

# Utilizing Machine Learning to Explore the Relationship between Organizational Wireless and Mobile Strategy and Firm Performance: the Moderating Roles of IT Investment and CIO Compensation

Xiaqing He  
University of Texas at Arlington  
Baylor university  
hexiaqing999@gmail.com

Sridhar Nerur  
University of Texas at Arlington  
snerur@exchange.uta.edu

Jennifer Zhang  
University of Texas at Arlington  
jiezhang@uta.edu

## Abstract

*This study investigates the implications of organizational wireless and mobile strategy on firm performance in the context of publicly traded information technology firms in the United States. Based on the resource-based view, it is hypothesized that information technology investment positively moderates the relationship between wireless and mobile strategy and firm performance. Similarly, chief information officer compensation is expected to strengthen the positive relationship between wireless and mobile strategy and firm performance. To test these hypotheses, topic modeling techniques and ordinary least squares regression are employed to analyze the data. The results support the positive effects of wireless and mobile strategy on firm performance. Additionally, chief information officer compensation significantly improves the performance implications of wireless and mobile strategy. Furthermore, information technology investment strengthens the positive impact of wireless and mobile strategy on firm performance. This study concludes by discussing the theoretical and practical implications of these findings.*

**Keywords:** Wireless and mobile strategy, Firm performance, Information technology investment, Chief information officer compensation, Topic modeling.

## 1. Introduction

Wireless and mobile platforms are an essential and integral part of an organization's information systems and are crucial to its performance (Viète & Erdsiek 2020). The strategic emphasis that firms place on wireless and mobile techniques has been recognized as a critical component in research and IS practice (Agrawal & Zeng 2015). The success of businesses is closely tied to the impact of information technology on their ability to create and unlock value for profitability (Drnevich & Croson, 2013). In this study, we focus on a firm's strategy from the perspective of wireless and mobile techniques,

referred to as *wireless and mobile strategy* in this paper. By following the existing definition of IS strategy and the characteristics of wireless technologies and mobile platforms, wireless and mobile strategy can be defined as an organizational viewpoint regarding investing in, deploying, using, and managing wireless techniques and mobile platforms. It is the shared view of the role of wireless techniques and mobile platforms within the firm (Chen et al. 2010).

Numerous studies have shown that wireless and mobile techniques can have a positive and significant influence on various organizational outcomes, including financial performance, productivity, and innovation (Viète & Erdsiek 2020; Picoto et al. 2012). The impact of wireless and mobile strategy on firm performance can manifest in different ways, such as organizational financial performance, workforce productivity, remote work, enterprise mobility, and collaboration tools (Viète & Erdsiek 2020). Mobile platforms have transformed commerce and business operations, enabling mobile payments, mobile marketing, and e-commerce strategies (Mennecke & Strader, 2003). Furthermore, mobile platforms have reshaped advertising and marketing strategies, including location-based advertising, mobile apps, and personalized content delivery (Sharma et al. 2008). Empirical findings demonstrate that mobile platforms positively and significantly affect the organization's performance (Manser Payne et al. 2021).

In addition, it is worth noting that existing studies in the field of wireless and mobile strategy predominantly rely on exploratory analyses, such as expert interviews or survey-based data (Viète & Erdsiek 2020), inductive content analysis (Seedoyal et al., 2023), and qualitative and quantitative methods (Choudhary et al. 2022), which can be prone to common method and subjective biases. The conventional approach for measuring wireless and mobile strategy using survey-based instruments may be susceptible to subjectivity from individuals' attitudes and emotions. Consequently, replicating prior studies becomes challenging. Although machine learning techniques, such as topic modeling, have been

successfully employed to extract insights from unstructured text data in various domains (Choi et al., 2021), to the best of our knowledge, no research employs these techniques to measure organizational wireless and mobile strategy. Thus, one of this research goals is to address the measurement challenge by adopting a novel approach based on natural language processing (NLP). We employ NLP to measure the relative emphasis placed on wireless and mobile strategy in the mission, vision, and strategy statements of 418 publicly traded IT firms in the United States. Specifically, we used unsupervised machine learning techniques (i.e., topic modeling and hierarchical clustering) to infer firms' wireless and mobile strategy from the unstructured mission, vision, and strategy statements extracted from their websites.

In light of the preceding discussions, this study aims to answer the following research questions: How does organizational wireless and mobile strategy impact firm performance? How does IT investment moderate the relationship between wireless and mobile strategy and firm performance? How does CIO compensation moderate the relationship between wireless and mobile strategy and firm performance? What are the direct effects of IT investment and CIO compensation on firm performance?

This study utilizes a firm's mission, vision, and strategy statements to infer a firm's wireless and mobile strategy for the following reasons. As a widely used strategic tool, mission statements are created by corporations for several purposes. They assert leadership (Klemm et al., 1991), promote a common understanding of organizational goals (Bart, 2001), serve as an effective public relations tool (Falsey, 1989), provide a rationale for resource allocation (Bart et al., 2001), and inspire enthusiasm about the firm (Collins & Porras, 1991). Mission statements also guide critical strategic decision-making (Ireland & Hitt, 1992). Therefore, it is believed that mission statements should reflect thoughtful consideration, careful planning, collaboration, and informed decision-making (Stallworth & Williams, 2008). Both mission and vision statements guide a firm's strategic direction and communicate its purpose to stakeholders. Vision statements articulate a firm's aspirations for the future and provide a long-term perspective on goals and achievements (Collins & Porras, 1996). While well-crafted mission and vision statements can improve firm performance, their effectiveness may depend on their alignment with the goals and values of the firm.

