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DOCTORAL THESIS

**Effects of Strategic Investment in IT on Digital Transformation,
Technology, and Talent: Mediation Effects and Alignment of IT
Leadership, IT Challenges, IT Priorities, and IT Spending**

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTORATE IN
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Abstract

Digital transformation can be considered to alter the people, process, technology and data components of an organization. Digital transformation strategies must be aligned with talent and technology strategies, which are the essential building blocks of digital project effectiveness. The study investigated the factors impacting the alignment of digital transformation strategies, technology, and talent, and under what context are these factors most favorable. It acquired data from *CanadianCIO Census*, who surveyed 804 respondents about IT strategies of businesses in Canada and their ability to manage digital transformation over five years (2015-2022). The collected data were analyzed using Partial Least Squares – Structural Equation Modeling (PLS-SEM). The results showed that IT strategy, CIO position, and hiring priorities significantly influence the alignment of digital transformation strategies, technology, and talent. However, year-wise comparison analysis identified an inconsistency in significance of results (only a few significant results are obtained). Hence, it can be concluded that digital transformation can only be successful if alignment of digital transformation strategies, technology, and talent. The study findings validated the role of external technological and socioeconomic environment as well as the role of IT and CIOs for the successful digital transformation at the firm level and at the employee level.

Effets de l'investissement stratégique dans les TI sur la transformation numérique, la technologie et les talents : effets de médiation et alignement du leadership TI, des défis TI, des priorités TI et des dépenses TI

Résumé

La transformation numérique peut être définie comme la transformation des composantes organisationnelles liées aux personnes, aux processus, aux technologies et aux données. Son succès repose sur l'alignement des stratégies de transformation numérique avec celles des talents et des technologies, considérées comme des leviers essentiels de performance. Cette étude examine les facteurs influençant cet alignement et les contextes dans lesquels il est le plus favorable. Les données proviennent du *CanadianCIO Census*, basé sur 804 répondants, portant sur les stratégies TI des organisations canadiennes et leur capacité à gérer la transformation numérique sur la période 2015–2022. L'analyse, réalisée à l'aide de la méthode PLS-SEM, montre que la stratégie TI, le positionnement du DSI et les priorités de recrutement influencent significativement cet alignement. Toutefois, une variabilité dans la significativité des résultats est observée selon les années. Ces résultats suggèrent que la réussite de la transformation numérique dépend d'un alignement cohérent entre stratégies, technologies et talents, tout en confirmant le rôle de l'environnement externe, ainsi que celui des fonctions TI et des DSI, aux niveaux organisationnel et individuel.

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1 Introduction

Over the last few years, the global economy is increasingly trending towards the digitalization, which has increased the significance of digital transformation in making organizations competitive in the market. However, disruptive changes not only affect companies but also have implications for the environment, society, and institutions. Considering this, the topic of digital transformation has increasing attention over the past two decades, resulting in a diverse array of topics being explored in the literature. Like all types of change programmes, digital transformation can be considered to alter the people, process, technology and data components of an organization (Dremel et al., 2017; Hansen et al., 2011).

Several definitions of term ‘digital transformation’ has been employed in the literature. Hinings et al. (2018) explained that digital transformation combines the effects of numerous digital innovations bringing about structures, novel actors (and actor constellations), practices, beliefs, and values that alter, modify, threaten, or complement existing rules of the game within organizations, industries, ecosystems, or fields. Digital transformation is a different concept from digitalization, as digital transformation refers to changes arising from digital technologies, while digitalization refers to the transmission of information through automatic technologies from analog to digital form (Hess et al., 2016). Hence, it can be referred that digital transformation is a function of accumulating digital innovations (Rodríguez-Abitia & Bribiesca-Correa, 2021).

Studies relating to digital transformation have emphasized the emergence of new post-alignment challenges with a more seamless integration of business and technology strategies (Warner & Wäger, 2019). Project leaders face more complex tasks, requiring hybrid skillsets, blending business and technological competencies, and spanning operational and strategic levels. Business Technology Management (BTM) professionals and executives are therefore challenged to accomplish more with the same levels of resources and expertise while continuing to accelerate technology learning rates to integrate several knowledge and certification domains (Sidenko et al., 2019).

Digital transformation strategies must be aligned with talent and technology strategies, which are the essential building blocks of digital project effectiveness. An organization can only aim to accomplish and deliver what it’s best and brightest, as talented professionals and executives

are significantly challenging to find, hire, and keep, especially when all markets undergo rapid technological change simultaneously. This may explain in significant part why certain transformation initiatives suffer even when timing and conditions are favourable, having attempted to “engineer” their organization by assuming that capabilities were easy to acquire and align as per their aims.

This phenomenon surrounding digital transformation leads us to formulate a research question motivating this study:

“What are the factors impacting the alignment of digital transformation strategies, technology, and talent, and under what context are these factors most favorable?”

To explain this phenomenon, the study assessed the impact of three aspects of digital transformation inquired from a survey of Chief Information Officers (CIOs) in Canada. These three aspects include: (i) IT strategy, (ii) CIO position, and (iii) hiring priorities. With respect to IT strategy, the study investigates the means through digital transformation can be aligned with organizational size and IT strategy, which include several indicators of IT hiring, IT infrastructure, IT priorities, IT challenges, and IT spending. Hence, it measures the level of investment and size of the organization set to achieve digital transformation and how IT spending priorities are linked based on the mediating effect of IT skill levels. With respect to CIO position, the study measures the innovation behaviour of senior IT executives, the extent to which these executives are depended on IT priorities and IT infrastructure, and the mediation effect from business benefits realization from balancing IT priorities and IT challenges. With respect to IT hiring priorities, the study measures the extent to which talent acquisition is incurred from IT strategy and IT spending, and the mediation effect of IT strategies on good alignment of IT hiring and IT challenges experienced by the organization. This should make it possible to demonstrate that the strategies developed by senior IT managers have the effects required to make the organization’s skills more agile.

1.2 Research Objectives

Following the proposed research question, the study aims to achieve the following research objectives:

1. IT Strategy

- i. To examine how organizational size influence IT hiring, IT priorities, IT challenges, and IT infrastructure to achieve business-technology-talent alignment; and
- ii. To examine how IT spending mediates the relationship between IT strategy and IT priorities to achieve business-technology-talent alignment;

2. CIO Position

- i. To examine how CIO position set the linkage between IT strategy and IT challenges to direct business-technology-talent alignment; and
- ii. To examine how IT challenges influence the linkage between CIO position and IT priorities to direct business-technology-talent alignment;

3. IT Hiring Priorities

- i. To examine how IT strategy influence IT hiring priorities to achieve business-technology-talent alignment; and
- ii. To examine how IT priorities influence the linkage between IT spending and IT hiring to set business-technology-talent alignment.

1.2.1 Impact of IT Strategy in Alignment of Digital Transformation Strategies, Technology, and Talent

Digital transformation is associated with talent attraction, retention, and management, which is concurrent with digital learning or digital skills development. Digital transformation can only be successful if timing, technological characteristics, and opinion leaders are aligned with vision, management, and culture of the organization. Contrarily, digital project failure rate is linked to poor technology choices, which can negatively influence a firm's operations and capacity for innovation (Ramesh & Delen, 2021).

To achieve digital transformation, the study seeks to assess the digital skills development within IT from different five perspectives: IT hiring, IT priorities, IT challenges, IT infrastructure, and IT spending. Firstly, the study proposes that digital skills can be developed if the firm focusing on developing IT infrastructure through setting IT priorities, recruiting experienced and skilled IT personnel, managers, and executives, and addressing IT challenges accordingly. Past literature identified that firm's resources is directly associated with organizational size (Boštjančič & Slana, 2018). Especially, development of digital skills is crucial for Business-Technology alignment and digital transformation for both large corporate and SMEs in order to ensure sustainable growth in an increasingly digital world (Atasoy et al., 2016). Having technical expertise as a core competency, larger organizations may be better suited to address critical IT issues such as cybersecurity and data management due to their more extensive resources. Similarly, SMEs may focus more on enhancing customer agility and adopting robust and fertile decision-making capabilities to gain competitive positioning. Hence, the study aims to analyze if the organizational size is linked to IT hiring, IT priorities, IT challenges, and IT infrastructure.

1.2.2 Impact of CIO Position in Alignment of Digital Transformation Strategies, Technology, and Talent

Organizations heavily rely on CIO positions, who dedicate themselves to promoting a change within the organization, such as digital transformation (Shea, 2021). CIO portrays the innovation behaviour of senior IT executives or the realization of business benefits from IT. This study seeks to assess if the innovation behaviour in form of competencies, experience, and champion roles of CIO can necessarily create the possibility of successful digital transformation and innovation.

The study seeks to investigate the role of CIO position in bridging the relationship between IT strategy and IT challenges, or to develop a specific IT strategy that would help in overcoming the current IT challenges. Being an advocate of innovation (Newbold & Azua, 2007), CIO are challenged to strategize their investment preferences and set them towards addressing IT issues or challenges. Hence, identifying the right competencies within the right candidates for CIOs may lead to turning the IT challenges into IT strengths, which may lead to reducing the

uncertainty in the fuzzy front end of the innovation. The study aims to determine if the CIO position is necessary to link the relationship between IT strategy and IT challenges.

The study proposed that CIO position is dealt with those challenges within the organization by prioritizing the integration of new technological capabilities into products, services, and processes with innovation. CIOs may become aware of the current challenges within the IT such as IT governance and IT controls, which may direct them to make technology choices while focusing on organizational priorities. In other words, the study expected IT challenges to shape the alignment of CIO position with IT priorities, considering the nature of technological innovation and business innovation. Hence, the study seeks to investigate the role of IT challenges in bridging the relationship between CIO position and IT priorities.

1.2.3 Impact of IT Hiring Priorities in Alignment of Digital Transformation Strategies, Technology, and Talent

IT hiring priorities refer to as the process by which departments determine the need and direction for future faculty searches (White-Lewis, 2021). To achieve IT hiring priorities, firms often sort candidates into smaller groups who share the same set of primary needs that they want an employer to meet. These priorities direct IT hiring processes that reflect standards governing job descriptions and job requirements to gain from the full potential of their educational and professional proficiency.

The study seeks to investigate how budgeting strategies of technology and corresponding technological selection affect the hiring priorities of IT personnel, managers, and executives or CIO. Talent management is crucial for executing any strategy within an organization (Collings & Mellahi, 2009). Digital transformation also needs skilled and experienced employees that foster digital maturity (Montero Guerra and Danvila-Del Valle, 2024). Hence, talent acquisition sets the pathway for successful talent attraction, retention, and management (Montero Guerra and Danvila-Del Valle, 2024). Its importance in business-technology alignment cannot be denied, as it helps in achieving strategic goals of an organization: IT strategic goals are aligned to business objectives and broken down into smaller objectives describing technological expertise—termed as IT hiring priorities—to be achieved through IT spending. Hence, the study proposed a direct relationship between IT strategy and IT hiring to successfully implement digital transformation strategies.

Considering IT spending mentioned earlier, the study seeks to investigate the role of integrating IT priorities in IT hiring practices through IT spending. It measures the mediation effect of IT strategies on the good alignment of IT hires and IT problems experienced by the organization. This should make it possible to demonstrate that the strategies developed by senior IT managers have the effects required to make the organization's skills more agile. However, the significant relationship between IT investment and IT hiring can only occur if IT priorities include creation of digital literacy and e-skills needed for successful implementation of new ICT technologies. Hence, the study proposed that IT priorities are necessary for alignment of IT spending and IT hiring.

1.3 Research Rationale & Unique Contribution – Digital Transformation through IT Development

Digital transformation is frequently described as a broad organizational change affecting structures, processes, and managerial practices. It has become a central strategic priority for organizations across industries (Bharadwaj et al., 2013; Warner & Wäger, 2019). However, in practice, it is primarily implemented through information technology-related decisions that shape how organizations design, deploy, and evolve their technological capabilities. Such decisions include choices related to IT infrastructure, system architecture, platforms, and digital capabilities, including cloud adoption, distributed systems, data-driven technologies, and cybersecurity. Consequently, digital transformation cannot be solely understood as a managerial or cultural phenomenon, but rather as a technology-driven form of organizational transformation in which technology strategy, expertise, and resource allocation play a central role. Such digital transformation can create value or core competencies of firm through strategic acquisition of IT technologies, rather than mere adoption or acquisition of new technologies.

At present, firms struggle to achieve the coherence between IT strategy, IT infrastructure and hiring decisions (Chew & Gottschalk, 2009; Mithas & Rust, 2016). To resolve this problem, the role and responsibilities of CIO in digital transformation are being redefined – a critically underrated phenomenon (Bharadwaj et al., 2013; Kraus et al., 2021; Peppard, 2011). Their core talent as well as the means through which they manage and recruit talent are also being redefined. Hence, the study emphasizes to map conceptual framework linking CIO position to

IT strategy, IT infrastructure, IT priorities, IT challenges to achieve digital transformation through learning by IT hiring. By doing so, the study brings an attention on mechanisms that explain how technological strategy, organizational attributes, and CIO position influence investment priorities, management of IT challenges, and IT hiring decisions.

The primary focus of this study is to examine how digital transformation strategies are aligned with technology and talent through IT leadership and decision-making. Adopting an IT-based perspective, the study focuses on the mechanisms through which technology strategy, organizational context, and IT leadership influence IT hiring decisions, investment priorities, and the management of IT challenges. Subsequently, each objective contributes to the existing literature in a unique way:

- Assessing the direct effect of IT strategy on IT hiring decisions clarifies how strategic intent is translated into talent acquisition.
- Assessing the influence of organizational size on IT hiring, IT priorities, IT challenges, and IT infrastructure clarifies how key IT-related dimensions can be managed by organizational size.
- Assessing the mediating role of the CIO position in translating IT strategy into responses to IT challenges highlights the CIO's role as a strategic and innovation-oriented leader.
- Analysing how IT challenges shape IT priorities explain the link between leadership roles and strategic technology focus.
- Assessing how IT priorities and IT spending mediate the relationship between IT strategy and IT hiring clarifies how resource allocation supports alignment between technology and talent.
- Assessing these interrelationships remain stable over time using multi-year data explained account for variations across different annual contexts.

2 Literature Review

The current literature review adopted a *scoping review approach*, in which a broader body of literature on the underlying topic is defined in terms of its scope or coverage and then obtain a detailed overview of its focus (Munn et al., 2018). This approach is useful to examine emerging evidence and build on it when only a limited information is available on the topic (Munn et al., 2018). Such a review enabled the researchers to pose a more specific questions or hypothesized statements that can be tested through empirical research (Munn et al., 2018). It identifies and maps the available evidence and then critically evaluates it to identify and analyze knowledge gaps (Munn et al., 2018).

Figure 1 represents the methodology employed to conduct scoping literature review, which was comprised of five steps. Firstly, an extensive search of literature was conducted on three scientific databases, including Scopus, Web of Science (WoS), and Google Scholar. The research seeks to obtain all related works that were already conducted on the underlying phenomenon examining research objectives of the study. Keywords for each sub-objective was identified in a scientific manner that defines the possible independent and dependent variables in the relationship the main objective seeks to achieve. For instance, the first research objective seeks to determine impact of technological competencies on the alignment of digital transformation strategies, technology, and talent. The idea behind this objective is to establish an interrelationship between organizational size, IT hiring, IT priorities, IT challenges, and IT infrastructure, and hence the keywords obtained here included ‘organizational size’, ‘IT strategy’, ‘IT hiring’, ‘IT priorities’, ‘IT challenges’, and ‘IT infrastructure’. Here, ‘IT strategy’ was also conducted as a keyword as ‘organizational size’ can be strategically controlled to align technology with talent. The review was conducted during the months of August and September, 2024 in intervals for each sub-objective.

Once the search was completed, the quality of research was critically evaluated. For this study, only peer-reviewed articles published in Q1 to Q3 journals (based on current indexing) were selected. All articles in-press and articles published before 2005 were excluded from the list of research. However, the study extended the search of books to at least five decades to capture the background and foundation on which topic has been built upon. The selection of research articles also included peer-reviewed conference papers published after 2005. Once the selection

is completed, the relevant information was extracted from selected articles. For this purpose, keywords were treated as key concepts, which were extended to synonym and phrases possible mentioned in the research articles. These keywords or concepts as well as factors relating or connecting to keywords/ concepts were then identified within the selected articles. Later, relevant information can be synthesized further to explain only a conceptual idea and empirical relationship between key variables under study.

Once the relevant information was extracted from selected articles, it was compiled and put in a scientific sequence that defined key concepts and elaborated how independent variables can influence dependent variables. If the relevant information directly explaining the relationship between independent and dependent variables cannot be obtained, key concepts or important components were connected in a consequential manner through a series of mediating variables. This also identified knowledge gaps from mapping of literature and further derive hypotheses, with a sole purpose of explaining how these concepts and their interrelationships would ascertain the alignment of talent, technology, and digital transformation.



