theoretical perspectives that explain how organizations innovate, transform, and adapt to their environments. This section discusses the Technology-Organization-Environment (TOE) framework, the Dynamic Capabilities framework, the Diffusion of Innovation (DOI) theory, and the Resource-Based View (RBV) as key theoretical foundations.

2.1.1 Technology-Organization-Environment (TOE) Framework

The TOE framework, developed by Tornatzky and Fleischer (1990), posits that the adoption and implementation of new technologies within an organization are influenced by three key contexts: technological, organizational, and environmental. The technological context refers to the availability, compatibility, and relative advantage of technologies. The organizational context includes the firm's size, structure, and resources, while the environmental context encompasses external factors such as competition, regulatory pressures, and market dynamics.

In the context of IT SMEs, the TOE framework provides a comprehensive approach to understanding how these enterprises adopt and leverage new technologies to enhance their competitiveness. For example, an IT SME's decision to adopt cloud computing technology may be influenced by the perceived benefits of scalability and cost savings (technological context), the availability of skilled IT staff (organizational context), and competitive pressures from rivals who have already adopted similar technologies (environmental context). The TOE framework emphasizes that successful technology adoption is not solely dependent on technological factors but also on the organizational readiness and the external environment in which the firm operates.

2.1.2 Dynamic Capabilities Framework

The Dynamic Capabilities framework, introduced by Teece, Pisano, and Shuen (1997), focuses on an organization's ability to integrate, build, and reconfigure internal and external resources to address rapidly changing environments. Dynamic capabilities are seen as the firm's ability to adapt to technological changes, innovate continuously, and respond to market shifts. This framework is particularly relevant to IT SMEs, which operate in an industry characterized by rapid technological advancements and shifting consumer demands.

For IT SMEs in Saudi Arabia, developing dynamic capabilities is crucial for staying competitive in the fast-paced digital economy. This involves not only adopting new technologies but also evolving organizational processes, business models, and strategies to align with technological advancements. For instance, an IT SME may develop dynamic capabilities by investing in R&D, fostering a culture of continuous learning, and building strategic alliances with technology partners to stay ahead of technological trends. The Dynamic Capabilities framework underscores the importance of agility and adaptability in achieving and maintaining competitiveness in the IT sector.

2.1.3 Diffusion of Innovation (DOI) Theory

The Diffusion of Innovation (DOI) theory, developed by Rogers (1962), explains how new ideas, technologies, and practices spread within an organization or society. The theory identifies several key elements that influence the adoption of

innovations, including the perceived relative advantage of the innovation, its compatibility with existing systems, its complexity, and the communication channels used to promote it.

In the context of IT SMEs, the DOI theory provides a framework for understanding how these firms adopt technological innovations and digital transformation initiatives. For example, the adoption of a new software development methodology may be influenced by its perceived efficiency gains (relative advantage), how well it integrates with existing tools (compatibility), the learning curve associated with its use (complexity), and how information about the methodology is disseminated within the organization (communication channels). The DOI theory suggests that the successful adoption of innovations depends on how well these factors are managed, highlighting the importance of strategic planning and leadership in driving technological change.

2.1.4 Resource-Based View (RBV)

The Resource-Based View (RBV) of the firm, articulated by Barney (1991), posits that a firm's competitive advantage is derived from its ability to manage and utilize its resources effectively. These resources can be tangible, such as physical assets, or intangible, such as knowledge, skills, and capabilities. The RBV emphasizes that resources that are valuable, rare, inimitable, and non-substitutable (VRIN) are key to achieving sustained competitive advantage.

For IT SMEs in Saudi Arabia, resources such as innovation capability, access to advanced technologies, and skilled personnel are critical to achieving competitiveness. The RBV framework suggests that IT SMEs that effectively leverage their unique resources, such as proprietary software or specialized technical expertise, are more likely to achieve superior performance compared to those that do not. Additionally, the RBV highlights the importance of continuous investment in developing and protecting these resources to maintain a competitive edge.

2.2 Technological Innovation in IT SMEs

Technological innovation is widely recognized as a key driver of competitiveness in the IT sector. For IT SMEs, innovation capability involves the ability to develop new products, services, and processes that meet the changing needs of the market. This section explores the role of technological innovation in enhancing SME competitiveness and the factors that influence innovation capability in IT SMEs.