Our empirical analysis of unstructured mission, vision, and strategy text data from the official websites of 418 publicly traded IT firms in the United States and financial data spanning 2022-2023 reveals a positive association between wireless and mobile

strategy and firm performance. Furthermore, this relationship is positively and significantly moderated by CIO compensation. CIOs involved in strategic decision-making and with a deeper understanding of the business's goals can better design wireless and mobile strategies that support and enhance the firm's overall performance. Besides, a well-compensated CIO may have more leverage in advocating for adequate resources to implement and maintain the wireless and mobile systems strategy, leading to better execution and improved firm performance. Higher CIO compensation can incentivize CIOs to align their efforts and decisions more closely with the organization's strategic goals. This alignment ensures that the wireless and mobile strategy directly contributes to the firm's overall performance. Overall, the positive interaction between wireless and mobile strategy and CIO compensation can be attributed to various factors, including alignment of interests between the CIO and the firm, optimal resource allocation, and strategic decision-making. Accordingly, firms should design an optimal CIO compensation structure that incentivizes the CIO to prioritize the firm's long-term strategic objectives and make IT investment decisions in line with strategy.

IT investment also has the potential to improve the positive impact of wireless and mobile strategy on firm performance. There are three possible explanations for this finding. First, strategic IT investments can provide the organization with new capabilities and resources that align with its business strategy. These investments may include implementing advanced software, adopting cloud computing, utilizing big data analytics, or investing in artificial intelligence and automation (Davenport & Patil 2012). Such capabilities can improve operational efficiency, decision-making, customer service, and competitiveness. Second, IT investments aligned with the wireless and mobile strategy can directly support achieving specific business objectives (McFarlan & Nolan 1995). For instance, if the strategy focuses on expanding online sales channels, investing in e-commerce platforms and digital marketing tools would reinforce and amplify that goal. Finally, effective IT investments can lead to better data management and analysis, enabling data-driven decision-making critical for informed, strategic choices that positively impact firm performance. Investing in IT infrastructure and systems can make an organization more agile and flexible in responding to market changes and opportunities (Bharadwaj et al. 2013). This adaptability is crucial in today's business landscape.

These findings have significant implications for wireless and mobile strategy research, as they highlight the crucial roles played by IT investment and

CIO compensation in shaping the implementation of wireless and mobile strategy. Furthermore, our study contributes to applying machine learning techniques in wireless and mobile strategy domains. Prior research has already demonstrated the usefulness of machine learning in creating strategic-related construct measures (Choi et al., 2021), and our study builds upon this by providing a novel perspective on deriving measurements and operationalizing the relative emphasis on wireless and mobile strategy reflected in mission, vision, and strategy statements. We offer valuable insights that complement and enrich the existing wireless and mobile strategy literature by applying machine learning techniques. Additionally, our study sheds light on the potential moderating effects of IT investment and CIO compensation, deepening our understanding of the mechanisms in the relationship between wireless and mobile strategy and firm performance. Overall, this research contributes to advancing the knowledge of wireless and mobile strategy by incorporating machine learning techniques and identifying the moderating roles of IT investment and CIO compensation.

## **2. Literature review**

### **2.1. Wireless and Mobile-related Literature**

The literature on mobile platforms encompasses various topics encompassing the design, development, impact, and challenges of mobile operating systems, applications, and devices. As to the impact on business and economic implications, researchers analyze the economic impact of mobile platforms on firms, industries, and economies (Stoica et al., 2012; Picoto et al. 2012; Soh & Grover 2020). Mobile platforms have transformed commerce and business operations, enabling mobile payments, mobile marketing, and e-commerce strategies (Mennecke & Strader, 2003). Researchers also explore how mobile platforms have reshaped advertising and marketing strategies, including location-based advertising, mobile apps, and personalized content delivery (Sharma et al. 2008). Furthermore, mobile platforms influence retail operations, customer engagement, online-to-offline integration, and "omnichannel" retail (Hayden & Webster 2014). Finally, mobile platforms affect organizational financial performance, workforce productivity, remote work, enterprise mobility, and collaboration tools (Madden & Madden 2013; Viète & Erdsiek 2020; Kim et al. 2021). Empirical findings demonstrate that mobile platforms have a positive and significant effect on the overall organization performance, underscoring the need for adopting wireless technology (Stoica et al. 2012)

The literature on wireless technology spans various topics related to wireless communication, networks, and their impact on multiple aspects of society, business, and technology (Rappaport 2002; Gibson 2012; Yang 2014). Research has explored how wireless technology adoption and effective utilization impact various aspects of business performance (Ozcan & Eisenhardt 2009). In other words, adopting and effectively using wireless technology can contribute to improved communication, efficiency, innovation, customer engagement, and competitive advantage. Finally, the literature on intelligent communication explores the intersection of advanced technologies, data analytics, and communication systems to enable more efficient and effective information exchange (Terashima 2001)

In summary, prior studies mainly adopt exploratory studies such as expert interviews and a web survey (Picoto et al., 2012; Viète & Erdsiek, 2020), inductive content analysis (Seedoyal et al. 2023), and qualitative and quantitative methods (Choudhary et al. 2022). This study differs from extant studies since it uses text analysis techniques to extract essential variables like wireless and mobile strategy from firms' mission, vision, and strategy statements. Nonetheless, this study also considers the moderating roles of CIO compensation and IT investment, which are overlooked.