Figure 1 – Methodology for Scoping Literature Review

2.1 Scott Morton's Five Forces Influencing the Organisation's Objectives

The MIT90 model, developed by Scott Morton in 1991, illustrates the alignment between strategy and information and communication technology (ICT) through the interrelationship of five influencing forces: **strategy, structure, technology, individual roles, and management processes** (Scott-Morton, 1991). Scott Morton argued that an organization consists of “five sets of forces in dynamic equilibrium among themselves,” while also being influenced by external factors. The model further examines the connections between these internal elements and three external factors: society, the economy, and advancements in science and technology.

The theory explained that, firstly, where one firm achieved a significant ‘competitive advantage’, it is necessary for its competitors to neutralize that advantage and avoid the ‘competitive disadvantage’ (Clarke, 1994). Secondly, the theory explained the phenomenon of ‘second-mover advantage’, that the first-mover actually incurs a disadvantage through available knowledge, overcoming resistance while driving average costs down, and locking down obsolescent system (Clarke, 1994). The third phenomenon explained the differentiation between ‘sustainable’ and ‘contestable’ competitive advantage in a way that differentiate between the sustainability of the original advantage and of derived advantage (Clarke, 1994). The fourth phenomenon was ‘alliance’, in which a number of organizations collaborate in order to gain competitive advantage over others or neutralize the advantage of one or more competitor organizations (Clarke, 1994). The fifth phenomenon was ‘strategic alignment’ of policies and initiatives with the directions indicated by the organization’s senior executives (Clarke, 1994).

In the context of digital transformation, the alignment between strategy and technology is necessary to gain competitive advantage or to neutralize the advantage of firm’s competitor. An organization that opts for digital transformation must align between strategy (IT strategy) and technology (IT priorities, IT hiring, IT spending, IT challenges, and IT infrastructure) with the support of C-executive i.e., CIO position. Hence, in line of MIT90 model (Scott-Morton, 1991), digital transformation is necessary for maintaining a firm’s competitive advantage.

Table 1 shows the mapping of six constructs i.e., IT strategy, IT priorities, IT hiring, IT spending, IT challenges, and IT infrastructure within Scott Morton’s Five Forces Framework influencing the organization’s objectives. Firstly, IT strategy itself is a strategy to formulate

and implement digital change in IT infrastructure, IT competencies, and means to achieve it. Secondly, IT hiring is mapped with strategy as well as individuals and their roles, as personnels are attracted, acquired, and recruited strategically in line of firm’s goals and objectives and then their roles is linked with their position in organizational structure and hierarchy. Thirdly, organizational size is mapped with structure as well as individuals and their roles, as employees as individuals are structured in organizational hierarchy with fixed size by assigning roles and responsibilities. Fourthly, IT priorities and challenges are termed as management process, as it sets the goals, processes, and procedures to address difficulties, concerns, or problems faced during digital transformation. Fifthly, IT infrastructure itself is technology that runs business processes and bring the needed transformation, flexibility, and innovation. Another construct— CIO position links individuals and roles with structure, or in other words, organizational chart by defining its roles and responsibilities and placement in C-executives and organizational hierarchy. Lastly, the study termed IT spending as a form of strategy, in which the amount to spent at different phases is aligned with organizational strategies and objectives.

	Strategy	Management Process	Structure	Individuals & Roles	Technology
IT Strategy	<input checked="" type="checkbox"/>				
IT Hiring	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
Organizational Size			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
IT Challenges		<input checked="" type="checkbox"/>			
IT Priorities		<input checked="" type="checkbox"/>			
IT Infrastructure					<input checked="" type="checkbox"/>
CIO Position			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
IT Spending	<input checked="" type="checkbox"/>				

Table 1 – Mapping Table

2.2 *Impact of IT Strategy on IT Hiring*

Information technology (IT) strategy is a critical business discipline that ensures IT delivers value to the business. It enhances the effectiveness and efficiency of business operations and enables firms to offer competitively differentiated, innovative products and services (Chew & Gottschalk, 2009). Mithas and Rust (2016) define IT strategy as an expression of the dominant strategic objective that a firm chooses to emphasize, whether it be revenue expansion, cost reduction, or a dual emphasis on both. The relationship between IT strategy and IT hiring is crucial in today's technological landscape, where the alignment of technology with business goals significantly influences how organizations attract, develop, and retain IT talent. It follows the Business-Technology Alignment theory, which holds that firms with higher level of Business-Technology alignment can better realize higher long-term profitability, availability of financial resources, and sales growth than firms with lower IT alignment (Gerow et al., 2015).

2.2.1 *Talent Management as a Strategic Component*

Talent management is pivotal in executing IT strategy, particularly in sectors undergoing digital transformation. Tafti, Mahmoudsalehi, and Amiri (2017) emphasized that talent management is central to achieving strategic goals in organizations, especially in industries like automotive, where innovation cycles are short, and competition is intense. They identified several structural, environmental, behavioural, and managerial barriers that can impede effective talent management, all of which are directly relevant to IT hiring. For instance, the lack of strategic alignment between HR and business strategies can lead to inefficient IT hiring processes that fail to meet the specialized needs dictated by the IT strategy.

McCarthy et al. (2021) highlighted that competent digital leadership has the most significant impact on successfully implementing a digital transformation programme. The competencies in digital leadership must evolve into hybrid capabilities, and it is essential to comprehend the digital leadership characteristics required to drive digital transformation. These qualities include, among others, professionals with expertise in digital strategies, corporate digital culture, digital architecture, agility, data advocacy, and business process optimization. The leadership required to lead a digital transformation programme may be more significant than anticipated. In many instances, the volume of changes within the organization is unprecedented and making the right decision is only sometimes a simple task. Whereas process and technology

are the most tangible and noticeable changes that can occur, data's role in an organization is undervalued. This is especially true if the business attempts to provide customers with value innovatively. Developing a digital customer experience requires a deep comprehension of data and how it can be used. Regardless of this, and even more challenging, is the leadership needed to guide everyone in the company through the digital transformation journey.

Montero Guerra and Danvila-Del Valle (2024) highlighted the significant impact of digital transformation on talent attraction, retention, and management. Their research underscores the importance of aligning recruitment processes with broader IT strategies to foster digital maturity. Similarly, Eom, Gudigantala, and Kim (2019) found that IT strategies focused on digital transformation are more likely to succeed when supported by robust talent management practices that emphasize acquiring digital skills. Technology and transformation strategies must be enacted more seamlessly and emerge from the practice (Pelletier & Raymond, 2020)

Gilch and Sieweke (2021) discussed the strategic role of IT recruitment in organizations' digital transformation, describing IT recruitment as a "sensory organ" that acquires external knowledge about environmental changes, which can then be used to drive internal innovation. This perspective highlights how IT recruitment meets immediate staffing needs and mediates external technological trends and internal strategic goals, ensuring that IT hiring aligns with the company's broader IT strategy.

2.2.2 Barriers to Effective IT Hiring

Various studies have identified obstacles to effective IT hiring that stem from misalignment between IT strategy and talent management practices. Talent management is also a set of processes that are more strategic than other HRM techniques, (McDonnell et al., 2017). Tafti, Mahmoudsalehi, and Amiri (2017) categorized these barriers into structural, environmental, and managerial challenges. These include the lack of integrated talent management systems and external pressures like economic sanctions and market saturation, which highlight the need for a cohesive IT strategy that ensures the recruitment and retention of necessary IT talent.

Bharadwaj et al. (2013) argued that IT strategy should evolve into a digital business strategy that is integrated with the overall business strategy rather than being treated as a separate functional strategy. This integration is essential for addressing the structural challenges in IT

hiring, such as the misalignment between business needs and the skills sought during recruitment. Furthermore, Weaver (2022) emphasized the difficulties that firms face in IT hiring IT talent due to the rapid pace of technological change, which often outstrips the ability of traditional IT hiring practices to identify and attract the right candidates.

Stepanova et al. (2022) highlighted that the recruitment of computer science (CS) graduates is increasingly influenced by the evolving nature of IT strategies, which demand a blend of technical expertise and strategic thinking. The study found that employers are now looking beyond academic performance, emphasizing candidates' practical experience, problem-solving skills, and the ability to adapt to rapidly changing technology environments.

2.2.3 Case Studies: Application of IT Strategy in Talent Acquisition

Practical applications of IT strategy in talent acquisition are evident across various industries. For example, the automotive industry in Iran, as studied by Tafti, Mahmoudsalehi, and Amiri (2017), presents a case where IT strategy directly influences the talent management process. Structural and managerial challenges, such as the absence of integrated HR systems and insufficient top management involvement, have hindered effective talent acquisition in this sector. This scenario illustrates the critical need for strategic alignment between IT goals and HR practices to facilitate successful IT hiring.

Edwards-Schachter et al. (2015) highlighted the importance of innovation in the IT hiring process within knowledge-intensive industries. They argue that IT strategy must encompass innovation-driven talent management practices to attract and retain the necessary expertise for sustaining competitive advantage. This includes adopting novel recruitment techniques, such as AI and big data analytics, to identify and engage with top talent in the field.

Das and Yadav (2021) presented a case study of a hyper-local food delivery organization where the IT strategy was directly tied to the IT hiring strategy. They used a simple integer programming model to determine the optimal number of delivery personnel needed to meet peak demand periods. This demonstrates how a well-aligned IT strategy can effectively guide hiring decisions to maximize productivity while minimizing costs. This approach underscores the importance of using data-driven strategies in IT hiring to meet business objectives.

Mankasingh and Ramsoomair (2017) examined how small IT consulting firms can leverage strategic IT hiring to gain a competitive advantage over larger firms. Their study found that a focused IT strategy, which emphasizes specialized skills and the ability to deliver customized solutions, can influence managerial hiring preferences, leading to more effective recruitment of business analyst IT consultants.

2.2.4 Strategic Frameworks: Enhancing IT Hiring through Alignment

Adopting strategic frameworks in talent management is essential for aligning IT hiring with broader organizational objectives. Collings and Mellahi (2009) proposed a framework emphasizing the need for a differentiated human resource architecture to support the systematic identification of key positions and the development of a talent pool to fill these roles. This approach ensures that IT strategy aligns with and drives the talent acquisition process, enabling organizations to meet their IT needs more effectively.

Iles et al.'s (2010) four-quadrant model categorizes talent management perspectives into exclusive-people, exclusive-position, inclusive-people, and social capital. By focusing on "exclusive-position" and "exclusive-people," organizations can ensure that their IT strategy prioritizes the recruitment of individuals who are not only highly skilled but also positioned in roles critical to achieving strategic IT objectives.

Khoreva, Vaiman, and Van Zalk (2017) explored the effectiveness of talent management practices from the employee perspective, finding that employees are more likely to be engaged and committed when they perceive that their organization's IT strategy supports their professional development. This highlights the importance of aligning IT hiring practices with talent management strategies that employees perceive as beneficial, thereby enhancing retention and reducing turnover.

2.2.5 Role of Digital Tools and AI in IT Hiring

Integrating digital tools and AI into the recruitment process is becoming increasingly important in enhancing IT hiring. Eom, Gudigantala, and Kim (2019) underscored the growing reliance on AI-driven tools in the recruitment process within IT firms. These tools assist in screening candidates, conducting preliminary interviews, and predicting candidate success based on data-

driven insights. The strategic use of these technologies aligns with broader IT strategies aimed at improving efficiency, reducing costs, and enhancing the accuracy of IT hiring decisions.

Hemalatha et al. (2021) discussed the impact of AI on recruitment and selection in IT companies, noting that AI can enhance productivity, increase efficiency, save time, reduce costs, improve accuracy, and reduce workload. This reflects a broader trend where IT strategy shapes IT hiring practices, as companies increasingly adopt AI and machine learning, leading to a shift in recruitment strategies. Muduli and Trivedi (2020) further supported the significant impact of social media recruitment, facilitated by IT strategies, on recruitment outcomes through credibility and satisfaction, making it a user-tailored platform for implementing IT strategies and achieving IT objectives.

The application of AI in recruitment reflects a broader trend where IT strategy shapes hiring practices. As companies increasingly adopt AI and machine learning, the demand for employees skilled in these areas grows, leading to a corresponding shift in recruitment strategies. This shift highlights the importance of an forward-looking IT strategy that is adaptive to technological advancements.

2.2.6 Learning and Innovation through IT Hiring

Tzabbar, Silverman, and Aharonson (2015) explored the concept of "learning-by-hiring," where the recruitment of new IT employees is seen as a means to acquire new knowledge and drive innovation within the organization. They emphasized that merely hiring new talent is insufficient; organizations must also have internal mechanisms, structures, and cultures promoting knowledge sharing and collaboration. This approach aligns with IT strategies aimed at fostering continuous learning and innovation, which are critical for maintaining competitiveness in technology-driven industries. Selecting suitable candidates for digital leadership careers requires developing new anchors and ways of developing a digital culture (Cabot & Gagnon, 2021).

Berkelaar (2017) examined how emerging technology-enabled practices, such as cybervetting, transform conventional personnel selection methods. This study highlights the role of IT strategy in evolving hiring practices, where organizations use social media and search engines to evaluate job candidates, uncovering their true potential and capabilities. While still

controversial, this practice demonstrates how IT strategy can influence the methods used in IT hiring to better align with organizational objectives.

2.2.7 Direct Effect of IT Strategy

The impact of IT strategy on IT hiring is multifaceted. As organizations continue to navigate the challenges of digital transformation, the alignment between IT strategy and talent management practices becomes increasingly crucial. For instance, as Montero Guerra and Danvila-Del Valle (2024) highlighted, digital transformation significantly influences talent attraction and retention, making it imperative for firms to align their IT strategies with broader business goals to achieve high levels of digital maturity.

The case studies, such as those by Das and Yadav (2021) on hyper-local food delivery organizations and by Mankasingh and Ramsoomair (2017) on small IT consulting firms, illustrate how a well-defined IT strategy can directly inform and improve hiring practices. These examples underscore the importance of a cohesive approach that integrates IT strategy with innovative IT hiring practices, supported by data-driven methods and technological advancements.

The role of digital tools and AI in recruitment, as discussed by Eom, Gudigantala, and Kim (2019) and Hemalatha et al. (2021), further emphasizes the need for IT strategies that incorporate these technologies to enhance efficiency, reduce costs, and improve the accuracy of hiring decisions. This shift toward AI-driven recruitment practices highlights the ongoing evolution in IT hiring, where traditional methods are increasingly supplemented or replaced by technology-enabled solutions (Berkelaar, 2017).

Moreover, the strategic frameworks proposed by Collings and Mellahi (2009) and the insights from Stepanova et al. (2022) suggest that organizations must adopt a differentiated approach to talent management that aligns with their IT strategies. This approach ensures that firms can effectively attract, develop, and retain the skilled IT personnel necessary to drive innovation and maintain a competitive edge in the digital economy. Digital innovation creates new challenges for CXO teams (Kohli & Melville, 2019).

The possible relationship between IT strategy and IT hiring follows the signal theory (Vickrey, 1961), which holds that individuals often depend on signals to avoid poor decisions, shaping

their perceptions of quality. The basic notion behind signal theory was that when parties exchange signals, the issues arising from asymmetric information can be reduced (Spence, 1973). In the context of digital transformation, organizations also implement this approach to craft and use their corporate brand to convey suitable signals, thereby increasing the possibility that candidates will attribute a competitive advantage to it (Dang et al., 2019). In the context of human resource management (HRM), due to the limited information, applicants depend on signals to form quality assessments about potential employers or to determine if joining the organization would fulfil their personal needs (Chapman & Webster, 2006). This underlying relationship follows the resource-based view (RBV), which hold that organizational resources and capabilities are the key to gaining competitive advantage and performance (Penrose, 2009). It defines how managers use firm resources and capabilities to create products that serve customers better than competitors (Penrose, 2009).

The study proposed that the alignment of technology with business goals significantly influences how organization attract, develop, and retain IT talent. It follows the Business-Technology Alignment theory, which holds that firms with higher level of Business-Technology alignment can better realize higher long-term profitability, availability of financial resources, and sales growth than firms with lower IT alignment (Gerow et al., 2015). Talent management is an IT strategy necessary to undergo digital transformation in corporate-level organizations. IT strategies face structural, environmental, and managerial challenges, such as lack of integrated talent management systems and external pressures like economic sanctions and market saturations. These challenges set the directions for IT hiring, either it is to be done in-house or outsource. This determines the preceding IT strategies between revenue expansion (in-house hiring), cost reduction (outsourcing), or a dual emphasize on both. Hence, the direct impact of IT strategy on IT hiring is linked to a critical business discipline that ensures IT delivers value to the business.

Following Scott Morton's Five Forces Framework (Scott-Morton, 1991), IT strategy acts as a key force in form of organizational strategy that enables firms to position itself, competes, and sets goals in response to industry structure, technology, and market change. It can be strongly linked with another key factor i.e., roles and responsibilities that human resources define or adapt to align employees' behaviour with organizational aims and objectives or, in this case, IT strategy (Scott-Morton, 1991). Considering that hiring is associated with human employees

(or people), their skills, motivations, and behaviours are necessary to bring adaptation and innovation required for digital transformation (Scott-Morton, 1991). Hence, the study established that IT strategy can define IT hiring practices or strategies, by which their roles and responsibilities for each individual employee can be set and then matched and later acquired with skills set available in the market (Hemalatha et al., 2021). Hence, the study hypothesized that:

H1: IT strategy has a direct effect on IT hiring.