2.2.1 Drivers of Technological Innovation

The literature on technological innovation identifies several drivers that influence the innovation capability of IT SMEs. These drivers include internal factors such as R&D investment, organizational culture, and leadership, as well as external factors such as market demand, competition, and government support. For instance, firms that invest heavily in R&D are more likely to develop breakthrough innovations that can provide a competitive advantage. Similarly, an organizational culture that encourages experimentation and risk-taking can foster an environment conducive to innovation.

In Saudi Arabia, government initiatives aimed at promoting innovation, such as funding for R&D and the establishment of innovation hubs, have played a significant role in driving technological innovation in IT SMEs. These initiatives are aligned with the goals of Vision 2030, which emphasizes the importance of innovation in achieving economic diversification and growth. However, despite these efforts, many IT SMEs in Saudi Arabia face challenges in building and sustaining innovation capability, such as limited access to advanced technology and a shortage of skilled personnel.

2.2.2 Barriers to Technological Innovation

While technological innovation is crucial for competitiveness, IT SMEs often encounter significant barriers that hinder their ability to innovate. These barriers include financial constraints, a lack of access to cutting-edge technology, and difficulties in attracting and retaining skilled talent. For example, many IT SMEs in Saudi Arabia struggle to secure the funding necessary for R&D activities, which can limit their ability to develop new products and services. Additionally, the rapid pace of technological change can make it difficult for SMEs to stay up-to-date with the latest technologies and trends.

Another significant barrier is the regulatory environment, which can either support or hinder innovation. In some cases, complex regulations and bureaucratic hurdles can slow down the innovation process and increase costs for IT SMEs. Conversely, a supportive regulatory environment that encourages innovation, protects intellectual property, and facilitates access to funding can help IT SMEs overcome these barriers and enhance their innovation capability.

2.2.3 Strategies for Enhancing Innovation Capability

To overcome these barriers and enhance their innovation capability, IT SMEs in Saudi Arabia must adopt a range of strategies. These strategies include investing in R&D, fostering a culture of innovation, building strategic partnerships, and leveraging government support. For instance, by collaborating with universities and research institutions, IT SMEs can gain access to new knowledge, technologies, and talent, which can enhance their innovation capability. Additionally, by participating in government programs that provide funding and support for

innovation, IT SMEs can reduce the financial constraints that often hinder innovation.

Moreover, IT SMEs can enhance their innovation capability by adopting open innovation practices, which involve collaborating with external partners to develop new products and services. Open innovation can provide IT SMEs with access to new ideas, technologies, and markets, and can help them overcome the resource constraints that often limit their ability to innovate. By embracing these strategies, IT SMEs in Saudi Arabia can enhance their competitiveness and contribute to the broader goals of Vision 2030.

2.3 Digital Transformation in IT SMEs

Digital transformation involves the integration of digital technologies into all aspects of an organization's operations, resulting in fundamental changes to how the organization delivers value to customers. For IT SMEs, digital transformation is not just about adopting new technologies; it is about rethinking business models, processes, and customer engagement strategies to thrive in the digital age.

2.3.1 The Role of Digital Transformation in Enhancing Competitiveness

The literature on digital transformation emphasizes its role as a critical enabler of competitiveness. Firms that successfully implement digital transformation initiatives are better able to improve operational efficiency, enhance customer experiences, and respond to market changes. For example, by adopting cloud computing, big data analytics, and artificial intelligence (AI), IT SMEs can streamline their operations, reduce costs, and offer more personalized and innovative products and services to their customers.

In Saudi Arabia, the government's Vision 2030 initiative has placed a strong emphasis on digital transformation as a key driver of economic growth. The development of digital infrastructure, such as high-speed internet, cloud computing, and e-government services, is expected to create new opportunities for IT SMEs. However, the success of digital transformation initiatives depends on the ability of SMEs to adopt and integrate these technologies effectively.