### **2.2. CIO Literature Summary**

CIO literature emphasizes the critical role of CIOs in leading digital transformation (Haffke et al. 2016), fostering innovation (Dawson & Denford 2015), managing technology risks (Smith et al. 2021), and aligning IT strategies with broader business goals (Gendron et al., 2009). This field continues to evolve as technology and business landscapes change, shaping the way organizations leverage technology for success (Banker et al. 2022).

Specifically, the compensation structure of CIOs impacts the overall performance of the firms they serve (Yayla & Hu 2008). The alignment between CIO-TMT compensation is indeed correlated to firm performance, and its impact is influenced by market competitiveness, capital expenditure, and the firm's market share. Also, CIO compensation could mirror the significance of leadership within firms, and these firms are more likely to make efficient IT investment, implementation, and maintenance, and thus have more robust IT organizational structure to achieve the business value of IT investment (Zhang et al. 2016). Therefore, firms may achieve superior firm performance. The literature empirically verified the significant relationship between CIO compensation and firm performance. However, we have not found a

study examining the interaction of CIO compensation and organizational wireless and mobile aspects of firms and how it may influence firm performance.

### 3. Research Model and Hypotheses

Information technology (IT) investment has the potential to directly create value for organizations (Bharadwaj et al., 2013). However, its effectiveness can be enhanced when integrated with the organization's wireless and mobile strategy, improving IT capabilities and sustained competitive advantages (Picoto et al. 2012). Therefore, it is crucial for organizational leaders to align their IT investments and assets with the wireless and mobile strategy, thereby developing their IT abilities and skills. In this study, we adopt the Resource-Based View (RBV) theoretical perspective to examine the impact of the interactions between wireless and mobile strategies and IT investment on firm performance.

Additionally, we explore the role of the Chief Information Officer (CIO) in organizations and investigate how CIO compensation may influence the performance implications of wireless and mobile strategy. The CIO is critical in overseeing the organization's IT function and aligning it with the overall business strategy (Luftman & Kempaiah 2007). We hypothesize that the compensation provided to the CIO can significantly influence their priorities and interests, which, in turn, can affect the implementation and outcomes of the wireless and mobile strategy. Figure 1 illustrates the research model, which outlines the relationships and corresponding hypotheses to be tested in this study.

#### 3.1. Hypotheses

Based on Chen et al. (2010) extensive review of the strategic management literature, wireless and mobile strategy can be defined as the organizational viewpoint regarding investing in, deploying, using, and managing wireless and mobile techniques. It is the shared view of the role of wireless and mobile techniques within the organization (Chen et al. 2010; Bhargava & Sundaresan 2013). Alternatively, wireless and mobile strategy provides a common understanding within a firm that guides subsequent decisions regarding IT investment and deployment in wireless and mobile techniques. Empirical studies have consistently shown positive implications of wireless and mobile for firm performance (Vieta & Erdsiek 2020).

If a firm adopts innovative wireless and mobile techniques and strategy, it prioritizes responding to external opportunities and exploring and leveraging

them for strategic benefits. During the implementation of the wireless and mobile strategy, the firm acquires and enhances information systems resources such as IS human capital, IT infrastructure flexibility, and IS relationship quality (Venkatesh, Brown, & Bala, 2013; Iyer & Henderson 2010). These resources are instrumental in supporting and implementing the wireless and mobile strategy. Mobile platforms would also transform commerce and business operations, enabling mobile payments, mobile marketing, and e-commerce strategies (Mennecke & Strader 2003). Mobile platforms have reshaped advertising and marketing strategies, including location-based advertising, mobile apps, and personalized content delivery (Sharma et al. 2008). Finally, mobile platforms affect organizational financial performance, workforce productivity, remote work, enterprise mobility, and collaboration tools (Vieta & Erdsiek 2020; Kim, Park, & Komarek 2021). Empirical findings demonstrate that mobile platforms have a positive and significant effect on the overall organization performance, underscoring the necessity of adopting wireless technology (Vieta & Erdsiek 2020). Given the perspective of the Resource-Based View (RBV), a firm's wireless and mobile resources and technology are decisive in determining its ability to achieve a competitive advantage (Aydiner et al., 2019), thereby positively influencing its overall firm performance. Consistent with the prior studies, we propose the following hypothesis:

***H1: Organizational wireless and mobile strategy is positively related to firm performance.***

CIOs are pivotal in managing and implementing information systems within a firm, significantly influencing its productivity, efficiency, and profitability (Yayla & Hu, 2014). Organizations often offer higher compensation packages as incentives to attract and retain highly skilled CIOs capable of driving innovation and optimizing IT utilization to enhance firm performance. By hiring talented CIOs through competitive compensation, firms are likely to improve their IT capabilities, leading to superior financial performance, increased market share, and enhanced consumer satisfaction compared to their competitors. Considering the growing importance of digital transformation in achieving organizational success, CIOs assume a crucial role in spearheading such initiatives. By providing robust IT support and adequate resources, firms can establish themselves as pioneers in digital endeavors and maintain a competitive edge, making the provision of attractive compensation to CIOs crucial for their overall success.