Table 2 represented a comparison of aims, methods, and findings across studies included in hypothesis 1. It presented the clear overview of how IT strategy can influence IT hiring.

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
Montero Guerra & Danvila-Del Valle (2024)	Examine how organizational changes from digital transformation (DT) influence talent management outcomes	Companies undergoing digital transformation	Managers of 314 companies	Structured survey questionnaire	Structural equation modelling (SEM)	DT-driven organizational changes significantly enhance talent attraction, retention, and overall talent management; talent management is a key driver of digital maturity, not just digitalization
Gerow et al. (2015)	Clarify and measure six types of IT–business strategic alignment within a unified model	Chief Information Officers in organizations	140 CIOs	Survey measuring six types of alignment	Psychometric evaluation; factor analysis to assess reliability/ validity of alignment constructs	Distinct alignment types show desirable psychometric properties: (i) alignment between IT & business strategies, (ii) between IT & business infrastructures & processes, and (iii) strategies are linked with infrastructures and processes

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
Eom et al. (2019)	Investigate how IT leadership behaviours help develop & retain competent IT personnel through quality of work life & soft skills	IT professionals in organizations	205 IT professionals	Questionnaire assessing transformational/transactional IT leadership, perceptions of soft skills, QWL, and intention to stay	Quantitative survey analysis (e.g., regression or SEM)	Transformational IT leadership improves IT personnel's QWL and intention to stay; QWL fully mediates leadership-retention link; transformational leadership enhances perceived soft-skill requirements
Hemalatha et al. (2021)	Analyze the impact of AI on recruitment and selection in IT companies	Information technology companies (recruitment/HR context)	141 employees, managers, and managing directors	Collection of journal articles & questionnaire	Multiple Linear Regression Analysis	AI tools reshape recruitment and selection in IT firms, improving efficiency and changing competency assessment
Das & Yadav (2021)	Develop a framework for manpower hiring	Hyper-local food delivery organization	141 IT employees in Chennai city, India	Conceptual and empirical work; uses	Framework development with analytical and	Proposes a structured hiring strategy framework tailored to hyper-local food delivery, linking

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
	strategy in a hyper-local food delivery organization	headquartered in Bengaluru, India		organizational data and/or managerial inputs to build a hiring framework	possibly statistical techniques	hiring decisions to operational needs and performance

Table 2 - Comparison of Aims, Methods, and Findings across Included Studies – Hypothesis 1

2.3 Impact of Organization Size on IT Hiring, IT Priorities, IT Challenges, And IT Infrastructure

2.3.1 Organization Size and IT Hiring Practices

The size of an organization significantly influences its approach to IT hiring. Ghobakhloo et al. (2011) emphasize that the number of employees, financial resources, and overall capital determine how a firm manages its IT recruitment. Larger organizations have more resources, which allows them to attract specialized talent, as noted by Boštjančič & Slana (2018) and Hunsinger et al. (2011). These firms often seek candidates with specific certifications and advanced technical skills, as highlighted by Carranza et al. (2022). For instance, Business Technology Management (BTM) is a professional certification that integrates various professional standards to match talents with projects (Gagnon, 2021).

Conversely, Bordonaba-Juste et al. (2012) and Tambe & Hitt (2012) explain that SMEs, constrained by limited financial and human resources, often rely on external support and may opt for outsourcing IT functions instead of hiring new personnel. Hunsinger et al. (2011) also point out that smaller firms tend to train their existing employees rather than invest heavily in recruitment. This approach helps SMEs manage costs, though it may limit their access to the specialized skills needed for advanced IT operations.

McGuirk et al. (2015) discuss how innovative human capital is more valuable in small firms, which often drives their need to hire IT personnel with broader skills. This innovative approach helps SMEs to remain competitive despite their limited resources. Moreover, Mithas & Rust (2016) highlight how IT strategy influences hiring practices, particularly in larger organizations where IT hiring is closely aligned with broader business strategies. Chew & Gottschalk (2009) further emphasize that effective IT strategy and management practices can help firms optimize their IT hiring processes regardless of size.

In short, larger organizations have more resources to attract specialized talent in opposed to smaller organizations, which may opt to outsourcing due to financial and human constraints. In larger organizations, such specialized talent can be developed with specific, professional certifications such as Business Technology Management (BTM), which integrated professional standards to match talents with projects. However, due to its limited resources, Small and

Medium Enterprises (SMEs) hire innovative human capital to remain competitive and valuable in today's competitive market. Comparatively, with their extensive resources, large organizations are better positioned to attract specialized talent, prioritize advanced IT initiatives, and overcome complex innovation, security, and infrastructure challenges. Their ability to invest in specialized training, adopt cutting-edge technologies, and maintain robust IT systems underscores the strategic advantages of scale. Overall, effective IT strategy and management practices can help firms optimize their IT hiring processes regardless of size.

Scott Morton's Five Forces influencing the organization's objectives also elaborated that structure of organization in terms of size defines the roles, units, and reporting lines, which are later aligned to strategic objectives. Roles, units, and reporting lines set the demands for skills needed to acquire from recruitment and IT hiring. Since SME firms have limited financial resources, these firms acquired highly qualified personnel and innovator who have mastered the core competencies and can align employee behaviour and values with company values and direction (Mouazen et al., 2023). Hence, it can be established that organization structure defined with size set the path for attracting exceptional people with a can-do attitude, who can be nurtured to excel and change. Thus, the study proposed:

H2a: Organization Size has a direct effect on IT hiring.

2.3.2 Organization Size and IT Priorities

Organization size also impacts IT priorities, with larger firms focusing on more complex IT strategies. Gutierrez et al. (2009) found that large organizations tend to prioritize strategic IT alignment and the development of comprehensive IT departments. Islam & Ferworn (2020) observe that medium-sized firms often prefer traditional software development methodologies, while large firms are more inclined toward agile methodologies, which offer greater flexibility and responsiveness.

Disaster recovery and bring-your-own-device (BYOD) policies are examples of IT priorities that are positively correlated with organization size, as noted by Baham et al. (2017) and Ophoff & Miller (2019). Larger firms are better equipped to handle the demands of extensive networks and large-scale operations, allowing them to pursue social business and collaboration

initiatives, according to Demirkan et al. (2013). However, Gutierrez et al. (2009) highlighted that SMEs may not give as much importance to IT-business alignment due to smaller IT units or a reliance on outsourcing.

Moreover, Bharadwaj et al. (2013) stress the importance of aligning digital business strategies with IT priorities in large firms. Tallon (2007) argue that larger organizations have the resources to fully integrate IT into their business strategies, thereby gaining a competitive advantage. Organizations must comprehensively understand their business processes, goals, objectives, and IT infrastructure and capabilities to achieve business-technology alignment. They must establish effective communication channels between their business and IT departments to ensure they achieve the same goal (Tallon, 2007). Additionally, they must continuously evaluate and monitor their IT initiatives to ensure that they are aligned with their business objectives and producing the desired outcomes (Tallon, 2007). The alignment of business and technology is essential for realizing business benefits, and it must be prioritized at the process level to realize the full potential of IT within the value chain (Tallon, 2007). Montero Guerra & Danvila-Del Valle (2024) extend this discussion by highlighting the role of digital transformation in reshaping IT priorities, especially in large organizations that are undergoing significant organizational change. McGee (2018) adds that the alignment of IT priorities is influenced not only by organization size but also by demographic factors such as gender and race/ethnicity within IT leadership. This demographic diversity can further shape IT priorities in different organizational settings.

Larger organizations set complex IT priorities like disaster recovery and bring-your-own-device (BYOD) that can offer agility, flexibility, responsiveness, and collaboration within IT infrastructure. Such complex priorities allow the larger firms to pursue social business and IT-business alignment through the proper implementation of business processes, setting appropriate goals and objectives, and 33 of 119 understanding the limitations of IT infrastructure and capabilities. Despite these challenges, organization size also impacts IT priorities. Large firms can focus on sophisticated IT strategies such as agile software development and robust disaster recovery systems (Islam & Ferworn, 2020; Baham et al., 2017), while smaller firms may prioritize basic IT operations due to limited resources. The larger the firm, the more likely it is to adopt cloud-based solutions to manage larger workloads (Sen et al., 2023; Pahl et al., 2013). Moreover, large organizations are better positioned to

manage vendor relationships and maintain complex infrastructure (Singh & Teng, 2016), giving them a competitive edge over smaller firms. Hence, the business and IT processes and their alignment are essential for realizing business benefits, if prioritized properly, to its full capacity.

Following Scott Morton's Five Forces influencing the organization's objectives, the study established that organizational size defines the management processes that prioritize the organizational goals and objectives. For instance, large firms need IT infrastructure that can handle large volume of operations conducted by large number of people while optimizing employee performance and productivity (Duso & Schiersch, 2025), while small firms need IT infrastructure that can automatize the work activities as a regular practice and bring change for digital transformation and organizational development (Maycotte et al., 2025). Here, IT priorities are differentiated based on the organizational size and mission of organizations. Thus, the study proposed that:

H2b: Organization Size has a direct effect on IT priorities.

2.3.3 Organization Size and IT Challenges

Larger organizations are typically better positioned to address IT challenges due to their greater resources. Rajapathirana & Hui (2018) and Ullah (2020) discuss how large firms can invest in innovation and adopt new technologies more easily than SMEs, which often face barriers such as limited capabilities and skills, as also noted by Ghobakhloo et al. (2011).

Low et al. (2011) found that firm size is a significant predictor of cloud computing adoption, with larger firms more likely to leverage cloud-based solutions. Spithoven et al. (2013) highlight that large organizations are more likely to patent innovations and effectively manage complex IT infrastructures, giving them a competitive edge in adopting open innovation practices. On the other hand, Heidt et al. (2019) and Singh & Teng (2016) discuss the security and privacy challenges faced by SMEs, which often struggle with budget constraints, a lack of skilled personnel, and insufficient strategic planning.

Tzabbar et al. (2015) provide insights into how the concept of "learning by hiring" can help larger organizations overcome IT-related challenges. By bringing in new talent and fostering a

collaborative environment, large firms can enhance their knowledge base and drive innovation more effectively than smaller firms. Rethinking organizational innovation capabilities may help develop stronger CIO champion roles for the digital transformation (Montreuil et al., 2020). Champions help reduce uncertainty in the fuzzy front end of the innovation (Eling et al., 2014). Peslak (2012) emphasizes that larger organizations are better equipped to address critical IT issues such as cybersecurity and data management due to their more extensive resources. This advantage allows them to tackle IT challenges that smaller firms might find overwhelming.

Larger organizations face large number of challenges in their IT processes due to complexity of IT infrastructure. These challenges include cybersecurity, difficulty in data management, lack of agility in communication, resources and budget constraints, and others. To address their IT challenges, larger organizations adopt “learning by-hiring” approach, in which they bring in new talent, foster collaborative environment, enhance knowledge base and drive innovation more effectively. Contrarily, smaller firms face lesser challenges such as limited resources, insufficient strategic planning, security and privacy issues, and a lack of skilled personnel due to their small scale and flexibility in business processes. Hence, the organization size can directly influence IT challenges.

Larger organizations, with more abundant financial and human resources, can hire highly specialized IT talent (Boštjančič & Slana, 2018; Hunsinger et al., 2011), set more complex IT priorities (Gutierrez et al., 2009), and face different IT challenges compared to smaller firms (Rajapathirana & Hui, 2018). Larger firms also tend to have the resources to manage sophisticated IT infrastructures, ensuring better alignment between their IT capabilities and business strategies (Fink & Neumann, 2009).

As opposed to larger firms, SMEs does not prioritize IT infrastructure or department at once; still, they often outsource their IT processes to minimize cost and reduce workload. On the other hand, small and medium-sized enterprises (SMEs) often face constraints that force them to adopt alternative strategies, such as outsourcing IT activities or training existing staff to reduce costs (Ghobakhloo et al., 2011; Bordonaba-Juste et al., 2012). These firms prioritize agility and flexibility, often being quicker to innovate despite resource limitations (McGuirk et al., 2015). SMEs may struggle with adopting cloud computing and other advanced technologies

due to budgetary constraints (Low et al., 2011; Spithoven et al., 2013) and are more susceptible to security and privacy challenges (Heidt et al., 2019).

Following Scott Morton's Five Forces Framework, the study highlighted that organizational size defines the structural hierarchy of the firm. In today's competitive market, digital transformation, which is the central idea behind the purpose of the study, connects organization size to IT challenges. Digitalization requires innovation and changes to maintain it, which brings additional challenges to existing IT infrastructure and processes. Organizations can be of two sizes: large organizations encounter IT-related challenges that relate with economies of scale, continuous innovation, and advanced knowledge base, while small-to-medium enterprises (SMEs) face challenges limited to their smaller budget such as flexibility in business processes, security and privacy issues, insufficient strategic planning, and lack of skilled personnel. Hence, a direct relationship between organizational size and IT challenges can be linked as:

H2c: Organization Size has a direct effect on IT challenges.

2.3.4 Organization Size and IT Infrastructure

Organization size also dictates the complexity and sophistication of IT infrastructure. Fink & Neumann (2009) found that larger firms are better able to invest in IT infrastructure that supports organizational complexity and enhances business processes. Wang et al. (2010) highlight that larger organizations are more likely to experiment with new technologies and can better absorb the risks associated with innovation.

Hikmet et al. (2008) observed that hospital size is positively related to the adoption of IT infrastructure at both the clinical and strategic levels. Gray et al. (2015) discuss how larger firms benefit from co-location, a type of IT infrastructure that supports knowledge-intensive processes. Additionally, Pahl et al. (2013) and Sen et al. (2023) compare cloud-based services with traditional on-premises services. They note that large firms prefer the scalability and flexibility of cloud solutions, which are better suited to handle their extensive workloads.

Roberts & Grover (2012) highlight that larger firms can leverage their IT infrastructure to enhance customer agility and competitive activity. Eom, Gudigantala, & Kim (2019) discuss

the role of strategic orientations in adopting open innovation, which is particularly relevant for large organizations with complex IT infrastructures. CIO positions are essential but hard to identify (Howell et al., 2005). Wang et al. (2018) emphasize that the adoption of big data analytics is more prevalent in larger organizations due to their ability to invest in sophisticated IT infrastructure. This adoption enhances their decision-making capabilities and competitive positioning.

Larger organizations have more complex and agile IT infrastructure that enhances business processes, manages scalability and flexibility, and promotes agility. Smaller organization can either outsource or adopt advanced and innovative IT infrastructure that leverage smart technology to reduce downtime and enhance productivity. Both smaller and larger firms now prefer to adopt cloud services instead of traditional on-premises services, which is better equipped to handle their extensive workloads and offer flexibility and customer agility. Its scalability is highly dependent on organization size and complexity of business processes that should align with technologies adoption. While larger firms benefit from more resources and can focus on IT innovations and strategic alignment, SMEs demonstrate resilience and flexibility in how they approach IT. Both large organizations and SMEs must tailor their IT strategies to their respective sizes, resource capacities, and business goals to ensure sustainable growth in an increasingly digital world (Gutierrez et al., 2009; Atasoy et al., 2016).

Understanding different organization sizes' distinct needs and capabilities is essential for tailoring IT strategies that align with business objectives. Both large enterprises and SMEs must strategically manage their IT resources to achieve long-term success in an increasingly digital and competitive landscape.

Scott Morton's Five Forces Framework explained the relationship between organizational size and IT infrastructure. It pinpointed that organizational size determines the type and nature of IT infrastructure an organization can adopt and align with organizational processes and mission or vision. For instance, SMEs might decide to outsource a certain technological infrastructure due to limited budget and poor manpower. However, larger firms can both financial and technological capabilities to acquire more advanced and sophisticated IT technologies that enhance their decision-making capabilities and competitive positioning. Hence, it can be established that:

H2d: Organization Size has a direct effect on IT infrastructure.

Table 3 represented a comparison of aims, methods, and findings across studies included in hypothesis 2. It presented the clear overview of how organizational size can influence IT hiring, IT priorities, IT challenges, and IT infrastructure.