2.3.2 Challenges in Implementing Digital Transformation

Despite the potential benefits of digital transformation, many IT SMEs in Saudi Arabia face significant challenges in implementing these initiatives. These challenges include limited access to digital infrastructure, resistance to change, and a lack of digital skills. For instance, SMEs in rural areas may struggle to access high-speed internet, which is essential for adopting cloud computing and other digital technologies. Additionally, resistance to change among employees and management can hinder the adoption of new technologies and processes.

Another challenge is the shortage of digital skills, which can limit the ability of IT SMEs to implement and manage digital transformation initiatives. In Saudi Arabia, the demand for skilled IT professionals, such as data scientists, cybersecurity experts, and software developers, often exceeds the supply, making it difficult for SMEs to attract and retain the talent needed to drive digital transformation. To address these challenges, IT SMEs must invest in training and development programs to build the digital skills of their workforce and foster a culture of innovation and continuous learning.

2.3.3 Strategies for Successful Digital Transformation

To successfully implement digital transformation initiatives, IT SMEs in Saudi Arabia must adopt a strategic approach that aligns with their business goals and resources. This includes developing a clear digital transformation strategy, investing in the necessary technologies and infrastructure, and building the digital skills of their workforce. Additionally, IT SMEs should consider partnering with technology providers and consultants who can provide expertise and support throughout the digital transformation process.

Another key strategy is to foster a culture of innovation and continuous improvement within the organization. This involves encouraging employees to embrace new technologies, experiment with new ideas, and continuously seek ways to improve processes and customer experiences. By creating an environment that supports innovation and digital transformation, IT SMEs can enhance their competitiveness and position themselves for success in the digital economy.

2.3.4 The Impact of Digital Transformation on Business Models

Digital transformation often leads to significant changes in business models, as IT SMEs adapt to new technologies and market dynamics. For example, the shift to cloud computing and software-as-a-service (SaaS) models has transformed the way IT SMEs deliver software products and services to customers. Instead of selling software licenses, many IT SMEs now offer subscription-based services that provide ongoing value to customers and generate recurring revenue for the business.

Similarly, the rise of e-commerce and digital marketing has transformed the way IT SMEs engage with customers and sell their products and services. By leveraging digital platforms and tools, IT SMEs can reach a global audience, personalize their offerings,

and build stronger relationships with customers. These changes in business models not only enhance the competitiveness of IT SMEs but also create new opportunities for growth and expansion.

In conclusion, the literature on technological innovation and digital transformation provides valuable insights into the factors that influence the competitiveness of IT SMEs in Saudi Arabia. By understanding these factors and developing strategies to address them, IT SMEs can enhance their performance and contribute to the broader goals of Vision 2030. The next section of the study will explore the methodology used to investigate these factors and their impact on SME competitiveness.

3. Methodology

The methodology section outlines the research design, data collection methods, analytical techniques, and ethical considerations employed in this study. The purpose of this section is to provide a detailed explanation of how the research was conducted to ensure the reliability and validity of the findings. This study adopts a mixed-methods approach, combining quantitative and qualitative data to gain a comprehensive understanding of the factors influencing the competitiveness of IT SMEs in Saudi Arabia.

3.1 Research Design

This study employs a cross-sectional research design, which involves collecting data from IT SMEs in Saudi Arabia at a single point in time. The cross-sectional design is particularly suitable for this study because it allows for the examination of relationships between key factors such as technological innovation, digital transformation, and SME competitiveness across a broad sample of firms. This approach provides a snapshot of the current state of IT SMEs in Saudi Arabia, enabling the identification of patterns and correlations that may not be observable over a shorter time frame.

The research design incorporates both quantitative and qualitative elements, allowing for a holistic analysis of the factors influencing IT SME competitiveness. The quantitative component involves the use of structured surveys to collect numerical data on variables such as innovation capability, digital transformation initiatives, access to infrastructure, and the regulatory environment. The qualitative component involves open-ended survey questions and follow-up interviews, which provide deeper insights into the experiences and perspectives of IT SME leaders.

The mixed-methods approach offers several advantages, including the ability to triangulate data from different sources, enhance the robustness of the findings, and provide a more nuanced understanding of the factors that influence IT SME competitiveness. By combining quantitative and qualitative data, this study aims to provide a comprehensive analysis that captures the complexity of the challenges and opportunities faced by IT SMEs in Saudi Arabia.