On the other hand, the compensation package offered to CIOs also indicates their responsibilities and the extent of their roles within a firm (Turedi & Erkan-Barlow, 2022). Typically, CIOs are accountable for

managing IT budgets and overseeing projects. Competitive compensation can serve as a motivating factor for CIOs to take calculated risks and pursue ambitious objectives aimed at fostering innovation and improving organizational performance. In conclusion, a positive relationship exists between CIO compensation and firm performance, as a well-designed compensation package can attract highly capable CIOs who are instrumental in driving innovation, supporting digital transformation initiatives, and ultimately enhancing overall organizational performance. Therefore,

***H2: CIO compensation is positively related to firm performance.***

A substantial body of research has established a positive relationship between IT investment and firm performance. First, IT investment can improve efficiency and productivity by reducing labor costs and increasing productivity through automation and streamlined processes (Huang & Liu, 2017). Second, IT investment enables better decision-making by supporting data analytics, enhancing strategic planning, forecasting, and risk management, leading to higher profitability and market value (Tarafdar et al., 2011). Finally, IT investment provides firms with a competitive advantage by facilitating faster innovation and enabling quick responses to market changes. It helps firms generate revenue and expand their market share and growth rates (Ray et al., 2019). Consequently,

***H3: IT investment is positively related to firm performance.***

For the following reasons, prior empirical studies have argued the positive moderating role of CIO compensation in the relationship between wireless and mobile strategy and firm performance. First, the alignment of interests between CIOs and firms can be influenced by CIO compensation (Dutta & Roy 2016). Higher CIO compensation can incentivize CIOs to align their efforts and decisions more closely with the organization's strategic goals. This alignment ensures that the wireless and mobile strategy directly contributes to the firm's overall performance. Second, firms attract and retain top talent by providing high CIO compensation packages (Laumer et al.2010).

Offering competitive compensation packages for CIOs can attract experienced and skilled professionals with the expertise to design and execute effective wireless and mobile strategies. Additionally, it can help retain talented CIOs whom other opportunities would otherwise lure away. Third, CIO compensation packages also reflect their responsibility within a firm. Wireless and mobile technology play a critical role in the modern business environment, and CIOs are responsible for ensuring the security, reliability, and efficiency of these wireless and mobile-based

information systems. Higher compensation may be justified by the increased risks associated with the position. A well-compensated CIO may have more leverage in advocating for adequate resources to implement and maintain the wireless and mobile strategy effectively, leading to better execution and improved firm performance. Thus,

***H4: CIO compensation positively moderates the relationship between organizational wireless and mobile strategy and firm performance.***

Existing empirical studies have demonstrated the positive moderating role of IT investment in the relationship between wireless and mobile strategy and firm performance (Bharadwaj et al. 2013). IT investment is crucial in enabling firms to implement their wireless and mobile strategies, leading to improved performance. Specifically, when firms have a strategic orientation towards innovation and flexibility, IT investment allows them to leverage their wireless and mobile resources more effectively, resulting in enhanced performance.

This study measures IT investment as software spending, representing intangible IT resources and assets. The software enables wireless and mobile technology's functionality, applications, and user experiences (Akyildiz et al., 2006). The prominence of software in wireless and mobile technology is due to its ability to control and manage hardware components, facilitate communication protocols, and provide a wide range of services to users (Gartner 2021).

IT investment significantly moderates the relationship between organizational wireless and mobile strategy and firm performance. By investing in wireless and mobile technology, firms can enhance their implementation of wireless and mobile strategy, leading to improved performance outcomes. Therefore,

***H5: IT investment positively moderates the relationship between organizational wireless and mobile strategy and firm performance.***

## **4. Method**

### **4.1. Data**

We obtained our study's independent and dependent variables from multiple sources, namely Compustat, CrunchBase, and the official websites of publicly traded IT companies. To begin with, we compiled a comprehensive list of publicly traded companies from Compustat and then focused on selecting firms from the IT industry based on their Standard Industrial Classification (SIC) code. Our research sample consists of a total of 418 publicly traded IT companies. This study only focuses on the IT industry since the nature of different industries may

also affect the relationship between IS-related strategy and firm performance (Kim & Lee 2006). Furthermore, it would be easier and more feasible to infer IS-related strategy by performance clustering analysis.

Next, we collected mission, vision, and strategy statements from each IT company's official website. These statements are crucial indicators of a firm's strategic plans, outlining its business direction and strategic intent (Rarick & Vitton, 1995).

In addition, we collected IT spending data from the CrunchBase website, explicitly focusing on projections at the beginning of 2022. The final dataset comprises 418 publicly traded IT companies, resulting in 287 observations. We also gathered board data from the BoardEx database (Pucheta-Martínez & Gallego-Álvarez 2020). The operationalization of the core constructs used in our study is outlined in Table 1.

The measurement of the dependent variable in our study is the return on assets (ROA). ROA is a widely used financial ratio that indicates how effectively a firm generates profits from its total assets (Rostami, Rostami & Kohansal, 2016).

Table 3 provides descriptive statistics of the metrics used in our study. Additionally, Table 4 presents the correlations among the variables. Our data analysis includes several control variables. These control variables help enhance the internal validity by accounting for the influence of confounding and other extraneous factors that could affect the relationships under investigation. The first control variable is the liquidity ratio, which measures a company's ability to meet short-term obligations or those due within one year (Beaver, 1966). This variable reflects a firm's financial stability and can impact its value (Husna & Satria, 2019). The age of the public firm is included as a control variable. Several board characteristics also serve as control variables. These variables reflect essential dimensions of corporate governance.