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
Boštjančič & Slana (2018)	To compare talent management practices and challenges in attracting and retaining talent between medium-sized and large companies	Medium-sized and large organizations	247 Slovenian companies (140 medium, 107 large)	Structured questionnaire on talent management practices, challenges, and outcomes	Descriptive statistics, comparison tests (e.g., t-tests/ANOVA), and correlational analyses	Large companies report more formalized talent management systems; both firm sizes struggle with attracting and retaining talented employees, but differ in key challenges and tools used
Hunsinger et al. (2011)	To develop a framework explaining how hiring personnel use IT	IT hiring personnel (managers and HR staff) in organizations	127 IT hiring professionals (survey respondents)	Survey on importance, perceived value, and use of IT certifications in	Descriptive statistics, factor analysis, and regression to relate	Large and small organizations influences infrastructure within organizational hiring context and characteristics of certifications context

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
	certifications in IT hiring decisions	recruiting IT workers		screening and selection	certification perceptions to hiring decisions	
Mithas & Rust (2016)	To theorize and test how IT strategy and IT investments influence firm performance	More than 300 Firms across multiple industries (publicly traded U.S. firms)	Panel of several hundred firms over multiple years	Archival data on IT spending, strategic orientation, and financial performance indicators	Econometric modeling (panel regressions, controls for endogeneity)	Strategic, customer-oriented IT investments are positively associated with firm performance; IT effects are contingent on strategic orientation and complementary capabilities limited to organizational size
Bordonaba -Juste et al. (2012)	To analyze how organizational factors influence e-business use and how these relationships	Firms using or considering e-business tools, grouped by size (SMEs vs large)	610 Spanish firms (SMEs and large firms)	Postal questionnaire on e-business adoption, organizational characteristics,	Multivariate techniques, including factor analysis and multiple regression;	Internal resources, top management support, and external pressure drive e-business use; the strength and type of drivers differ between SMEs and large firms

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
	differ by firm size			and perceived benefits	sub-group analysis by firm size	
Ghobakhlo o et al. (2011)	To review and synthesize 20 years of research on information technology adoption in small and medium-sized enterprises	Empirical and conceptual studies on SMEs worldwide published over ~20 years	103 empirical and conceptual articles (reported in review)	Systematic literature review of prior empirical and theoretical studies	Qualitative synthesis and thematic categorization of determinants, barriers, and outcomes of IT adoption	Identifies key drivers (top management support, perceived benefits, external pressure) and barriers (cost, lack of skills, infrastructure) to IT adoption in SMEs

Table 3 – Comparison of Aims, Methods, and Findings across Included Studies – Hypothesis 2

2.4 Evolving Role of Chief Information Officer (CIO) in IT Leadership and Strategic Decision-Making

The Chief Information Officer (CIO) role has evolved significantly from a primarily technical position to one of strategic importance. With the growing dependence on technology for business success, the CIO has become a crucial player in aligning IT with overall business strategy, driving innovation, and addressing operational challenges (Chew & Gottschalk, 2009; Mithas & Rust, 2016). This shift reflects the increasing complexity of digital ecosystems and the centrality of IT in achieving competitive advantage (Peppard, 2011).

2.4.1 Strategic Alignment and CIO's Role

As Bharadwaj et al. (2013) argue, IT strategy must now be treated as a digital business strategy integral to overall business goals. The CIO plays a key role in ensuring that this alignment is achieved. Montero Guerra & Danvila-Del Valle (2024) highlighted how digital transformation reshapes talent management and recruitment. CIOs need to ensure that their IT teams possess the necessary skills for strategic initiatives. This aligns with Tafti, Mahmoudsalehi, and Amiri's (2017) observation that effective talent management is crucial for industries undergoing rapid digital transformation, such as automotive or manufacturing, where the CIO must oversee strategic decisions involving technical expertise. CIOs can help enhance innovation but need more impact on the strategy (Newbold & Azua, 2007)

De Tuya & Cook (2020) explore how many organizations, particularly SMEs and public sector entities, struggle to leverage the CIO role for strategic influence fully. This gap often results from a lack of recognition of the CIO's potential impact beyond operational IT management, reflecting the broader challenges of IT-business alignment (Denstad & Bygstad, 2012).

Gilch & Sieweke (2021) discuss the CIO's role as a mediator between external technological trends and internal strategic needs. Acting as a "sensory organ" for technological shifts, the CIO plays an essential role in recognizing which technologies will have the most strategic impact on the business. This also supports Tzabbar et al. (2015), who emphasize the importance of learning by hiring for organizations undergoing rapid digital transformation overseen by the CIO.

2.4.2 IT Leadership Challenges

Despite the growing importance of the CIO, Shao et al. (2016) highlight the structural power limitations that CIOs often face within organizations. These limitations restrict their ability to enact transformative IT strategies, especially in large firms. Smaltz et al. (2006) propose a configuration model that describes how CIOs must balance various competing demands, such as being both a utility provider and a strategist, depending on the organization's needs.

The difficulty in balancing operational responsibilities with strategic initiatives is compounded in larger organizations where the decision-making process is highly bureaucratic. Feng et al. (2019) highlight that CIOs need to build strong alliances with other senior leaders to overcome these barriers and influence long-term business strategy.

Weaver (2022) discusses how the rapid pace of technological change often surpasses the ability of traditional IT management approaches to keep up, which reinforces the argument for more CIOs to assume leadership roles. Additionally, Muduli & Trivedi (2020) emphasize the CIO's role in integrating AI and social media recruitment tools to enhance the organization's digital readiness, underscoring the importance of IT strategy in evolving hiring practices. A strong IT leader must oversee this digital transformation, making the CIO essential for successfully guiding this change.

2.4.3 CIO in Digital Transformation

The increasing adoption of AI, big data, and cloud technologies means that CIOs are at the forefront of digital transformation initiatives. Eom, Gudigantala, & Kim (2019) argue that IT strategies focused on digital transformation are more likely to succeed when supported by talent management practices. This directly connects to Hemalatha et al. (2021), who highlight the role of AI in recruitment and IT talent management, tools that CIOs must now integrate into their strategic vision.

As Atasoy, Banker, & Pavlou (2016) found, the role of technology in employment and job transformation across various industries requires a CIO with a forward-looking approach. Similarly, Rajapathirana & Hui (2018) stress that innovation capability within firms is highly influenced by the strategic decisions made by CIOs, especially in tech-driven industries. CIO

role and authority can have an impact on how an organization draws benefits from IT (Ding et al., 2014).

2.4.4 CIO as a Change Agent

CIOs are now expected to be change agents within their organizations. Thatcher et al. (2011) highlight how CIOs can drive IT-related change by influencing organizational culture, promoting innovation, and integrating new technologies into business processes. Tambe & Hitt (2012) note that as firms increasingly offshore their IT functions, CIOs play a critical role in managing the shifting skill composition of their IT workforce, ensuring alignment with strategic goals.

Tzabbar, Silverman, & Aharonson (2015) discuss how CIOs use learning-by-hiring approaches to keep pace with technological change. This is particularly relevant in industries where continuous learning is key to maintaining competitiveness, reflecting the broader role of the CIO as a strategic leader (Sousa & Rocha, 2019; Tzabbar, Silverman, & Aharonson, 2015).

Schein (1992) elaborates on how CIOs manage IT-led transformational strategies in collaboration with CEOs, reinforcing the CIO's role in shaping organizational growth. Collings & Mellahi (2009) add to this by suggesting a framework for how talent management—overseen by the CIO—can support strategic IT initiatives, ensuring that IT strategy aligns with talent acquisition and development efforts.

2.4.5 Interplay between CIO Position, IT Strategy, & IT Challenges

The evolving role of the CIO is critical to aligning IT strategy with business objectives and addressing organizational challenges. As Bharadwaj et al. (2013) and Peppard (2011) emphasize, the CIO is no longer a purely technical manager but a key strategic leader who must navigate digital transformation, innovation, and talent management. The structural power and influence of the CIO, as discussed by Shao et al. (2016) and Feng et al. (2019), determine their ability to drive these changes successfully.

The integration of new technologies such as AI and cloud computing, highlighted by Eom et al. (2019) and Hemalatha et al. (2021), places the CIO at the center of modern business transformation. By acting as change agents and aligning IT initiatives with business strategy,

CIOs ensure that organizations remain agile, competitive, and prepared for future challenges. The future success of CIOs will depend on their ability to balance operational responsibilities with strategic leadership, fostering innovation while ensuring the efficient management of IT resources.

The Chief Information Officer (CIO) is the executive member of IT department within any organization that aligns business processes with IT infrastructure. CIOs design IT strategy to address IT challenges. As a strategic leader, he acts as a change agent by influencing organizational culture, promoting innovation, and integrating new technologies into business processes. CIOs also employ learning-by-hiring approaches to keep pace with technological change. By employing these approaches, they hire highly educated or skilled workers with most valuable knowledge embodied with a tacit and complex nature. Thus, by moving these workers from one department to another, these workers carry this knowledge and apply it to new contexts. This process of knowledge transmission via inter-firm labor mobility is referred to as learning by hiring. CIOs play a vital role in digital transformation, as they integrate IT strategy, now referred to as digital business strategy, with overall business goals. They also play a vital role in promoting innovation by overseeing strategic decisions involving technical expertise and reshaping talent management and recruitment. CIOs also act as a “sensory organ” for technological shifts, by which they connect external technological trends with internal strategic needs – a major IT challenge. They are essential to recognize the technologies that have a most significant impact on the business and that goes beyond operational IT management. Such role reflects the broader challenges of IT-business alignment. CIOs also play several leadership roles, including utility provider and strategist, to align IT strategy with IT challenges. They build strong alliances with other senior leaders to overcome barriers of bureaucratic decision-making process and rapid technological change. Their leadership helps them in overcoming structural power limitations, surpassing the ability of traditional IT management approaches, and reducing the difficulty in balancing operational responsibilities with strategic initiatives.

Scott Morton’s Five Forces Framework also explained the possible relationship between CIO position, IT strategy, and IT challenges. CIOs are assigned with roles and responsibilities to drive innovation strategically while ensuring the efficient management of IT resources. Here, innovation is a form of IT strategy or digital business strategy, in which CIOs connect external

technological trends with internal strategic needs and play different leadership roles to overcome structural power limitations and play a leadership role to address the main challenge i.e., to align IT strategy with IT challenges (Eom et al., 2019; Hemalatha et al., 2021). The study emphasized that CIOs acts as a change agent, who aligns IT strategy with organizational goals and thereby integrates new technologies into business processes. Resultantly, the integration brought IT challenges i.e., rapid technological change and bureaucratic decision-making process (Bharadwaj et al., 2013; Peppard, 2011).

Hence, the study proposes that:

H3. Higher CIO position is necessary (mediation effect) for alignment of IT strategy with IT challenges.

Table 4 represented a comparison of aims, methods, and findings across studies included in hypothesis 3. It presented the clear overview of how CIO position can bring a bridge between IT strategy and IT challenges.

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
Bharadwaj et al. (2013)	Conceptualize digital business strategy as a fusion of IT and business strategy and propose a new framework	Firms undergoing or considering digitalization; strategy and IS scholars	Conceptual or theoretical article	Conceptual synthesis of prior literature and illustrative industry examples	Theoretical framework organized around four themes: scope, scale, speed, & sources of value in digital business strategy	Argues IT strategy is no longer subordinate; proposes digital business strategy as an integrated, organization-wide strategic perspective with implications for performance and metrics
Peppard (2010)	Explore how CIO performance can be improved and linked to firm performance via IT	CIOs, other C-suite executives, and commentators	Qualitative sample of interviewed CIOs, CEOs and commentators	Semi-structured interviews with CIOs and other senior executives	Qualitative coding and thematic analysis leading to a CIO performance model	CIO effectiveness depends heavily on context, especially CEO and top team IT savvy; highlights conditions and role configurations that enable CIO and IT success
Feng et al. (2021)	Evaluate how CIO structural power would improve	Public firms with identifiable CIOs	7,185 firm-year observations from	Secondary archival data from multiple databases	Panel fixed-effects regression models; factor analysis to	Greater CIO structural power is positively associated with Tobin's q; benefits are stronger

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
	financial performance via environmental contingencies		1,327 public companies (US)	(Execucomp, Compustat, InformationWeek 500, etc.)	construct CIO structural power index	under high market turbulence, high industry IT intensity, and high operating efficiency
Shao et al. (2016)	Examine effects of CIO strategic knowledge and structural power on enterprise systems success	Firms that have implemented enterprise systems	Sample of organizations with enterprise systems	Survey of CIOs/senior IT executives on CIO attributes and enterprise systems outcomes	Quantitative analysis	CIO strategic knowledge and structural power both positively influence enterprise systems success, with strong moderator of structural power

Table 4 – Comparison of Aims, Methods, and Findings across Included Studies – Hypothesis 3

2.5 Role of IT Challenges in Aligning CIO Position and IT Priorities

When digitalization become top priority of an organization, Chief Information Officers (CIOs) are exposed to new tensions and challenges because new technological capabilities are to be incorporated into products, services, and processes, as technology evolves (Rizzo, 2018). Every firm adapts digital or technological transformation to create new products and services so that they can attract new customers and gain competitive advantage. The role of CIOs is very important, as they have those core skills and capabilities needed to determine right technology, identify undeveloped technical areas, and deal with IT challenges within the organization (Kraus et al., 2021).

2.5.1 IT Governance as a Challenge

As the technology is evolving, the role of CIO towards achieving IT priorities and dealing with IT challenges is changing over time. Previously, CIO adopt monopolistic approach over technology choices or conservative reactions to make-or-buy challenges such as infrastructure delivery and service management. This allows them to focus on true organization priorities and consider technology as a means rather than their goals (Rizzo, 2018). Benefit realization depends on the proper configuration of governance mechanisms (Musawir et al., 2017). Nowadays, CIO are facing the challenge of re-adapting the governance of technology investment (Rizzo, 2018). While dealing with this challenge of IT governance, CIO together with C-suite executives decide between clan and adhocracy organizational culture to achieve IT priorities required for IT governance (Grembergen & De Haes, 2018).

2.5.2 Aligning IT Challenges to IT Priorities – CIO Competencies

CIOs are expected to create new IT-based value for the organizations by introducing new technologies and focusing on key strategic areas that aligned IT investments with business goals (Cokins et al., 2010). In this virtue, CIOs make all necessary decisions that help in developing new technologies and improving the weak strategic IT areas. If they make wrong decisions, it will not only cost the company millions of dollars but also derail and distract the organizational capabilities (Stamoulis, 2022). Thus, CIOs deal with challenges of bringing right technologies to the organization through business innovation so that critical strategic areas or priorities can be assigned to correct resources (Prajogo & McDermott, 2011).

Among all IT priorities, firms now focus more on uptime/ availability, customer satisfaction, value of IT to the business, satisfaction of internal IT customers, projects delivered on time, innovative/ new ideas, help-desk performance, business cost reduction/ control, workforce reduction, and projects delivered on budget (J. Luftman et al., 2015). Earlier, only three to four priorities were focused. If the organization plans to outsource their IT infrastructure, the role of CIOs might erode over time because more applications are brought directly under the business units (J. Luftman et al., 2015). Hence, approach to deal with IT challenges helps aligning CIO position with IT priorities.

A newly appointed CIOs experience four types of transitions (Gerth & Peppard, 2016): Firstly in startup CIO transition, CIOs are responsible to assemble the IT capabilities, including people, processes, funding, and technology, which are aligned to business value and strategy. Secondly, in turnaround CIO transition, CIOs are responsible to identify strategic focal areas that fail to deliver and deal with challenges to bring the organization back on track. Thirdly, in realignment CIO transition, CIOs are responsible to revitalize a troublesome IT department by redirecting towards new IT priorities based on the current IT challenges. Fourthly, in success-sustaining CIO transition, CIOs are responsible to ensure sustaining and maintaining a successful IT department and even expand it to the next level (Gerth & Peppard, 2016). All these transitions highlight how CIOs firstly look into or deal with IT challenges to come up with IT priorities that aligned with organizational strategies and business value.

Past research has identified that CIOs are responsible to lead and structure IT units, establish IT priorities needed for implementation of IT controls, and supervise the IT functional divisions to deliver such controls as necessary (W. Li et al., 2021), hence indicating the alignment of CIO positions with IT priorities. Here, IT controls itself is a challenge for firms that were engaged in commercial activities in the era of digital business (W. Li et al., 2021). Hence, IT controls, or alternatively IT challenges, can be seen as a backbone that aligns CIO positions with IT priorities.

2.5.3 CIO's Role in Business Innovation and Digital Transformation

Werlinger et al. (2009) highlighted 18 challenges related to technical, human, and organizational factors of IT security management – a form of IT technologies, which reflects the complexity of the role of CIO. CIO as an individual get himself familiar with the business,

strategy, business processes, technology, and managerial staff, cope with the challenges of data breaches, and make critical decisions by prioritizing the IT investments, IT usage, and IT risk exposure (Smith et al., 2021).

As a business enabler, CIO have to achieve ambidexterity for driving IT-enabled business innovation and digital transformation (Kratzer et al., 2023). It requires balancing between supply- and demand-side leadership, which poses the conflicting priorities, in other words challenges, for the CIO. Several recommendations have been made to CIOs for dealing with these challenges, including dualistic toolbox (Bekkhus & Hallikainen, 2017) and staged maturity model (Chen et al., 2010). These tools also suggested that IT challenges shape the alignment of CIO position with IT priorities.

2.5.4 Interplay between CIO Position, IT Priorities & IT Challenges

Due to the technological innovation and business innovation, the role of CIO has been transformed, specific to stages of business growth and development (Gerth & Peppard, 2016). These CIO transformations specifically address the IT challenges and aligned them to IT priorities. For instance, IT governance is a recent common IT challenge that CIO faces and deals with a proactive approach rather than monopolistic approach in order to achieve IT priorities (Rizzo, 2018).