3.2 Sampling Techniques

The study employs a stratified random sampling technique to select a representative sample of IT SMEs in Saudi Arabia. Stratified sampling is a type of probability sampling where the population is divided into subgroups or strata based on specific characteristics, such as firm size, industry sector, or geographic location. Random samples are then drawn from each stratum to ensure that the sample is representative of the entire population.

In this study, the population of IT SMEs in Saudi Arabia is stratified based on the following criteria:

- **Firm Size**: The sample includes micro, small, and medium-sized enterprises, as defined by the General Authority for Small and Medium Enterprises (Monsha'at). This ensures that the sample captures the diversity of firm sizes within the IT sector.
- **Industry Sector**: The sample includes SMEs from various sub-sectors within the IT industry, such as software development, IT consulting, telecommunications, cybersecurity, and digital services. This allows the study to explore differences in competitiveness across different sub-sectors.
- **Geographic Location**: The sample includes IT SMEs from different regions of Saudi Arabia, including major cities like Riyadh, Jeddah, and Dammam, as well as smaller cities and rural areas. This ensures that the sample reflects the geographic diversity of the IT sector in Saudi Arabia.

The final sample size is determined based on the Krejcie and Morgan (1970) table for determining sample size from a given population. The target sample size is set at 200 IT SMEs, which provides sufficient statistical power to detect significant relationships between the variables of interest. The sample size also allows for meaningful subgroup analysis, enabling the study to explore variations in competitiveness across different firm sizes, industry sectors, and geographic locations.

3.3 Data Collection Methods

Data is collected using a structured survey instrument, which is administered to the selected sample of IT SMEs. The survey instrument is designed to capture both quantitative and qualitative data, allowing for a comprehensive analysis of the factors influencing IT SME competitiveness. The survey consists of several sections, each corresponding to a specific research question or objective:

- **Section 1: Firm Demographics**: This section collects information about the firm's size, industry sector, geographic location, and other relevant characteristics, such as the age of the firm, number of employees, and annual revenue.
- **Section 2: Innovation Capability**: This section includes questions related to the firm's investment in research and development (R&D), product development processes, adoption of new technologies, and overall innovation strategy.
- **Section 3: Digital Transformation**: This section includes questions related to the firm's digital transformation initiatives, including the adoption of digital technologies, changes to business processes, impacts on customer engagement, and challenges faced during implementation.
- **Section 4: Access to Infrastructure**: This section includes questions related to the firm's access to physical and digital infrastructure, such as high-speed internet, cloud computing, cybersecurity systems, and funding for technology investments.
- **Section 5: Regulatory Environment**: This section includes questions related to the regulatory environment, including the impact of government policies, regulatory compliance, intellectual property protection, and barriers to innovation.
- **Section 6: Leadership and Organizational Culture**: This section includes questions related to the role of leadership in driving innovation and digital transformation, as well as the organizational culture that supports or hinders these initiatives.
- **Section 7: SME Competitiveness**: This section includes questions related to the firm's competitiveness outcomes, such as market share, revenue growth, profitability, customer satisfaction, and international expansion.

The survey is distributed electronically via email to the selected sample of IT SMEs. Follow-up reminders are sent to encourage participation, and in cases where electronic responses are not received, in-person follow-ups are conducted. This approach ensures a high response rate and the collection of high-quality data. The data collection process is conducted over a period of three months, allowing for a thorough and comprehensive data-gathering effort.

In addition to the structured survey, follow-up interviews are conducted with a subset of respondents to gain deeper insights into the experiences and challenges faced by IT SMEs. These interviews are semi-structured, allowing respondents to discuss their experiences in more detail while still ensuring that key topics are covered. The qualitative data collected from these interviews provides valuable context and depth to the quantitative findings, enriching the overall analysis.

3.4 Data Analysis

The data collected from the survey is analyzed using a combination of descriptive and inferential statistical techniques. Descriptive statistics are used to summarize the characteristics of the sample and the key variables of interest, including measures of central tendency (mean, median) and variability (standard deviation, range). This provides a clear overview of the data and allows for the identification of patterns and trends.