## 4.2. Analysis techniques

Topic modeling is a widely used natural language processing (NLP) technique well-suited for uncovering latent themes in unstructured text data. It is based on the premise that a document may reflect multiple thematic areas to varying degrees (Blei et al. 2003). Topic modeling has been applied in various domains to derive valuable insights from large corpora of text (Blei & Lafferty 2007). As one of the most widely used topic models in analyzing unstructured text data, LDA uses a probabilistic model to provide valuable insights into documents' underlying content and structure (Blei et al. 2003).

To perform the LDA analysis, we created a corpus based on each firm's mission, vision, and strategy statements, resulting in a total of 418 documents for

the sample. The number of topics for the LDA model is selected based on a triangulation approach using different measures of model fit, as shown in Figure 2. The top panel displays two metrics whose minimum values reflect the optimal number of topics, while the bottom panel uses metrics whose maximum values suggest the desired number of topics.

The values of these measures vary between 0 and 1, with 1 indicating the best fit. For this research, the optimal number of topics is determined to be 37 based on the fit measures. After preprocessing the corpus, the LDA topic model is implemented based on the selected optimal number of topics (Choudhury et al., 2019). It allows for extracting and analyzing the latent topics within the mission, vision, and strategy statements, providing insights into the content and themes across the sample of companies.

In the LDA estimation process, the algorithm analyzes the co-occurrence of words across documents and produces two main outputs: (1) the probability distribution of topics in each document and (2) the probability distribution of keywords in each topic.

The 37 topics were subjected to hierarchical clustering to group together topics representing higher-level (i.e., more abstract) thematic areas. Hierarchical clustering is a widely used technique in data analysis and machine learning that aims to cluster similar data points together based on their pairwise similarities or distances (Jain & Dubes 1988). This approach creates a hierarchical representation of data, where clusters are organized in a tree-like structure called a dendrogram. Hierarchical clustering can be particularly useful for organizing and understanding relationships within a dataset and visualizing the data's structure (Hahsler et al. 2020).

Figure 3 shows the hierarchical clusters obtained using the cosine similarities between the 37 topics identified by LDA. Thus, we could identify topics emphasizing wireless and mobile strategy (Manning et al. 2008). The seven clusters and their corresponding topics are shown in Table 7. The group labeled mobile platforms and wireless solutions serves as a proxy for wireless and mobile strategy. The Rationale for this is that the topics and their associated words (e.g., "mobile," "platform," "connect," "wireless," "technology," "communication," and "intelligent") in this group are closest to reflecting the deployment and use of wireless technology and mobile platforms. In addition to reflecting an organization's mission and shared goal of pursuing wireless and mobile techniques (Chen et al. 2010), the group emphasizes mobile platforms (Kamal & Shawish 2019), wireless technologies (Goldsmith 2005), and intelligent communication (Mitra & Tzannes 2008). Figure 4 shows the entire process of generating topics based on the LDA algorithm and using hierarchical clustering to

get 7 clusters. Based on these 7 clusters, we identify the group of mobile platforms and wireless solutions as the proxy of wireless and mobile strategy since their keywords are strongly correlated to the definition of wireless and mobile strategy.

To test the hypotheses, we conducted an OLS regression analysis using a dataset comprising 287 firm-year observations from 418 publicly traded firms in the United States due to limited data on IT investment. These firms are selected based on their operation in the IT industry, as indicated by their four-digit SIC codes.

It is worth noting that firm performance is measured using a one-year lag of IT investment and wireless and mobile strategy, which follows the approach used in previous studies (Dissanayake et al., 2021). This lag allows for assessing the impact of prior IT investment and wireless and mobile strategy on firm performance.

## 5. Discussion

### 5.1. Outcomes of Hypotheses Testing

Table 5 shows the findings of the OLS regression analysis with robust standard errors, examining the impact of independent and moderating variables on firm value as measured by ROA. Including the independent and moderating variables in the models improves the statistical fit, as indicated by R-squared increases and decreases in AIC and BIC.

The results from Model 2 support Hypotheses 1 and 2. Hypothesis 1 states a positive relationship between wireless and mobile strategy and firm performance, supported by the statistically significant positive coefficient for wireless and mobile strategy ( $\beta = 0.23$ ;  $p < 0.05$ ). The findings indicate that firms with a solid wireless and mobile strategy tend to have higher firm performance, as measured by ROA.

Hypothesis 2 suggests that CIO compensation positively impacts firm performance, supported by the statistically significant positive coefficient for CIO compensation ( $\beta = 0.18$ ;  $p < 0.001$ ). The results indicate that higher CIO compensation is associated with improved firm performance.

Hypothesis 3 proposes a positive relationship between IT investment and firm performance. Although this is not supported since the coefficient for IT investment is not significant ( $\beta = 0.0003$ ;  $p > 0.10$ ), the direction of the relationship between IT investment and firm performance is positive.

Overall, the results suggest that wireless and mobile strategy and CIO compensation are essential factors influencing firm performance, and they support the hypotheses proposed. Model 4 and Model 5 results

support Hypothesis 4, which suggests that CIO compensation moderates the relationship between wireless and mobile strategy and firm performance.

The statistically significant positive coefficients for the interaction term between wireless and mobile strategy and CIO compensation ( $\beta = 0.53$ ;  $p < 0.01$ ;  $\beta = 0.47$ ;  $p < 0.05$ ) indicate that the positive relationship between wireless and mobile strategy and firm performance is positively moderated by CIO compensation. It means that as CIO compensation increases, the positive impact of wireless and mobile strategy on firm performance becomes stronger.