Considering the changing nature of technology, the CIO mainly is expected to set IT priorities and deal with IT challenges. However, CIO has switched from their old monopolistic approach to IT governance in order to integrate new technological capabilities into products, services, and processes. IT governance has become increasingly a major IT challenge for CIOs, as they need to effectively manage and restructure the firm's IT assets and investments, and build relationships with business unit heads and executive management (Golding & Facey-Shaw, 2019). CIO position has its own significance within an organization, as if their position is centralized, they can better govern its processes and technologies through company-wide policies and shared services. CIO competencies deal with IT challenges of bringing right technologies to the organization through business innovation, so that the critical strategic areas or priorities can be assigned to correct resources. Some specific IT priorities include uptime/availability, customer satisfaction, satisfaction of internal IT customers, value of IT to the business, projects delivered on time, help-desk performance, innovative/ new ideas, workforce

reduction, business cost reduction/ control, and projects delivered on budget. All these priorities are set to address current IT challenges faced by the organization in the direction of innovation and improving the weak strategic IT areas. A CIO position experience four types of traditions depending on the growth level of organization. If an organization is in startup stage, CIOs are responsible to assemble the IT capabilities, including people, processes, funding, and technology, which are aligned to business value and strategy. Secondly, in turnaround CIO transition, CIOs are responsible to identify strategic focal areas that fail to deliver and deal with challenges to bring the organization back on track. Thirdly, in realignment CIO transition, CIOs are responsible to revitalize a troublesome IT department by redirecting towards new IT priorities based on the current IT challenges. Fourthly, in success-sustaining CIO transition, CIOs are responsible to ensure sustaining and maintaining a successful IT department and even expand it to the next 36 of 119 level (Gerth & Peppard, 2016). All these transitions highlight how CIOs firstly look into or deal with IT challenges to come up with IT priorities that aligned with organizational strategies and business value.

The proposed relationship between IT challenges, CIO position, and IT priorities would be explained with Scott Morton's (1991) Five Factors influencing the organization's objectives. Among five factors, structure represents CIO position, while IT priorities and IT challenges represent management processes. The position of CIOs in organizational structure gives them the power and rights to prioritize both technological and non-technological IT strategies. CIOs have the people skills and the capability to implement adaptation and innovation, resulting in several IT challenges that hinder external turbulence. Hence, the study proposed that:

H4. Higher IT challenges are necessary (mediation effect) for alignment of CIO position with IT priorities.

Table 5 represented a comparison of aims, methods, and findings across studies included in hypothesis 4. It presented the clear overview of how CIO position can bring a bridge between IT strategy and IT challenges.

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
Gerth & Peppard (2016)	Identify why CIOs derail and how they and CEOs can prevent failure in leading digital transformation	Senior IT executives (CIOs) and their top- management colleagues across multiple organizations	8-year multi-firm qualitative program	Longitudinal qualitative research using interviews and case evidence on CIO careers and digital transformation efforts	Interpretive, inductive thematic analysis of derailment episodes and contextual factors	CIO derailment often stems from ambiguous role expectations, poor relationship management, misaligned pace of change, and unclear definitions of IT success. To reduce derailment risk, several mitigations (e.g., aligning with CEO vision, proactively defining IT success, managing change pace) are evaluated to lead digital transformation
Golding & Facey-Shaw (2019)	Explore challenges facing a new CIO implementing IT governance and a	Single large Jamaican multinational (GraceKennedy Group): board,	Single in-depth teaching case	Rich qualitative case: internal documents and narrative of events around IT	Narrative and issue-oriented case analysis for teaching; no	Challenges in digital transformation toward centralized IT governance were highlighted; remedies like CIO without traditional IT background must

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
	strategic vision in a diversified conglomerate (GraceKennedy Group)	CEO, new CIO, and IT governance structures		governance review, risk assessment, and CIO appointment	formal statistical analysis	build legitimacy, align with CEO's strategic mandate, and redesign governance to create value and manage risk
Bekkhuis & Hallikainen (2017)	Develop a dualistic CIO toolbox to enable organizational ambidexterity (exploitation and exploration) in digital business transformation	CIOs and IT leadership teams in organizations undergoing digital business transformation	Conceptual / methodological paper	Systematic concept analysis and derivation drawing on organizational learning and ambidexterity literature, applied to the CIO role	Qualitative concept analysis and concept derivation; toolbox illustrated with hypothetical cases, not statistical testing	Proposes a toolbox combining traditional KPIs (for operational effectiveness) with leadership principles (for exploratory, innovative behavior), helping CIOs balance gatekeeper and contributor roles to support digital transformation
Kratzer et al. (2023)	Conduct a systematic	CIO research articles in IS and	40-year corpus of CIO studies;	Systematic database search	Main path analysis and	Identifies core streams (e.g., CIO role, competencies, structural

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
	literature review and main path analysis of four decades of CIO research and propose a future agenda	management journals	bibliometric network	and selection of CIO articles; bibliometric data extraction	structured literature review to trace intellectual roots, themes, and evolution of CIO research	power, value contribution), shows how CIO research has evolved with digitalization, and outlines research gaps around new digital roles and shared leadership at the top
Smith et al. (2021)	Examine how CIO characteristics influence the occurrence of organizational data breaches	Public firms with identifiable CIOs (primarily U.S. listed companies)	Archival panel; firm-year observations	Secondary data on data breaches, CIO demographic/role characteristics, and firm attributes from public databases	Econometric regression analysis linking CIO traits to breach incidence and severity	Certain CIO attributes (e.g., experience, background) are systematically related to data breach outcomes, suggesting CIO human capital and role design matter for information security performance

Table 5 - Comparison of Aims, Methods, and Findings across Included Studies – Hypothesis 4

2.6 Role of IT priorities in Aligning IT Spending and IT Hiring

2.6.1 In-house vs Outsourcing of IT operations

Firms often set their IT priorities to outsource or in-house operation of information technology (IT). This determines their need of IT professionals for in-house operation or specific investment for outsourcing information technology (IT) (J. Luftman et al., 2015). In case of outsourcing, about 60% of IT budgets is set on human resources (including consulting and outsourced staff) while only 25% of remaining IT budgets was spent in outsourced infrastructure. However, in case of in-house operation of information technology (IT), the allocation of IT budget between people and infrastructure is 50:50 percent (J. Luftman et al., 2015). This explained how IT priorities differentiates the impact of IT spending on IT hiring.

2.6.2 Linking IT Spending, IT Hiring, and IT Priorities with Five-Stage Growth Model

The five-stage growth model postulated by Churchill and Lewis (1983) supported the rationale behind the mediating role of IT priorities in the relationship between IT spending and IT hiring. In its first-stage i.e., firm existence stage, technological innovation as a measure of investment in technology that would assess and develop operations. While the second-stage also focused on innovation for growth and sustainability, the third-stage i.e., success focused on prioritizing IT needs of business that are linked to optimal efficiency and productivity. These priorities are linked to growth and development of business at fourth stage, and then linked to resources maturity with a partial focus on managerial talents and IT personnel (IT hiring) to some extent (Chege et al., 2020).

2.6.3 IT Priorities Set IT Hiring and IT Spending

Modern firms employ different approach to hiring IT employees and managers than traditional firms; these firms hire knowledge workers with either more experience or entry-level knowledge and then invest in their cognitive abilities to help them learn the new systems. This approach is primarily based on their IT priorities, in which IT can either be outsourced or developed in-house. This reflects on how IT spending affects IT priorities, which in turn affects IT hiring (Wang et al., 2020).

In a very different perspective, IT investment in form of capital stock did not have any direct effect on creating more jobs. In fact, creating more jobs and digitalization are two opposing concepts, as continuous digitalization through artificial intelligence (AI) and machine learning (ML) creates a substitution for white-collar jobs, similar to replacement of blue-collar jobs with robotic technologies. However, the significant relationship between IT investment and IT hiring can only occur if the IT priorities include creation of digital literacy and e-skills needed for successful implementation of new ICT technologies, besides investment in high-tech infrastructure such as AI, ML, and robotic technologies (Biagi & Falk, 2017).

Kane et al. (2019) mentioned that in era of digitalization, digital leaders must possess all the traditional leadership competencies, which include the ability to influence, communicate effectively, and strategize, among others, alongside being digitally proficient. Beyond hard-core technical skills such as programming or data science, general digital literacy and previous experience in a technology leadership role become essential competencies for digital leaders. Digital literacy is important because it reinforces leadership qualities: having a vision for transformation and being forward-looking. Without it, leaders cannot keep up with emergent trends and developments and unable to comprehend how these trends can add value to the organization or pose a threat to it. Leaders who understand how technology works at a high level have the capability to make more informed decisions in an uncertain environment. Though remained unchanged, the fundamentals of effective leadership in the face of digital change is one of the most significant risks. Often, executives become so preoccupied with the technological aspects of these endeavours that they neglect why they are engaged in them in the first place: to improve how their company conducts business. Leaders need to communicate the change's value and invest accordingly. New technology is the driving force behind digital transformation, but it is only as valuable as the new business strategies and practices it enables. Before investing in any new technology, leaders must be able to articulate the need to do so. Not enough executives demonstrate this type of discipline amid all the digital disruption. CIO background may help better identify who is best qualified for the champion role (Jones et al., 2020). Leaders need to understand how technology impacts the evolution of business trends to steer their organizations in response to these changes (Kane et al., 2019).

2.6.4 Investment in AI and Advanced Search Technologies

Organization often invests in job-testing technologies that enable them to rely less on human judgment when making hiring decisions. It helps them in reducing the influence of human mistakes and bias. But the success of such technologies is only possible when HR managers acquire prerequisites of the needs and demand of IT department in form of IT priorities, i.e., identifying areas in IT department which needs IT personnel (Hoffman et al., 2018).

The AI-based business model defines the IT spending priorities (i.e., transform the core business, grow the core business, and scale new business) as preconditions to success. Different AI technologies offering different purposes and implemented through different action plans required different level of spending to reach these priorities and set goals (Lee et al., 2019). Moreover, the link between IT strategy, IT priorities, and IT spending varied across different industries and sectors such as technology/ media, manufacturing, consumer products, financial services, health care, industrial, energy, and public sectors industries based on their needs and nature of business (Lee et al., 2019).

Keeping asides firm's objectives of running and growing a business, transforming a business through information technology specifically requires mobilization and engagement of people (Kohnke, 2017). This phenomenon is also common in digital transformation, in which organizational policies and structures as well as incentive and reward systems have to be adapted to support new ways of working and collaboration (Kohnke, 2017). If a firm focuses on digital transformation as their plan of IT spending, they should determine the technology needs accordingly and then look to hire IT personnel that would operate those technologies.

2.6.5 Digital Transformation and Changing Skills Demands

With the continuously evolving technologies in the era of Industry 4.0, the demand of skills set needed in IT personnel is also changing rapidly. According to Li (2022), reskilling and upskilling of the future-ready workforce must be integrated with the technologies developed in Industry 4.0. The expenditures/ investments on such technologies is only profitable if it matches with priorities these IT technologies are going to be employed (L. Li, 2022).

Digital transformation priorities bridges between IT investment in infrastructure and continuous skills upgradation. According to Dutta et al. (2020), investments in infrastructure

will not give returns until right manpower and skills gap fulfilment is made at all levels, including technical, supervisory and managerial. The continuous skills upgradation must be based on needs of technologies and applied through periodic plan where digital transformation priorities were set. Hence, upgrading the continuous skills of people is highly dependent on technology and should be oriented towards people growth so as to retain key employees within an organization (Dutta et al., 2020).

2.6.6 Interplay between IT Spending, IT Priorities, & IT Hiring

Either in-house or outsourcing, IT priorities create the bridge between IT spending and IT hiring. The changing demands of skills set of IT personnel and managers are set by IT priorities, which also determines the direction of IT investment, transforms IT infrastructure, and develops IT processes that can facilitate in hiring of IT personnel and employees.

Firms may set their IT priorities to link IT spending or investment to IT hiring. Considering its nature, organization can either develop IT system in-house or outsource IT technologies. Both options can need different IT budgets for its development and hiring of IT personnel. In case of in-house, firms allocate 50% of IT budgets on IT hiring and remaining 50% of budgets on IT infrastructure. In case of outsourcing, firms allocate only 25% of IT budget on hiring IT personnel. Hence, IT priorities differentiate the impact of IT spending on IT hiring. Five-stage growth model also supported the mediating role of IT priorities in relationship between IT spending and IT hiring at each stage. The first stage, i.e., firm existence stage, technological innovation requires substantial investment in technology for assessing and developing operations. The second stage focuses on growth and sustainability towards innovation. The third stage focuses on optimal efficiency and productivity by prioritizing IT needs of business. The fourth stage advances to growth and development of business and consequently, IT. Lastly, the fifth stage continue to focus on growth and development until it reaches to resources maturity through focusing on managerial talents and IT personnel. Considering the notion of five-stage growth model, the level of IT investment in linked to IT hiring. As the organization grows, its priorities towards information technology (IT) change and hence provide a bridge between IT spending and IT hiring. Similarly, digitalization and creating more jobs can act as two opposing concepts. For instance, continuous digitalization through artificial intelligence (AI) and machine learning (ML) have replaced blue-collar jobs with white-collar jobs with

robotic technologies. However, digitalization has become a necessary IT priority that links IT investment and IT hiring. Digitalization creates digital literacy and e-skills needed for successful implementation of new ICT technologies. These ICT technologies require additional IT investment/ IT spending for their successful adoption and implementation. Once such technologies are implemented, firms hire skilled or experienced workers who are capable to operate such technologies to its full potential. Similar case is AI-based business model, in which IT spending priorities, including transformation of core business, growth of core business, and scaling of new business) are set first. Then IT personnel are hired to successful implementation and running of the AI-based business model. Hence, different technologies follow same organizational policies and structures set in accordance with IT priorities and run by skilled or experienced workers and employees rewarded with incentive and reward systems. Digital transformation priorities bridge between IT investment in infrastructure and continuous skills upgradation.

Scott-Morton's (1991) Five Forces Framework explained the interrelationships between IT priorities, IT spending, and IT hiring. Here, IT priorities represent management processes, IT spending represent strategy, and IT hiring comes under strategy and roles/ responsibilities. Firms decide on the budget they are going to spend on IT infrastructure. To decide IT priorities, employees, managers, and even CIOs implemented management processes that require qualified IT personnel (individuals). Such demand or need of qualified IT personnel creates a need for human resources that directly affects the structure of an organization. Hence, the study proposed that:

H5. Higher IT priorities are necessary (mediation effect) for alignment of IT spending with IT hiring.

Table 6 represented a comparison of aims, methods, and findings across studies included in hypothesis 5. It presented the clear overview of how CIO position can bring a bridge between IT strategy and IT challenges.

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
Golding & Facey-Shaw (2019)	Explore challenges facing a new CIO implementing IT governance and a strategic vision in a diversified conglomerate	Single large Jamaican multinational (GraceKennedy Group): board, CEO, new CIO, and IT governance structures	Single in-depth teaching case; no numerical sample (organization-level case)	Rich qualitative case: internal documents and narrative of events around IT governance review, risk assessment, and CIO appointment	Narrative and issue-oriented case analysis for teaching; no formal statistical analysis	Highlights tensions in moving from decentralized to centralized IT governance; shows how a CIO without traditional IT background must build legitimacy, align with CEO's strategic mandate, and redesign governance to create value and manage risk
Kratzer et al. (2023)	Systematic literature review and path analysis of four decades of CIO research	CIO research articles in IS and management journals	40-year corpus of CIO studies bibliometric network	Systematic database search and selection of CIO articles; bibliometric data extraction	Path analysis & structured literature review	Identifies core streams (e.g., CIO role, competencies, structural power, value contribution), shows how CIO research has evolved with digitalization, and outlines

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
						research gaps around new digital roles and shared leadership at the top
Smith et al. (2021)	Examine how CIO characteristics influence the occurrence of organizational data breaches	Public firms with identifiable CIOs (primarily U.S. listed companies)	Archival panel; firm-year observations	Secondary data on data breaches, CIO demographic/role characteristics, and firm attributes from public databases	Econometric regression analysis linking CIO traits to breach incidence and severity	Certain CIO attributes (e.g., experience, background) are systematically related to data breach outcomes, suggesting CIO human capital and role design matter for information security performance

Table 6 – Comparison of Aims, Methods, and Findings across Included Studies – Hypothesis 5

2.7 Role of IT Spending in Aligning IT Strategic Planning and IT Priorities

2.7.1 Setting IT Priorities through IT Financing

Different levels of technological advancements have different levels of ICT use, ICT investment, and financing (Grant & Yeo, 2018). Technological advancements define the strategic focus areas that drive an organization's technological initiatives. These strategic focus areas must be aligned with the ICT strategy stating the use of ICT in such areas. However, tech investments become increasingly important with higher levels of technological advancement; the more complex the technological advancement is, the higher will be tech investments (Grant & Yeo, 2018).

Investment in IT, such as supply chain management (SCM) systems (often by leveraging the platform of e-business nowadays), makes it technically possible for firms and their supply chain partners to seamlessly and accurately integrate and share market- and consumer-related information in a timely fashion (Chi et al., 2020).