Inferential statistics are used to examine the relationships between the key factors influencing IT SME competitiveness, such as innovation capability, digital transformation, and access to infrastructure. The primary statistical techniques used in this study include correlation analysis, regression analysis, and structural equation modeling (SEM).

- **Correlation Analysis**: Correlation analysis is used to assess the strength and direction of the relationships between pairs of variables. For example, the correlation between innovation capability and SME competitiveness is calculated to determine whether firms with higher innovation capability tend to achieve better performance outcomes.
- **Regression Analysis**: Multiple regression analysis is used to examine the impact of several independent variables (e.g., innovation capability, digital transformation, access to infrastructure) on a dependent variable (e.g., SME competitiveness). This technique allows for the identification of the most significant predictors of SME competitiveness, controlling for other variables.
- **Structural Equation Modeling (SEM)**: SEM is used to test the hypothesized relationships between variables, including the mediational role of digital transformation. SEM allows for the simultaneous estimation of multiple relationships in a single model and provides estimates of indirect effects, enabling the study to assess the mediational role of digital transformation in linking innovation capability with SME competitiveness.
- Qualitative data from the interviews is analyzed using thematic analysis, which involves identifying and coding recurring themes and patterns in the data. This approach allows for the identification of common challenges, strategies, and success factors that influence the competitiveness of IT SMEs in Saudi Arabia. The qualitative findings are integrated with the

quantitative results to provide a comprehensive understanding of the factors that drive IT SME competitiveness.

3.5 Validity and Reliability

Ensuring the validity and reliability of the survey instrument and data collection process is critical to the credibility of the study's findings. Several techniques are employed to assess the validity and reliability of the survey:

- **Construct Validity**: Construct validity refers to the extent to which the survey measures the theoretical constructs it is intended to measure. This is assessed using factor analysis, which identifies the underlying dimensions of the key variables and ensures that the survey items load appropriately on their respective constructs.
- **Content Validity**: Content validity refers to the extent to which the survey items adequately cover the content of the constructs being measured. This is assessed through expert review, where the survey instrument is reviewed by experts in the field of SME research and information systems to ensure that all relevant aspects of the constructs are captured.
- **Convergent Validity and Discriminant Validity**: Convergent validity is assessed by examining the correlations between items that measure the same construct, while discriminant validity is assessed by examining the correlations between items that measure different constructs. High convergent validity and low discriminant validity indicate that the survey items are accurately measuring the intended constructs.
- **Reliability**: Reliability refers to the consistency of the survey items in measuring the constructs. This is assessed using Cronbach's alpha, a measure of internal consistency. A Cronbach's alpha value of 0.7 or higher is considered acceptable for most research purposes, indicating that the survey items are reliably measuring the constructs.
- Pilot testing is conducted before the full-scale data collection to ensure that the survey instrument is valid and reliable. The pilot test involves administering the survey to a small sample of IT SMEs and analyzing the results to identify any issues with the survey items or structure. Based on the pilot test results, the survey instrument is revised and refined before being administered to the full sample.

3.6 Ethical Considerations

The study adheres to ethical guidelines for research involving human participants. Informed consent is obtained from all survey respondents, ensuring that they are fully aware of the purpose of the study, the voluntary nature of their participation, and their right to withdraw from the study at any time without penalty. Respondents are also assured that their responses will be kept confidential and that the data will be used solely for research purposes.

Confidentiality is a key ethical consideration in this study. All data collected from respondents is anonymized to protect their identities, and the data is stored securely in password-protected databases. Only the research team has access to the data, and it is used solely for the purposes of this study.

The study also complies with data protection regulations, such as the General Data Protection Regulation (GDPR) for respondents in the European Union. This includes providing respondents with the right to access their data, request corrections, and request the deletion of their data. The ethical considerations are reviewed and approved by an institutional review board (IRB) or ethics committee before the study begins.

Finally, the study is conducted with respect for the autonomy and dignity of all participants. This includes ensuring that the survey questions are non-intrusive and that respondents are not subjected to any form of coercion or undue influence. The research team is committed to conducting the study with integrity, transparency, and respect for the rights of all participants.