In other words, firms with higher CIO compensation may experience an improved effect of wireless and mobile strategy on firm performance compared to firms with lower CIO compensation. This finding suggests that CIO compensation can influence the effectiveness of wireless and mobile strategy in driving firm performance. Overall, the results demonstrate that the relationship between wireless and mobile strategy and firm performance is contingent upon the level of CIO compensation, supporting the moderating role of CIO compensation.

Model 3 and Model 5 results suggest a significant moderating effect of IT investment on the relationship between wireless and mobile strategy and firm performance. The coefficient for the interaction term between wireless and mobile strategy and IT investment is statistically insignificant ( $\beta = +0.00$ ;  $p < 0.001$ ), indicating that the level of IT investment significantly influences the relationship between wireless and mobile strategy and firm performance. Therefore, the data supports Hypothesis 5, which proposed a positive moderating effect of IT investment on the relationship between wireless and mobile strategy and firm performance.

These findings suggest that the level of IT investment does significantly alter the relationship between wireless and mobile strategy and firm performance. It indicates that the positive impact of wireless and mobile strategy on firm performance is contingent upon the level of IT investment.

### 5.2. Additional Analyses

The results from the robustness check using Tobin's q as the alternative dependent variable confirm the findings from the previous analysis. The detailed results are shown in Table 6.

## 6. Implications for Research

The findings suggest several essential research implications. First, this study contributes to the existing literature on wireless and mobile strategy by

highlighting the potential moderating roles of IT investments and CIO compensation in the relationship between wireless and mobile strategy and firm performance. The study reveals that the impact of wireless and mobile strategy on firm performance can vary depending on the level of IT investments and CIO compensation. It highlights the need for managers to carefully consider these factors when formulating and implementing their IT-related strategies to enhance firm performance. Additionally, the findings emphasize the importance of aligning the deployment of IT resources with the firms' overall strategic goals.

The nuanced relationship between wireless and mobile strategy and firm performance uncovered in this study is consistent with the previous research. It suggests that a direct effect does not solely drive the link between wireless and mobile strategy and firm performance but is also influenced by other moderating factors such as IT investments and CIO compensation. Future research should, therefore, delve deeper into understanding the mechanisms through which IT investments interact with wireless and mobile strategy to impact firm performance.

This study highlights the significance of considering the interplay between wireless and mobile strategy, IT investments, and CIO compensation to effectively leverage organizational IT resources and enhance firm performance. It calls for a more holistic approach to studying the relationship between wireless and mobile strategy and firm performance, considering the direct and indirect effects of IT investments and CIO compensation. Organizations can make well-informed decisions regarding their wireless and mobile strategy, IT investments, and compensation practices to drive sustainable success.

Second, this study also makes notable theoretical contributions. On the one hand, it enhances the RBV literature by providing a strategic perspective on the relationship between IT investment, wireless and mobile strategy, and organizational performance. By considering the impact of wireless and mobile strategy, this study expands the understanding of how IT investment influences firm performance, validating the RBV in a new context by analyzing firms' mission, vision, and strategy statements. The findings demonstrate that the interaction between IT investment and wireless and mobile strategy shapes organizational performance. This advancement in knowledge contributes to a deeper understanding of the mechanisms through which IT resources generate competitive advantage and enhance firm performance.

Third, our study demonstrates the use of text analysis to infer a specific IS strategy from firms' mission, vision, and strategy statements. Future studies may explore this further to elicit a firm's strategic orientation unobtrusively. There is, however,

a need to consider other boundary conditions, such as environmental turbulence, in future research. The relationship between wireless and mobile strategy and firm performance is intricate and demands a more profound comprehension of their linkages, how they interact with IT investment, and the firm's overall strategic direction. Additionally, future studies must collect data over a more extended period and multiple years to obtain a more comprehensive understanding of how firms design their mission, vision, and strategy statements to enhance their competitive advantages. It would provide a more robust and nuanced picture of the relationships under investigation.

## **7. Limitations and future research**

This study outlines opportunities for future research in which more perspectives can contribute to wireless and mobile strategy. This study has the following limitations. The first limitation is attributed to a limited time frame. Due to the limited years of data collected, the findings may not fully represent the broader population. The study's statistical power may be affected by the small sample size, potentially leading to limited generalizability of the results. While efforts were made to ensure the validity and reliability of the data within the sample, a more extensive and diverse participant pool would enhance the study's external validity and strengthen the overall robustness of the conclusions drawn. Second, this study focuses solely on the IT industry. The findings may lack generalizability to other industries or sectors by restricting the analysis to this specific sector.

Consequently, the insights and conclusions drawn from the study may not be generalizable to organizations operating in other domains. Future research could consider exploring a broader range of industries to attain a more comprehensive understanding of the subject matter and its implications across various sectors. Finally, this study lies in its narrow focus on a firm's emphasis on mobile and wireless techniques, which may not fully encompass the breadth of a firm's overall information systems-related techniques. By solely concentrating on this specific aspect, the research may overlook other critical components of an organization's information systems strategy, potentially limiting the overall understanding of the strategic landscape. Future studies should incorporate a more comprehensive view of a firm's overall information systems strategy, including various dimensions and approaches, to provide a more holistic and nuanced analysis of its impact on firm performance.

## 8. Conclusion

The question of how wireless and mobile strategies shape organizational performance is crucial to firms and society. Our study provides a deeper understanding of this phenomenon, supported by insights from applying machine learning techniques in unstructured data, considering the moderating roles of CIO compensation and IT investment. The empirical findings imply that a firm's wireless and mobile strategy would improve its financial performance, further positively moderated by CIO compensation and IT investment. Based on our conceptualization and findings, we find a strong need for future studies to focus on strategic orientation by applying machine learning techniques to unstructured text data.