Hanafi et al. (2020) highlighted that COBIT 5 approach is the best practices framework useful in achieving IT governance and management processes. It established that organizations apply COBIT 5 framework to map IT process priorities in accordance to organizational goals, IT objectives, and IT processes. To put it in light of IT spending, IT strategic planning, and IT priorities, COBIT 5 framework allows the firms to outline organizational goals, plan the IT objectives and make strategic plans for IT department, review and develop IT processes within the organization according to organizational and IT objectives, and thus map out IT priorities within the organization.

Outsourcing is a form of IT strategic planning, which often leads to loss of internal competency and prevents the internal knowledge sharing (Alaceva & Rusu, 2015). Usually, firms decide to outsource their IT activities if it leads to cost reduction, better IT-specific performance, and asset specificity (Lee, 2017). Thus, it can be established that IT strategic planning in form of outsourcing leads to reduced IT spending and, hence, changed the IT priorities with more focus of non-sharing of internal knowledge, asset specificity, and better IT performance.

2.7.2 IT Strategic Investments Save Firms from Business Failure

In this study, IT spending is viewed as the percentage of spending a firm make for either running, growing, or transforming a business. It maintains that IT investment decisions should be aligned with business strategic planning for achieving high efficiency and performance from all departments, including IT department. However, Alaceva & Rusu (2015) established that prioritizing customer needs over IT needs caused business failure due to lack of proper IT strategic planning and redundancy to understand IT domain. 2.2.2 Digital project failure rate is linked to poor technology choices (Ramesh & Delen, 2021). Hence, spending on information technology (IT) is necessary to reach from IT strategic planning to IT priorities effectively.

In virtue of strategic decision-making on IT projects, making decisions on how to spend IT budget apart from business decisions or even without considering technological possibilities and limits is usually another example of how businesses fail (Alaceva & Rusu, 2015). Furthermore, the level of IT spending or investment determines how the IT strategic planning is aligned to IT priorities (Mithas & Krishnan, 2008). For instance, low levels of IT investments caused firms to choose between revenue expansion and cost reduction, while high level of IT investments creates a dual-emphasis in IT strategy or IT strategic ambidexterity that can increase its pay-off (Mithas & Krishnan, 2008).

2.7.3 IT Strategic Investments is Essential for Business Growth

When IT focuses on making investments for effective and efficient running of business, it strategically plans to create value for organizations by measuring maintenance performance and developing maintenance strategies such as reliability-centred maintenance, condition-based maintenance, and e-maintenance, etc. (Kumar et al., 2013). In other words, investments in maintaining current IT systems (IT spending) ensure stability and reliability (IT priorities), which is essential for operational efficiency (IT strategic planning) (Kumar et al., 2013).

Information systems (IS) investment decisions taken by hospital managers is a unique example of how IT spending mediates the impact of IT strategic planning on IT priorities. Hospital managers make decisions to invest in IS (i.e., IT spending) not only to find solutions to performance shortfalls, but also to achieve continuity and predictability in resource allocation and signal conformity with external norms and expectations (i.e., IT priorities) (Salge et al.,

2015). For achieving these IT priorities, hospital managers undertake a sustainable IS investment project (i.e., IT strategic planning) to automate emergency call processing and ambulance displacing – components of IT priorities – to reduce financial losses and increase return on corresponding IT investment (Salge et al., 2015).

When IT focuses on making investments for transformation of business, IT strategic planning provides a bridge to connect improvement of processes with priorities, thus leading to long-term success and change within an organization (Suarez et al., 2016). In other words, effective IT spending translates strategic plans into tangible actions, enabling the implementation of projects that facilitate transformation (Vial, 2019). Hence, effective management of the financial, material or knowledge resources affects the processes and procedures conducted to develop products and services, resulting in alignment between IT strategic planning, IT spending and IT priorities in stated pattern (Suarez et al., 2016).

2.7.4 Interplay between IT Strategy, IT Spending, & IT Priorities

The percentage an organization spends on IT development for running, growing, or transforming the business can shape the priorities an organization pursues (Tan et al., 2017). The rationale behind this linkage is that the availability of resources dictate the kind of technological improvements to be made and how integration can realistically be achieved (Tan et al., 2017). Hence, optimal and positive return on IT investments can only be achieved if the IT strategic planning is aligned with IT priorities. Similarly, making right investment decisions on IT make it necessary for selecting right projects and assigning right investments to each project to achieve the needed IT priorities within an organization.

IT strategy determines if the firm's IT infrastructure operates in-house or outsource to a different technological firm. For in-house IT department, the firm set IT investments, through which its executives and managers design its own IT processes, hire experienced and skills IT personnel, develop IT rules and regulations. Contrarily, for outsourcing IT process and systems, the firms spend their entire IT investments on hiring an external IT firm and implementing personalized IT infrastructure and processes developed and maintained by that external IT firm. Differentiating strategy creates a difference in the amount of IT spending/ IT investments and set the IT priorities accordingly in order to achieve organizational goals. The more complex is the IT strategy, the higher the IT spending will be and the complex the IT priorities will be.

Defining IT strategy and setting IT priorities requires financial resources and effective decision-making. Managers make decisions to invest in IT systems for (i) solving their 38 of 119 performance shortfalls, (ii) achieve continuity and predictability in resource allocation, and (iii) signal conformity with external norms and expectations. Effective management of financial, material or knowledge resources affects the processes and procedures conducted to develop products and services, resulting in alignment between IT strategic planning, IT spending and IT priorities in stated pattern. IT spending or IT strategic investments save firms from business failure, as it helps decide the amount to spend on either running, growing, or transforming a business. Low IT investments lead to poor decision-making between revenue expansion and cost reduction, while high level of IT investments creates a dual-emphasis in IT strategy or IT strategic ambidexterity that can increase its pay-off. Poor IT strategic choice results in poor IT investments, leading to poor IT priorities and consequently poor organizational performance. Hence, spending on information technology (IT) is necessary to reach from IT strategic planning to IT priorities effectively.

Scott-Morton's (1991) Five Forces Framework also explored the interrelationships between IT spending, IT strategy, and IT priorities. Here, IT spending and IT priorities represents management processes, while IT strategy represents strategy itself. IT strategy helps firms to position itself in a competitive environment and set goals to bring changes in technological and business processes. IT priorities can be set through management processes, deciding which process comes first and which comes later. Both IT strategies and IT priorities are contingent upon IT spending: the more investment is made, the better strategies and priorities can be set. Hence, the study proposed that:

H6a. IT strategy influence IT spending.

H6b. IT spending influence IT priorities.

H6c. IT strategy influence IT priorities.

H6c'. IT spending mediates the relationship between IT strategy and IT priorities.

IT strategy -> IT spending -> IT priorities

H6. Higher IT spending is necessary (mediation effect) for alignment of IT strategy with IT priorities.

Table 7 represented a comparison of aims, methods, and findings across studies included in hypothesis 6. It presented the clear overview of how CIO position can bring a bridge between IT strategy and IT challenges.

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
Tan et al. (2017)	Explain how enterprise IT enables operational agility through managing resource inter-dependencies in supply chains	Firms implementing enterprise systems in supply chain operations	Multi-firm qualitative field study	Qualitative field study of enterprise system use in supply chain tasks; interviews and observations	Inductive, stagewise process modeling of IT use, negotiation, and capability development	Proposes a model where IT enables new capabilities to manage pooled, sequential, and reciprocal interdependencies, supporting supply-chain operational agility and offering actionable managerial guidelines
Suárez et al. (2016)	Examine role of strategic planning within EFQM-based excellence management systems and its	Spanish firms that applied for EFQM-type excellence awards	225 organizations subjected to complete self- and external EFQM assessments	EFQM self-assessment questionnaires completed by managers plus results from	Partial Least Squares structural equation modeling (PLS-SEM) of relationships among EFQM enablers and results	Leadership and people commitment must be made effective via process design, resource management, and alliances; integrating quality values into

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
	links to TQM factors and results			external assessments		strategic planning is critical, and technical enablers differ by degree of excellence in strategic planning
Vial (2019)	Provide an integrated framework of digital transformation and propose a research agenda	Prior research on digital transformation across IS and management fields	282 works reviewed	Systematic literature review of digital transformation studies	Inductive qualitative synthesis into eight “building blocks” of digital transformation	Conceptualizes digital transformation as a process where digital technologies create disruptions triggering strategic responses that reshape value creation while managing structural changes, barriers, and mixed outcomes; highlights dynamic

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
						capabilities and ethics as key research avenues
Salge et al. (2015)	Identify behavioural and institutional search mechanisms driving hospitals' IS investment decisions and how regulation shapes them	Public non-specialist hospital organizations in England	Panel of 153 hospital organizations	Secondary panel data on hospital IS investments, performance, slack, legitimacy, and context	Fixed-effects panel regression grounded in behavioral theory of the firm and neo-institutional theory	Hospital managers invest in IS due to problemistic, institutionalized, and mimetic search; slack search is salient mainly in low-legitimacy hospitals, showing how regulation and legitimacy condition motives for IS investment
Kumar et al. (2013)	Review maintenance performance metrics and frameworks, and	Maintenance performance measurement literature and frameworks	Review Paper	Extensive literature search on maintenance performance measures,	Qualitative synthesis comparing approaches, metrics, and	Finds lack of structure and clear references for maintenance performance measurement; reviews metrics and frameworks

Study (Author, Year)	Purpose	Target Population	Sample Size	Data Collection Method	Data Analysis Method	Key Findings
	assess how they create organizational value			indicators, and frameworks	frameworks (e.g., balanced scorecard, performance prism)	for evaluating strategies and highlights need for integrated, value-focused maintenance performance frameworks

Table 7 – Comparison of Aims, Methods, and Findings across Included Studies – Hypothesis 6

2.8 Multi-group analysis for years

Since the data was collected over a course of seven years (from 2016-2022), year wise comparison was conducted to detect the discrepancies in the relationships being studied across year. Such discrepancies can help improve the underlying results or achieving the final variable for the successive years. Such analysis can provide an in-detailed overview of changes in independent variables leads to changes in dependent variables over the year. It also gives if a short-term or long-term planning within an organization can generate the possible outcome, if implemented within an organization. Year-to-year comparison also provides a trend in the association between variables and explains how the low and high scores have changed over the selected years. The analysis also determines if and how the relationships between variables under study remain consistent across time, considering the economic and technological conditions.

2.9 Theoretical Framework

In the research model (Figure 2), the study has integrated several key hypotheses in a causal model. This model was designed to achieve three aspects of digital transformation: (i) IT strategy, (ii) CIO position, and (iii) IT hiring priorities. The first aspect – IT Strategy determines how digital transformation can be aligned with organizational size and IT strategy by influencing on IT hiring, IT infrastructure, IT priorities, IT challenges, and IT spending . This aspect is covered by assessing the direct effect of organization size on IT hiring, IT priorities, IT challenges, and IT infrastructure (H2) and the mediating effect of IT spending in the relationship between IT strategy and IT priorities (H6). The second aspect – CIO position focuses on the challenges of digital innovation and the role, expertise and qualification of CIO in digital transformation and organizational innovation. This aspect is covered by assessing the mediating effect of CIO position in the relationship between IT strategy and IT challenges (H3) and the mediating effect of IT challenges in the relationship between CIO position and IT priorities (H4). The third aspect – IT hiring priorities focus on determinants of hiring technology talent, including IT strategy, IT priorities, and IT spending. This aspect is covered by assessing the direct effect of IT strategy on IT hiring (H1) and mediating effect of IT priorities in the relationship between IT spending and IT hiring (H5). This section will outline in detail each hypothesis and their theoretical grounding.

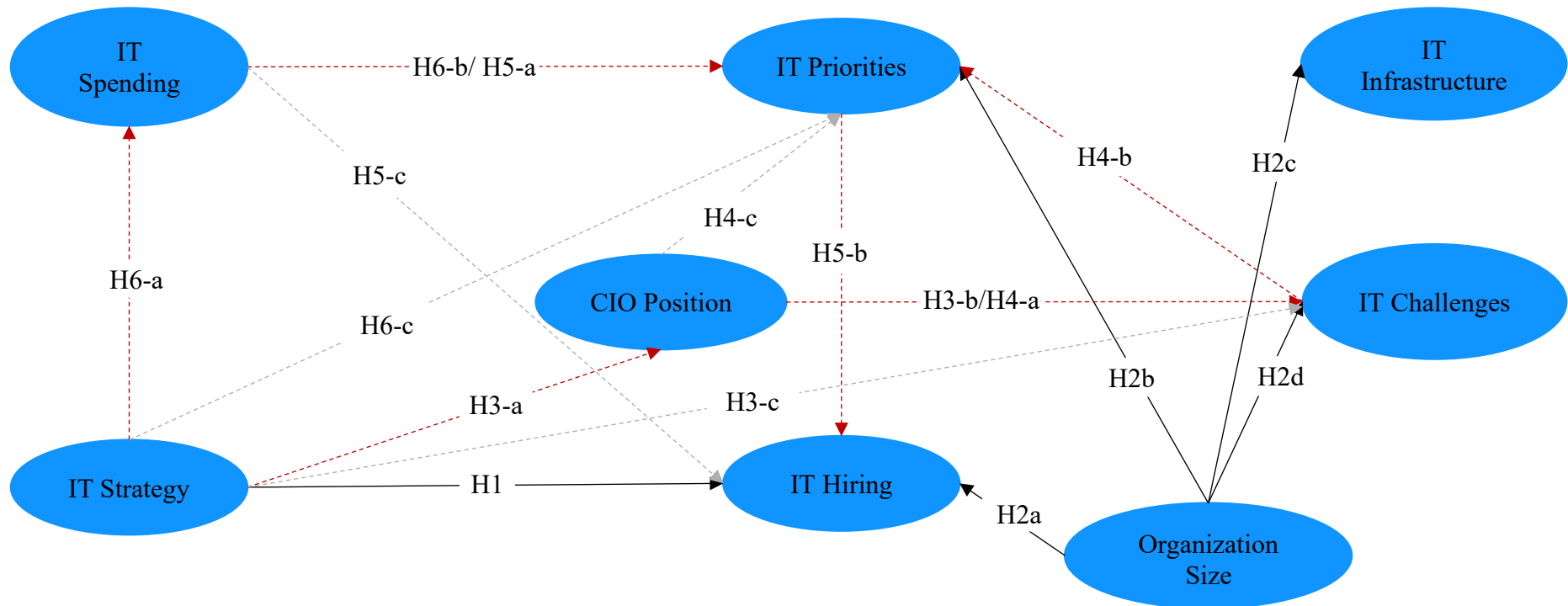


Figure 2 – Research Model

Note: H1 – H2 test for direct effects, while H3 – H6 test for mediation effects (whereby H3a – H6a test for direct effect between independent variable and mediator, H3b – H6b test for direct effect between mediator and dependent variable, and H3c – H6c test for mediating effect of mediator between independent and dependent variables).

3 Methodology

Figure 3 highlighted the research approach of the study. This section will present survey methodology of the study and how the Partial Least Squares Algorithm was employed to test the study hypotheses.

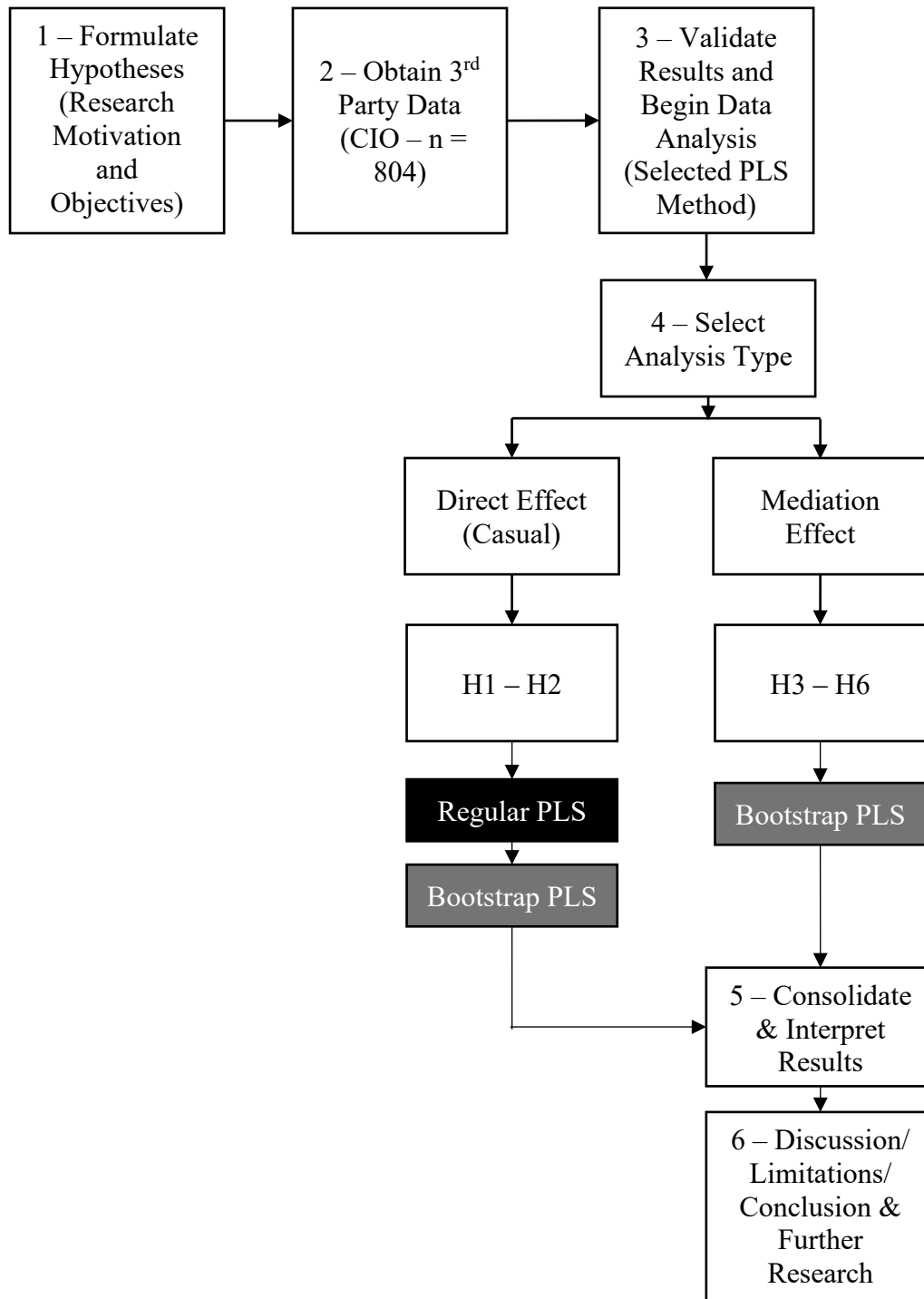


Figure 3 – Research Approach

The study begins by formulating the hypotheses. A total of 12 hypotheses were formulated and consequently tested using various methods. The next step consisted of building a survey, which included 62 construct items (Table). The study proceeded to acquire the data from the “CanadianCIO” census to generate results. Once results were in, the study reviewed and discarded surveys (i.e., incomplete, non-qualified respondents) to leave us with a net sample size of 804 which satisfies conditions to pursue the study. The study then proceeded to segregate hypotheses into direct casual effects and mediation effects. For all mediation effect, the study strictly ran bootstrap analyses. However, for direct effects, the study ran the regular and bootstrap PLS algorithm which satisfies the standard for fully reflective models. The study then proceeded in interpreting the results, highlighting certain limitation, and even providing recommendations for further research considerations.