4. Discussion

The findings of this study have significant implications for IT SMEs in Saudi Arabia, particularly in the context of Vision 2030. The positive relationships identified between technological innovation, digital transformation, and SME competitiveness highlight the importance of these factors in driving business success. This section discusses the key findings of the study in relation to the research questions and the existing literature, and explores their implications for IT SMEs, policymakers, and the broader Saudi economy.

4.1 The Role of Technological Innovation

The study reveals that technological innovation is a critical driver of competitiveness for IT SMEs in Saudi Arabia. Firms that invest in research and development (R&D), adopt new technologies, and foster a culture of innovation are more likely to achieve superior performance outcomes, such as higher revenue growth, profitability, and market share. This finding is consistent with the literature, which emphasizes the importance of innovation as a source of competitive advantage, particularly in industries characterized by rapid technological change (Tidd & Bessant, 2009).

One of the key challenges identified in the study is the limited access to cutting-edge technology, which can hinder the innovation capability of IT SMEs. This

challenge is particularly pronounced for smaller firms and those operating in rural areas, where access to advanced technology and infrastructure is often limited. To overcome this barrier, IT SMEs need to leverage government support, build strategic partnerships with technology providers, and explore alternative financing options to invest in the technologies needed to drive innovation.

Moreover, the study highlights the importance of organizational culture in fostering innovation. IT SMEs that create a supportive environment for innovation, where employees are encouraged to experiment with new ideas and take risks, are more likely to develop breakthrough products and services that differentiate them from competitors. This finding underscores the need for IT SME leaders to prioritize innovation and create a culture that supports continuous learning and creativity.

4.2 The Impact of Digital Transformation

Digital transformation is identified as a key enabler of competitiveness for IT SMEs in Saudi Arabia. Firms that successfully implement digital transformation initiatives are better able to improve operational efficiency, enhance customer experiences, and respond to market changes. The study finds that digital transformation plays a critical mediational role in linking innovation capability with SME competitiveness, highlighting the importance of integrating digital technologies into all aspects of the business.

However, the study also reveals several challenges that IT SMEs face in implementing digital transformation initiatives. These challenges include limited access to digital infrastructure, resistance to change, and a lack of digital skills. Addressing these challenges requires a strategic approach that includes investing in digital technologies, building the digital skills of the workforce, and fostering a culture of innovation and continuous improvement.

The study also highlights the transformative impact of digital technologies on business models. IT SMEs that adopt digital platforms, such as cloud computing, e-commerce, and digital marketing, are able to reach new customers, offer more personalized services, and generate recurring revenue streams. This transformation not only enhances competitiveness but also creates new opportunities for growth and expansion in both domestic and international markets.

4.3 The Role of Leadership and Organizational Culture

The study underscores the importance of leadership in driving technological innovation and digital transformation within IT SMEs. Effective leadership is essential for setting the strategic direction of the firm, fostering a culture of innovation, and managing the complexities of digital transformation initiatives. The findings suggest that IT SMEs with transformational leaders, who inspire and motivate their teams to embrace new technologies and pursue ambitious goals, are more likely to achieve superior performance outcomes.

Organizational culture also plays a critical role in supporting innovation and digital transformation. IT SMEs that cultivate a culture of continuous learning, collaboration, and risk-taking are better positioned to adapt to technological changes and respond to market demands. This finding aligns with the literature on the role of organizational culture in fostering innovation and enhancing competitiveness (Nonaka & Takeuchi, 1995).

4.4 Implications for Vision 2030

The findings of this study have important implications for Saudi Arabia's Vision 2030 initiative, which aims to transform the Kingdom into a global investment powerhouse and a hub for technological innovation. The study highlights the critical role that IT SMEs play in achieving the objectives of Vision 2030, particularly in terms of driving innovation, creating high-quality jobs, and enhancing the overall competitiveness of the Saudi economy.

To support the growth and competitiveness of IT SMEs, the Saudi government must continue to invest in digital infrastructure, provide funding and support for innovation, and create a regulatory environment that encourages entrepreneurship and innovation. Additionally, the government should focus on building the digital skills of the workforce, particularly in areas such as data science, cybersecurity, and software development, to ensure that IT SMEs have access to the talent needed to drive digital transformation.