## 9. References

- Agrawal, D. P., & Zeng, Q. A. (2015). Introduction to wireless and mobile systems. Cengage learning.
- Akyildiz, I. F., Lee, W. Y., Vuran, M. C., & Mohanty, S. (2006). NeXt Generation/Dynamic Spectrum Access/Cognitive Radio Wireless Networks: A Survey. *Computer Networks*, 50(13), 2127-2159.
- Aydiner, A. S., Tatoglu, E., Bayraktar, E., & Zaim, S. (2019). Information system capabilities and firm performance: Opening the black box through decision-making performance and business-process performance. *International Journal of Information Management*, 47, 168-182.
- Banker, R. D., Feng, C., & Pavlou, P. A. (2022). Businessperson or Technologist: Stock Market Reaction to the Alignment between CIO Background and Firm Strategy. *Journal of Management Information Systems*, 39(4), 1006-1036.
- Bart, C. K., Bontis, N., & Taggar, S. (2001). A model of the impact of mission statements on firm performance. *Management Decision*, 39(1), 19-35.
- Beaver, W. H. (1966). Financial ratios as predictors of failure. *Journal of Accounting Research*, 71-111.
- Bhargava, H. K., & Sundaresan, K. (2013). Mobile platforms: Application development and security challenges. *Information Systems Management*, 30(3), 186-197.
- Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013). Digital Business Strategy: Toward a Next Generation of Insights. *MIS Quarterly*, 37(2), 471-482.
- Blei, D. M., Ng, A. Y., & Jordan, M. I. (2003). Latent dirichlet allocation. *Journal of Machine Learning Research*, 3(Jan), 993-1022.
- Blei, D. M., & Lafferty, J. D. (2007). A correlated topic model of Science. *The Annals of Applied Statistics*, 1(1), 17-35.
- Chen, D. Q., Mocker, M., Preston, D. S., & Teubner, A. (2010). Information systems strategy: reconceptualization, measurement, and implications. *MIS Quarterly*, 233-259.
- Choi, J., Menon, A., & Tabakovic, H. (2021). Using machine learning to revisit the diversification–performance relationship. *Strategic Management Journal*, 42(9), 1632-1661.
- Choudhury, P., Wang, D., Carlson, N. A., & Khanna, T. (2019). Machine learning approaches to facial and text analysis: Discovering CEO oral communication styles. *Strategic Management Journal*, 40(11), 1705-1732.
- Collin, J. A., & Porras, J. I. (1991). Organisational Vision and Visionary Organisations. *California Management Review*, Fall.
- Collins, J. C., & Porras, J. I. (1996). Building your company's vision. *Harvard Business Review*, 74(5), 65-77.
- Dawson, G. S., & Denford, J. S. (2015). A playbook for CIO-enabled innovation in the federal government. *IBM Center for the Business of Government*, Washington, DC.
- Davenport, T. H., & Patil, D. J. (2012). *Data scientist*. Harvard business review, 90(5), 70-76.
- Dissanayake, L., Jeyaraj, A., & Nerur, S. P. (2021). The impact of structure and flux of corporate boards on organizational performance: A perspective from the information technology industry. *The Journal of Strategic Information Systems*, 30(2), 101667.
- Drnevich, P. L., & Croson, D. C. (2013). Information technology and business-level strategy: Toward an integrated theoretical perspective. *MIS Quarterly*, 483-509.
- Dutta, S., & Roy, R. (2016). Impact of Compensation on the Alignment of IT and Business Strategy. *Journal of Management Information Systems*, 33(2), 497-529.
- Falsey, T. A. (1989). *Corporate philosophies and mission statements: A survey and guide for corporate communicators and management*. Praeger.
- Gartner. (2021). *Magic Quadrant for Mobile Operating Systems*. Gartner Research.
- Gendron, M. S., Banks, D. A., & Miller, D. J. (2009). Effective Strategic Alignment of IT: Implications for the CIO as a Member of the C-Suite. *Asia Pacific Management Review*, 14(4).
- Gibson, J. D. (Ed.). (2012). *Mobile Communications Handbook*. CRC press.
- Goldsmith, A. (2005). *Wireless communications*. Cambridge University Press.
- Haffke, I., Kalgovas, B. J., & Benlian, A. (2016). The Role of the CIO and the CDO in an Organization's Digital Transformation.
- Hahsler, M., Piekenbrock, M., & Doran, D. (2020). Introduction to Visualizations for Clustering Algorithms in R. *The R Journal*, 12(1), 116-133.
- Hayden, T., & Webster, T. (2014). *The mobile commerce revolution: Business success in a wireless world*. Que Publishing.
- Huang, X., & Liu, W. (2017). Information technology investment and firm performance: A literature review and synthesis. *International Journal of Information Management*, 37(5), 487-503.
- Husna, A., & Satria, I. (2019). Effects of return on asset, debt to asset ratio, current ratio, firm size, and dividend payout ratio on firm value. *International Journal of Economics and Financial Issues*, 9(5), 50.