3.1 Research Design

A correlational research design was utilized to investigate the role of IT strategy, CIO position, and organizational size on IT spending, IT priorities, IT infrastructure, IT hiring, and IT challenges in the context of digital transformation. The study applied an established theory i.e., Scott Morton’s Five Forces influencing the organization’s objectives to propose the theoretical framework regarding how digital transformation can be achieved through the interrelationships between IT strategy, CIO position, organizational size, IT spending, IT priorities, IT infrastructure, IT hiring, and IT challenges. Once the theory identified the proposed hypotheses, the collection of data i.e., CanadianCIO Census was conducted with the assistance of third-party marketing company i.e., IT World Canada. The collected data was later analyzed through proper statistical analyses i.e., PLS-SEM analysis. Such deductive research approach allowed the researchers to apply the established theory to establish the relationship between study variables and then to test them through proper data collection and analysis techniques. Such approach established the cause-and-effect relationships between study variables and is conducted to improve generalizability of study findings to larger population.

3.2 Target Population

The study targeted all C-level executives and IT managers who are working in or with the IT department of organisations with varying sizes and across different sectors. This population was selected because these individuals are primarily responsible for initiating and

implementing strategic changes in a firm's digital technologies, whether through investments in new technological solutions or through the development and allocation of human resources. For instance, Chief Information Officers (CIOs) in large corporation act as decision-makers evaluate which technologies should be internally developed, purchased, or outsourced, considering factors such as budget constraints, organisational priorities, and the strategic importance of the technology. Their central role in technology-related decision-making makes them the most relevant and informed respondents for this study's objectives.

3.3 Sampling Technique & Sample Size Estimation

The study employed a purposive sampling technique to ensure that respondents possessed sufficient authority and familiarity with strategic IT decisions. Organisations located in Canada were first identified and, later, eligible participants were those holding managerial or C-level roles with direct responsibility for IT-related decisions. Here, it should be considered that the purpose of this study was the alignment of digital transformation strategies with talent and technology strategies – the essential building blocks of digital project effectiveness. Considering the purpose of this study, the sampling population of the study was Chief Information Officers (CIOs), IT directors and senior IT managers of all organizations (SMEs and large corporations) across Canada. These leaders from all sectors contributed to the survey, as CIOs, IT directors, and senior IT managers are directly responsible for digital transformation, balancing security with accessibility, and improving existing applications for online and mobile use rather than creating new ones.

The minimum sample size was estimated using G*Power. Since the study seeks to assess a cause-and-effect relationships between variables, the parameters for multiple linear regression analysis were applied to estimate the sample size: effect size $f^2 = 0.15$ (large), significance level (α) = 0.05, statistical power ($1 - \beta$) = 0.80, and number of predictors (n) = 5. Based on these parameters, a minimum sample size of 55 responses was required. To account for non-responsive and incomplete questionnaires, 150 respondents were potentially invited each year, aiming to achieve a final usable sample exceeding the minimum threshold for robust analysis.

3.4 Data Collection Techniques

The study proceeded to acquire the data from the “CanadianCIO Census” – a digital media and content marketing services company conducted annual survey from 2015-2022 by IT World Canada (<https://www.itworldcanada.com/cio#census>). Since the data was acquired/ purchased from third party, it can be certainly established that study utilized secondary data. The survey was designed and distributed on SurveyMonkey – an online survey platform that assists in creating, spreading, and analyzing online surveys. Primarily, the survey targeted fifteen different industries, including business/ professional services (legal, real estate, accounting, etc.), education, financial services (banking, insurance, brokerage), government (local/ municipal, province/ state, federal/ ministry), healthcare provider, manufacturing (including automotive, aerospace and defense, construction, engineering, chemical, metals and mining), media/ entertainment/ advertising/ marketing/ PR, non-profit (not including government or education), pharmaceutical/ life sciences, retail, wholesale and distribution, technology provider (hardware, software, and networking), technology services/ consulting, telecommunications and utilities, transportation (airlines, trucking, railroads, shipping, and logistics), travel and leisure (cruise lines, hotels, theme parks, and casinos), and others. By using translation feature in SurveyMonkey, the survey was made available in the 2 official languages: (i) English and (ii) French. The survey was spread and collected on periodic basis on annual basis from 2015-2022.

Chief Information Officers (CIOs)/ IT directors, IT managers, and senior IT leaders completed the survey. Each model has the following number of responses respectively: (1) 567, (2) 516, and (3) 993. Considering that the minimum sample size was estimated at 55, the number of respondents surveying in each year (i.e., 2015, 2016, 2017, 2018, 2019, 2020, 2021, and 2022), were 177, 126, 87, 67, 120, 94, and 133, respectively, resulting in 804 respondents in total. Hence, it can be observed that the minimum threshold was achieved in all years and collectively gave sufficient (i.e., a larger pool of) respondents to analyze data and answer the research’s objectives.

3.5 Measurement Instrument

A self-administrative and self-developed survey was designed to inquire about the alignment between technology, talent, and digital transformation strategies caused by the impact of IT

strategy, CIO position, and IT hiring priorities. The survey was comprised of six sections: The first section is comprised of demographic characteristics, including cluster, language, and organization size. The second section is comprised of CIO position, which inquired about job title, years of experience, frequency of executive decision-making meetings, reporting authority, and level of involvement in technology-related purchase decisions for my business. The third section is comprised of IT strategy, which inquired about selection of IT projects for investment, annual IT spending per employee, change in IT budget from last year. The fourth section is comprised of IT challenges, in which the respondents were asked to rate areas as a concern for business on a day-to-day basis. The fifth section is comprised of IT infrastructure, in which the respondents were asked to rate different IT priorities for the next 12 months. The sixth and last section is comprised of IT hiring priorities, in which respondents were asked to rate different IT hiring priorities for the next 12 months. Table 8 represents the operationalization of study variables, including operational definition, survey items, and measurement scale, in light of existing literature.

Variable Names	Operational Definition	Survey Items	Measurement Scale	References
IT Strategy	The rise in the budget of firm's IT department from the last year's budget to choose between revenue expansion strategy and cost reduction strategy.	STRA 2 – Organization's annual ICT spend per employee	1 = Very low (Less than \$2,000) 2 = Low (\$2,000 – \$4,999) 3 = Moderate (\$5,000 – \$6,999) 4 = High (\$7,000 – \$9,999) 5 = Very High (\$10,000)	Mithas and Rust (2016)
		STRA 3 – How much has your organization's IT budget changed over last year's budget?	1 = Reduced to a greater extent (Decreased 15%+) 2 = Reduced slightly (Decreased 1-14%+) 3 = Unchanged 4 = Increased slightly (Increased 1-14%+) 5 = Increased to a greater extent (Increased 15%+)	
IT Spending	The amount of money spent to specific IT strategy.	With the total equal to 100%, approximately what percentage of your IT spend is used to: SPEN 1 – Run the business (IT is focused on the continuing operation of the business) SPEN 2 – Grow the business (IT is enhancing business outcomes in existing markets)	1 = Very low (0% – 19.9%) 2 = Low (20% – 39.9%) 3 = Moderate (40% – 59.9%) 4 = High (60% – 79.9%) 5 = Very High (80% – 100%)	Aral & Weill (2007); Cha et al. (2009); Steelman et al. (2019)

Variable Names	Operational Definition	Survey Items	Measurement Scale	References
		SPEN 3 – Transform the business (IT is entering new markets, with new value propositions)		
IT Challenges	The extent to which firm prioritize or give vested interest in concern they faced on a day-to-day basis.	How would you rate the areas below as a concern for your business on a day-to-day basis? CHAL 1 – Staffing CHAL 2 – Data security/Data privacy CHAL 3 – Physical security CHAL 4 – Uptime/reliability CHAL 5 – Meeting compliance requirements CHAL 6 – Vendor relations CHAL 7 – Sourcing/Strategic sourcing CHAL 9 – Cloud infrastructure CHAL 11 – Making data actionable CHAL 12 – Budgetary constraints CHAL 13 – Skills gap CHAL 14 – Mobile application development	1 = Not a Priority 2 = Low Priority 3 = Medium Priority 4 = High Priority 5 = Very High Priority	Akbar et al. (2022); Gulzar et al. (2024); Kappelman et al. (2019); Schwarz & Hirschheim (2003); Stamoulis (2022)

Variable Names	Operational Definition	Survey Items	Measurement Scale	References
		CHAL 18 – Managing a more complex network infrastructure		
		CHAL 19 – Data management		
		CHAL 20 – Scalability		
		CHAL 21 – Business innovation (product, service, process)		
IT Infrastructure	The extent to which IT infrastructure and applications are utilized in leveraging specified IT models	Approximately how much of your IT infrastructure and applications do you expect to leverage each model below 12-24 months from now?	1 = Very low (0% – 19.9%) 2 = Low (20% – 39.9%) 3 = Moderate (40% – 59.9%) 4 = High (60% – 79.9%) 5 = Very High (80% – 100%)	Cañete et al. (2022); Dintén et al. (2024); Enos & Herber (2025); Gray et al. (2015);
		INFR 1 – On-premises		
		INFR 2 – Traditional/dedicated hosting		
		INFR 3 – Managed services		
		INFR 4 – Colocation		
		INFR 5 – Cloud		
IT Priorities	The extent to which firms prioritize their strategic focus on a certain form of IT infrastructure. Or The extent to which a firm’s strategic focus, governance, and investment decisions deliberately favor a specific IT	Please provide a rating for each of the items based on your priorities for the next 12 months. PRIO 1 – Virtualization PRIO 2 – Managed services (dedicated) PRIO 3 – Managed services (shared)	1 = Not a Priority 2 = Low Priority 3 = Medium Priority 4 = High Priority 5 = Very High Priority	Baham et al. (2017); Gerth & Peppard (2016); J. Luftman et al. (2015); Islam & Ferworn (2020); Pahl et al. (2013); W. Li et al. (2021); Sen et al.

Variable Names	Operational Definition	Survey Items	Measurement Scale	References
	infrastructure configuration (e.g., shared enterprise platforms, cloud, edge, hybrid) to support current and future business strategy.	PRIO 4 – Risk and compliance PRIO 5 – Internet of things (IoT) PRIO 6 – Business Intelligence/Big Data/Analytics PRIO 10 – Storage PRIO 11 – Expansion or consolidation of data centre PRIO 12 – Social business and collaboration PRIO 13 – VoIP/Voice Services PRIO 14 – Security PRIO 15 – Sourcing/ Strategic sourcing PRIO 16 – Public/private/hybrid cloud “As-a-Service” PRIO 17 – Disaster recovery PRIO 18 – Enterprise mobility management		(2023); Singh & Teng (2016)
IT Hiring	The extent to which employers recruit a unique set of knowledge, competencies, skills, contributions, commitment, and abilities required from employees to	Please provide a rating for each of the items based on your IT hiring priorities for the next 12 months. HIRE 1 – Enterprise application development	1 = Not a Priority 2 = Low Priority 3 = Medium Priority 4 = High Priority 5 = Very High Priority	Abid & Polo (2025); Milburn (2021); Sparrow & Makram (2015)

Variable Names	Operational Definition	Survey Items	Measurement Scale	References
	implement value-creating strategies and achieve strategic goals.	<p>HIRE 2 – Application maintenance and support</p> <hr/> <p>HIRE 3 – Business analysis</p> <hr/> <p>HIRE 4 – Big data/business intelligence/analytics</p> <hr/> <p>HIRE 5 – Data centre management</p> <hr/> <p>HIRE 6 – Database development/administration</p> <hr/> <p>HIRE 7 – General IT</p> <hr/> <p>HIRE 8 – Help desk/IT support IT/network security</p> <hr/> <p>HIRE 9 – IT project management</p> <hr/> <p>HIRE 10 – Mobile/wireless Networking/network administration</p> <hr/> <p>HIRE 11 – Systems analyst</p> <hr/> <p>HIRE 12 – Telecommunications</p>		
Organizational Size	The number of employees employed in the entire organization or enterprise that classifies or separates small-, medium-, and large- organization.	Size – How many people are employed in your entire organization or enterprise?	<p>1 = Less than 50 (Small)</p> <p>2 = 50 – 100 (Small)</p> <p>3 = 100 – 249 (Medium)</p> <p>4 = 250 – 499 (Medium)</p> <p>5 = 500 – 999 (Large)</p> <p>6 = 2,499 or more (Large)</p>	Boštjančič & Slana (2018); Duso & Schiersch (2025); Maycotte et al. (2025); Mithas & Krishnan (2008)

Variable Names	Operational Definition	Survey Items	Measurement Scale	References
CIO Position	It inquires about reporting authority, frequency of executive decision-making meetings, and level of involvement in technology-related purchase decisions for my business.	CPO 3 – How often, if ever, are you involved in executive decision-making meetings? CPO 4 – Who do you report into at your organization? CPO 5 – Do you have involvement in or influence over technology-related purchase decisions for your business?	1 = Never 2 = Rarely 3 = Only IT 4 = Depends on Topic 5 = Always	Gerth & Peppard (2016); Kappelman et al. (2019); Kraus et al. (2021); Preston et al. (2008); Šarčević (2025)

Table 8 – Operationalization of Study Constructs

3.6 *Data Analysis Techniques*

Data analysis is comprised of both descriptive and inferential statistical analysis. For descriptive statistical analysis, the study designed the frequency distribution to portray the frequency and percentage of the respondents involved in the study. The study also computed mean and standard deviation of the study variables to describe the average scores and variability in the average scores of the study variables. The study variables were assessed for normality when its values are symmetrically distributed around the mean. For inferential statistical analysis, the study conducted structural equation modelling (SEM) to assess the cause-and-effect relationships between study variables, including IT strategy, CIO position, organizational size, IT spending, IT priorities, IT challenges, IT infrastructure, and IT hiring. Reliability and validity were initially assessed to confirm the internal consistency and accuracy of measurement instruments in measuring the original scale. Lastly, mediation analysis was conducted to test hypotheses H3 to H6 relating to the indirect effects or mediating effects. Also, group-wise analysis was conducted to assess the relationship between study variables across different years to determine any discrepancies in underlying relationships.

3.7 *Ethical Considerations*

The study considered several ethical considerations to protect participants and ensure scientific integration. Firstly, the researcher has taken a written permission from CanadianCIO and signed a written contract with them for the official usage of data for the purpose of this study. The written contract clearly states the scope of use and ensures compliance with copyright or data protection laws. Secondly, the study gave participants the full rights to voluntarily participate in the survey and withdraw themselves from participation at any point in time. Thirdly, the data is kept privately in password-protected computer that can only be authorized by the researcher. Fourthly, the researcher did not ask for any personal information (such as name, contact number, or address) to protect their identity and maintain confidentiality and anonymity. Lastly, the study assures ethical collection and analysis of data to ensure fairness and transparency of research process.

4 Results

4.1 Profiling

As for respondents' profile, the study collected the data from 804 respondents. Most organizations had organizational size above 2,500 employees (24%), indicating that a majority were the large organizations (38%). Furthermore, a considerable percentage of respondents were from medium-sized enterprises as well (28%).