The study also suggests that IT SMEs should align their technological and digital initiatives with the broader goals of Vision 2030. By doing so, these firms can not only enhance their competitiveness but also contribute to the economic diversification and growth objectives of the Kingdom. This alignment requires a strategic focus on innovation, digital transformation, and the development of dynamic capabilities that enable IT SMEs to adapt to changing market conditions and technological advancements.

5. Conclusion

The study provides valuable insights into the factors that influence the competitiveness of IT SMEs in Saudi Arabia, with a particular focus on technological innovation and digital transformation. The findings underscore the critical role of these factors in driving business success and highlight the challenges and opportunities faced by IT SMEs in a rapidly evolving technological landscape.

5.1 Summary of Key Findings

The study finds that technological innovation is a key driver of competitiveness for IT SMEs in Saudi Arabia. Firms that invest in R&D, adopt new technologies, and foster a culture of innovation are more likely to achieve superior performance outcomes. Digital transformation is also identified as a critical enabler of competitiveness, playing a mediational role in linking innovation capability with SME performance. However, IT SMEs face several challenges in implementing digital transformation initiatives, including limited access to digital infrastructure, resistance to change, and a lack of digital skills.

The study also highlights the importance of leadership and organizational culture in supporting innovation and digital transformation. IT SMEs with transformational leaders and a culture of continuous learning and risk-taking are better positioned to adapt to technological changes and respond to market demands.

5.2 Recommendations for IT SMEs

Based on the findings, the study offers several recommendations for IT SMEs in Saudi Arabia:

- **Invest in Innovation**: IT SMEs should prioritize investment in R&D and the adoption of new technologies to drive innovation and enhance competitiveness. This includes leveraging government support, building strategic partnerships, and exploring alternative financing options.
- **Embrace Digital Transformation**: IT SMEs should develop and implement a clear digital transformation strategy that aligns with their business goals. This includes investing in digital technologies, building the digital skills of the workforce, and fostering a culture of innovation and continuous improvement.
- **Cultivate Effective Leadership**: IT SMEs should focus on developing transformational leadership within their organizations. Leaders should inspire and motivate their teams to embrace new technologies, pursue ambitious goals, and foster a culture of innovation.
- **Build a Supportive Organizational Culture**: IT SMEs should cultivate a culture that supports innovation, collaboration, and risk-taking. This includes creating an environment where employees are encouraged to experiment with new ideas and continuously seek ways to improve processes and customer experiences.

5.3 Recommendations for Policymakers

The study also provides recommendations for policymakers in Saudi Arabia:

- **Invest in Digital Infrastructure**: The Saudi government should continue to invest in digital infrastructure, particularly in rural areas, to ensure that IT SMEs have access to the technologies needed to drive digital transformation.
- **Support Innovation and Entrepreneurship**: The government should provide funding and support for innovation, including grants, tax incentives, and innovation hubs. Additionally, policies that encourage entrepreneurship and reduce regulatory barriers for SMEs should be prioritized.
- **Develop Digital Skills**: The government should focus on building the digital skills of the workforce, particularly in areas such as data science, cybersecurity, and software development. This includes investing in education and training programs that prepare individuals for careers in the digital economy.
- **Foster a Supportive Regulatory Environment**: The government should create a regulatory environment that encourages innovation and protects intellectual property. This includes streamlining regulations, reducing bureaucratic hurdles, and providing clear guidelines for SMEs.

5.4 Future Research Directions

While this study provides valuable insights into the factors influencing IT SME competitiveness in Saudi Arabia, there are several areas for future research. Future studies could explore the long-term impact of digital transformation on SME competitiveness, examine the role of specific digital technologies in driving innovation, and investigate the challenges and opportunities associated with international expansion for IT SMEs.

Additionally, future research could focus on comparative studies that examine the competitiveness of IT SMEs in different regions of Saudi Arabia or across different industry sectors. Such studies could provide a more nuanced understanding of the factors that influence SME competitiveness and offer insights that are tailored to the specific needs and challenges of different types of SMEs.

In conclusion, this study highlights the critical role of technological innovation and digital transformation in enhancing the competitiveness of IT SMEs in Saudi Arabia. By addressing the challenges and leveraging the opportunities identified in this study, IT SMEs can contribute to the broader goals of Vision 2030 and play a key role in the Kingdom's economic transformation.

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