- Ireland, R. D., & Hirc, M. A. (1992). Mission statements: Importance, challenge, and recommendations for development. *Business Horizons*, 35(3), 34-42.
- Iyer, B., & Henderson, J. C. (2010). Preparing for the Future: Understanding the Seven Capabilities of Cloud Computing. *MIT Sloan Management Review*, 51(2), 1-7.
- Jain, A. K., & Dubes, R. C. (1988). Algorithms for Clustering Data. Prentice-Hall.
- Kamal, M. M., & Shawish, A. (2019). *Mobile computing: Hardware, software, communications, and security*. In Mobile Computing (pp. 13-47). CRC Press.
- Klemm, M., Sanderson, S., & Luffman, G. (1991). Mission statements: Selling corporate values to employees. *Long range planning*, 24(3), 73-78.
- Laumer, S., Eckhardt, A., & Weitzel, T. (2010). Electronic human resources management in an e-business environment. *Journal of Electronic Commerce Research*, 11(4), 240-256.
- Luftman, J. N., & Kempaiah, R. (2007). The Impact of Business Strategy and Maturity on Information Technology and Firm Performance. *Information Systems Management*, 24(1), 65-73.
- Madden, J., & Madden, B. (2013). *Enterprise Mobility Management: Everything you need to know about MDM, MAM, and BYOD, 2013 Edition*. Jack Madden.
- Manning, C. D., Raghavan, P., & Schütze, H. (2008). *Introduction to Information Retrieval*. Cambridge University Press.
- McFarlan, F. W., & Nolan, R. L. (1995). How to manage an IT outsourcing alliance. *MIT Sloan Management Review*, 36(2), 9.
- Mennecke, B. E., & Strader, T. J. (Eds.). (2003). *Mobile commerce: technology, theory, and applications*. IGI Global.
- Mitra, S., & Tzannes, A. (2008). *An overview of intelligent communication systems*. In *Intelligent Communication Systems* (pp. 1-26). Springer.
- Ozcan, P., & Eisenhardt, K. M. (2009). Origin of alliance portfolios: Entrepreneurs, network strategies, and firm performance. *Academy of Management Journal*, 52(2), 246-279.
- Picoto, W., Belanger, F., & Palma-dos-Reis, A. (2012). Leveraging on mobile business to enhance firm performance: An organizational level study.
- Pucheta-Martínez, M. C., & Gallego-Álvarez, I. (2020). Do board characteristics drive firm performance? An international perspective. *Review of Managerial Science*, 14(6), 1251-1297.
- Rappaport, T. S. (2002). *Wireless communications: Principles and practice (2nd ed.)*. Prentice Hall.
- Rarick, C. A., & Vitton, J. (1995). Corporate strategy: Mission statements make cents. *Journal of Business Strategy*.
- Ray, G., Barney, J. B., & Muhanna, W. A. (2019). Information technology and corporate strategy: A research perspective. *MIS Quarterly*, 43(1), 1-21.
- Rostami, S., Rostami, Z., & Kohansal, S. (2016). The effect of corporate governance components on return on assets and stock return of companies listed in Tehran stock exchange. *Procedia Economics and Finance*, 36, 137-146.
- Sharma, C., Herzog, J., & Melfi, V. (2008). *Mobile Advertising: supercharge your brand in the exploding wireless market*. Wiley Publishing.
- Smith, T., Tadesse, A. F., & Vincent, N. E. (2021). The impact of CIO characteristics on data breaches. *International Journal of Accounting Information Systems*, 43, 100532.
- Soh, F., & Grover, V. (2020). Effect of release timing of app innovations based on mobile platform innovations. *Journal of Management Information Systems*, 37(4), 957-987.
- Stallworth Williams, L. (2008). The mission statement: a corporate reporting tool with a past, present, and future. *The Journal of Business Communication (1973)*, 45(2), 94-119.
- Stoica, M., Roach, W., & Price, D. (2012). Wireless business and the impact on firm performance: The strategic move to adopt a new technology. *International Journal of Management & Information Systems (IJMIS)*, 16(1), 45-54.
- Tarafdar, M., Tu, Q., Ragu-Nathan, B. S., & Ragu-Nathan, T. S. (2011). The impact of technostress on role stress and productivity. *Journal of Management Information Systems*, 28(1), 301-328.
- Terashima, N. (2001). *Intelligent Communication Systems: Toward Constructing Human Friendly Communication Environment*. Elsevier.
- Turedi, S., & Erkan-Barlow, A. (2022). CIO equity compensation and IT investment: the moderating role of board monitoring and evidence of managerial myopia. *Review of Behavioral Finance*, (ahead-of-print).
- Venkatesh, V., Brown, S. A., & Bala, H. (2013). Bridging the Qualitative-Quantitative Divide: Guidelines for Conducting Mixed Methods Research in Information Systems. *MIS Quarterly*, 37(1), 21-54.
- Viete, S., & Erdsiek, D. (2020). Mobile information technologies and firm performance: The role of employee autonomy. *Information Economics and Policy*, 51, 100863.
- Yang, K. (2014). Wireless sensor networks.
- Yayla, A. A., & Hu, Q. (2008, January). Determinants of CIO compensation structure and its impact on firm performance. In *Proceedings of the 41st Annual Hawaii International Conference on System Sciences (HICSS 2008)* (pp. 427-427). IEEE.
- Yayla, A. A., & Hu, Q. (2014). The effect of board of directors' IT awareness on CIO compensation and firm performance. *Decision Sciences*, 45(3), 401-436.
- Zhang, P., Zhao, K., & Kumar, R. L. (2016). Impact of IT governance and IT capability on firm performance. *Information Systems Management*, 33(4), 357-373.