Variables	Categories	Frequency	Percentage
Organization Size	Less than 50 (Small)	72	9%
	50-100 (Small)	90	11%
	100-249 ((Medium)	108	13%
	250-499 (Medium)	121	15%
	500-999 (Large)	110	14%
	1,000 or above (Large)	303	38%

Table 9 – Demographic Characteristics (n = 804).

4.2 Description & Reasoning of Data Analysis Techniques Adapted to Test Hypotheses

4.2.1 PLS-SEM analysis

The study adapted the Partial Least Squares – Structural Equation Modelling (PLS-SEM) approach to conduct the testing of designed hypothesis and evaluation of the theoretical model. PLS-SEM, developed by Herman Wold, is most frequently used in the disciplines of marketing (Henseler et al., 2009), education (Benitez et al., 2020), strategic management (Hulland, 1999; Hair et al., 2017), social sciences (Dash & Paul, 2021), and various other fields. Hair et al. (2017) signifies the use of PLS-SEM analysis in exploratory research to better identify the population relationships, because it is supported by the method's less restrictive requirements in terms of model setups, model complexity, and data characteristics. PLS-SEM analysis is generally used to explore the relationship between independent and dependent variables (Garson, 2016).

4.2.2 Structural Equation Modelling (SEM)

Structural equation modelling (SEM) is frequently used statistical tool in the field of social sciences (Benitez et al., 2020; Dash & Paul, 2021). It allows the researchers to study and

analyze the cross-sectional, longitudinal, experimental, or non-experimental data (Dash & Paul, 2021). It allows them to study the relationship between all variables in theoretical framework in one comprehensive model (Hair et al., 2017). It provides flexibility to test models having several constructs and predictors by using latent variables and hence accounts for measurements errors for observed variables as well as highlighting mediation relationships (Nitzl, 2016). There are various approaches of structural equation modelling (SEM), such as covariance SEM (CB-SEM), partial least squares SEM (PLS-SEM), and generalized structured component analysis (GSCA). Different statistical softwares are often used to test models under each approach. For instances, CB-SEM is often conducted in AMOS, EQS, MPlus, and LISREL, while PLS-SEM can be performed in SmartPLS, VisualPLS, WarpPLS, and PLS-Graph. In the light of purpose of this study, we will only focus on discussing the differences in CB-SEM and PLS-SEM based on the similarities in these approaches.

4.2.3 PLS-SEM versus CB-SEM

Adapted from Hair et al. (2017), the differences between PLS-SEM and CB-SEM is presented in Table 1. The purpose of CB-SEM is to confirm theoretically assumed relationships, while the purpose of PLS-SEM is to identify the relationships between constructs. CB-SEM is based on strong theory, in which the hypothesized relationship is tested in the light of existing theory, whereby, the PLS-SEM analysis is based on flexible theory. In CB-SEM analysis, the constructs is often tested for univariate and multivariate normality as a pre-requisites of the analysis. If the assumption of multivariate normality is not met, PLS-SEM is conducted to test the relationship between variables. Given the normality assumption, the sample size is usually larger in CB-SEM compared to PLS-SEM. In CB-SEM, both reflective and formative model can be run, whereby in CB-SEM, mainly reflective model can be performed.

In this study, PLS-SEM approach was used due to flexibility of theory, purpose of identification of relationship between constructs, complex and large model, having one indicators for some constructs, and having categorical to ratio as the measurement type.

Elements of Consideration	CB-SEM	PLS-SEM
Theory	Strong	Flexible
Distribution Assumptions	Multivariate Normality	Non-parametric
Sample Size	Large (200-300)	Small (30-100)
Analytical focus	Confirms theoretically assumed relationships	Identification of relationships between constructs
Indicators to Construct-	Mainly reflective	Both reflective and formative
Complexity of Model	Models with 100+ indicators	Can deal with large models
Number of Indicators per constructs	Ideally 4+ (depending on aggregation)	1 or more (depending on consistency)
Type of Measurement	Interval to ratio (continuous)	Categorical to ratio

Table 10 – PLS-SEM versus CB-SEM

4.2.4 Assessments of Reflective Measures

The evaluation of reflective measures includes reliability of each indicator as well as composite reliability, convergent validity and discriminant validity of the constructs (Hair et al., 2014, Benitez et al., 2020).

4.2.4.1 Composite Reliability

Composite reliability measures internal consistency or reliability and evaluates the interdependence of indicators. Commonly, reliability is primarily measured through Cronbach's alpha (Davenport et al., 2015), which estimates the reliability based on the intercorrelations of observed indicator variables (Hair et al., 2017). However, Cronbach's alpha can only be applied when the study assumes equal reliability across all indicators and is sensitive to the number of items in the scale (Hair et al., 2017). Due to the limitations of Cronbach's alpha, composite reliability was applied to measure reliability – another common and most accurate measure of reliability in PLS-SEM analysis (Peterson & Kim, 2013; Hair et al., 2017). As a threshold, a value of composite reliability higher than 0.60 is satisfactory in exploratory research (Bagozzi & Yi, 1988; Hair et al., 2017), but a value of composite reliability higher than 0.70 is preferred (Wong, 2013). A composite reliability score less than 0.60 is not preferable, as it lacks internal reliability (Hair et al., 2017), while a score higher than 0.95 is undesirable, because this implies that the measurements are not really representative of the construct (Garson, 2016).

4.2.4.2 Convergent Validity

Convergent validity is referred to as the extent to which an item correlates with other items of the same construct. In particular, it is the analysis of the relationship between statements and latent variables based on outer loadings and cross-loadings (Hair Jr et. al., 2020). As a threshold level, the outer loadings, also called external loadings of the indicators or indicator reliability, which should be ideally higher than 0.70 (Hair et al., 2017). However, Hulland (1999) also recommended that outer loadings ranged between 0.40 and 0.70 is also acceptable, while the outer loadings less than 0.40 should be removed from the model. In addition to this, the significance of outer loadings is tested using bootstrapping; if the outer loadings is significant at 5%, it is retained in the construct and model (Hair et al., 2017). The convergent validity was also assessed through average variances extracted (AVE). AVE is referred to as the variances in the latent variable explained by the underlying constructs of that latent variables (Henseler et al., 2015). As a threshold level, the AVE should be higher than 0.50 to be acceptable level of convergent validity (Hair et al., 2017).

4.2.4.3 Discriminant Validity

Discriminant validity is referred to as the extent to which a construct is truly distinct from other constructs by empirical standards (Hair et al., 2017). In other words, the discriminant validity estimates the uniqueness of the construct and measures phenomenon not represented by other constructs in the model (Shaffer et al., 2016). Discriminant validity is assessed using Heterotrait-Monotrait ratio (HTMT) and Fornell-Larcker criterion.

The Heterotrait-Monotrait ratio (HTMT) is the ratio of the correlation between constructs (heterotrait-heteromethod) to the correlation within constructs (monotrait-heteromethod) (Henseler et al., 2015). As a threshold level, all values in the Heterotrait-Monotrait ratio (HTMT) matrix should be less than 0.85 to achieve discriminant validity. A HTMT ratio close to 1 indicates a lack of discriminant validity (Hair et al, 2017).

The Fornell-Larcker criterion compares the square root of the average variances extracted (AVE) values with the correlations of the latent variable (Hair et al., 2017). As a threshold level, the AVE should be less than the correlations of the latent variable in order to achieve discriminant validity (Hair et al., 2017). In simple words, if the top values (i.e., the square root

of the AVE) in the factor column should be less than all values below (i.e., the correlations of the latent variable with all other latent variables), there is no issue of discriminant validity (Garson, 2016).

4.2.5 *Structural Model Assessments*

Benitez et al. (2020) and Hair et al. (2017) described that the assessment of structural model include assesment of collinearity issues through VIF, the coefficient estimates and their significance, f^2 effect size and the coefficient of determination (R^2).

4.2.5.1 Variance Inflation Factor (VIF)

Variance Inflation Factor (VIF) is used to assess the assumption of collinearity of the constructs (Kock, 2017). As a threshold level, the VIF scores should lay between 5 and 10 in order to have no issue of collinearity (Hair et al., 2017). If the values is less than 5 or higher than 10, the constructs should be eliminated and merged into a single construct, or created higher-order constructs to deal with collinearity problems (Hair et al., 2017).

4.2.5.2 Coefficient Estimates (Path Coefficients)

The coefficient estimates or path coefficients represents the hypothesized relationships between the constructs (Hair et al., 2017). In other words, it is referred to as the degree of influence of independent variables on the dependent variables (Dash & Paul, 2021). The statistical significance of path coefficients determines the statistical significance of the underlying relationship between the constructs. If the p-value is less than 5%, the estimate of the coefficient is considered as statistically significant (Hair et al., 2017).

4.2.5.3 Coefficient of Determination (R^2)

The coefficient of determination (R^2) is referred to as the variances in endogenous variables due to the change in all exogenous variables (Hair et al., 2017). It is a measure of the model's explanatory power (Hair et al., 2019). It is also referred to as in-sample predictive power (Rigdon, 2012) and is calculated as the squared correlation between a specific endogenous construct's actual and predicted values (Hair et al., 2017). The R^2 ranges from 0 to 1, whereby 0 represents no explanatory power and 1 represents highest explanatory power. As a threshold level, if the R^2 values obtained are 0.25, 0.50, and 0.50 respectively, the relationship is

considered as weak, moderate, and substantial respectively (Henseler et al., 2009; Hair et al., 2019).

4.2.5.4 Effect Size (f^2)

f^2 effect size is referred to as the change in R^2 values when a specified exogenous construct is eliminated from the model that have been previously used to predict its impact on endogenous construct (Hair et al., 2017). In other words, it reveals the strength or magnitude of the relationship between two variables (Sawyer & Ball, 1981). As a threshold level, if the estimates obtained are 0.02, 0.15, and 0.25 respectively, the effect size is considered as small, medium, and large respectively (Cohen, 1988).

4.2.6 Mediation

Mediation, or indirect effects, is a test typically used to determine whether the relationship between independent and dependent variables is occurred through other mediating variable (Carrión et al., 2017). There are two types of mediation: first is full mediation, in which the independent variable have a significant influence on the dependent variable both directly and indirectly through the mediating variable, while the second one is partial mediation, in which the independent variable influences the dependent variables through mediating variable only (Fuller, 2018).

In PLS-SEM, bootstrapping is typical procedure to conduct the mediation analysis. Bootstrapping is a non-parametric resampling procedure, in which samples are recreated from the original sample in order to estimate the models for each sub-sample. In case of mediation, the bootstrapping estimates path coefficients and their relative standard errors as well as t-statistics to evaluate their statistical significance. These values are then used to conduct Sobel test of mediation as introduced by Baron & Kenny (Baron & Kenny, 1986) developed by Sobel in 1982 (Sobel, 1982, 1986). The significance of Sobel test determines whether the independent variable influence the dependent variable through the mediator. An online interactive calculation tool for the Sobel test was used to conduct the Sobel test assessed through the website <https://quantpsy.org/sobel/sobel.htm>.

4.3 Data Analysis – Testing Hypotheses Designed in Study’s Theoretical Framework

4.3.1 Evaluation of Overall PLS Model

The evaluation of the PLS model in the study was done in two stages: Firstly, the evaluation of measures was done using reflective approach, and secondly, the evaluation of structural model was done (Hair et al., 2017). The summary of the results is given in Table 1, and the overall SEM model is presented in Figure 3.

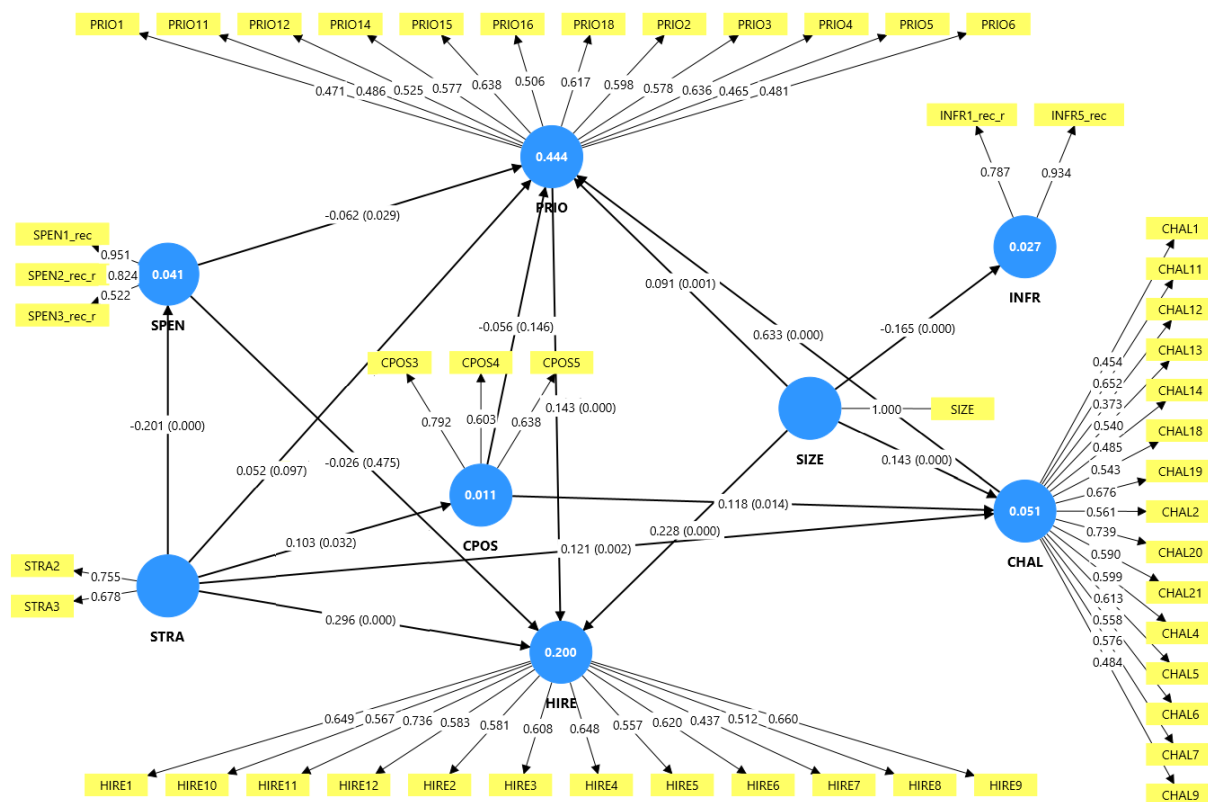


Figure 4 – Overall SEM Model

4.3.2 Construct Reliability & Validity

Using the reflective approach, the consolidated standardized factor loadings of all items of variables under study and composite reliability (CR) and average variances extracted (AVE) of all variables under study was assessed (Table 3).

Ideally, the standardized factor loadings of all items need to be higher than 0.70 (Hair et al., 2017). However, standardized factor loadings between 0.40 and 0.70 could be accepted as well if it does not result in improving the composite reliability (Hulland, 1999; Hair et al, 2017).

Lastly, standardized factor loadings less than 0.40 should be eliminated from the construct. In our PLS model, all standardized factor loadings were higher than 0.40, except for two items ‘CHAL12’ and ‘HIRE7’, whose loadings were 0.370 and 0.376 respectively. These items were retained, as their standardized factor loadings improved to 0.500 and 0.502 respectively in the structural model during hypothesis testing (Table 3).

The composite reliability of variables should be, ideally, higher than 0.70 (Hair et. al., 2017) or at least higher than 0.60 (Fornell & Larcker, 1981; Hair et al., 2014). Composite reliability values of less than 0.60 show a lack of internal consistency reliability. The composite reliability of all variables, except CIO Position and IT Strategy, were higher than 0.70. The composite reliability of CIO Position and IT Strategy were 0.465 and 0.077 respectively. This indicated that these variables lack in internal consistency reliability, or in simple words, does not measure the measures as it is supposed to be in the underlying situation explained by the study. Since the standardized factor loadings of these variables were higher than 0.60, these variables hence were retained in the model for hypothesis testing.

The average variances extracted (AVE) of all variables should be higher than 0.50 (Hair et al., 2017). In this model, the average variances extracted (AVE) scores of CIO Position, IT Strategy, IT Spending, and IT Infrastructure only were higher than 0.50. All remaining variables were lower than 0.50, indicating that the questions or items other than specified questions or items explains the variances in these variables.

Constructs	Construct	Loadings	AVE	CR
CIO Position	CPOS3	.864	.591	.465
	CPOS5	.661		
IT Strategy	STRA2	.773	.520	.077
	STRA3	.665		
IT Spending	SPEN1	.951	.618	.891
	SPEN2_rec_r	.825		
	SPEN3_rec_r	.521		
IT Challenges	CHAL1	.454	.325	.857
	CHAL2	.559		
	CHAL4	.596		
	CHAL5	.612		
	CHAL6	.559		

Constructs	Construct	Loadings	AVE	CR
	CHAL7	.577		
	CHAL9	.485		
	CHAL11	.654		
	CHAL12	.370		
	CHAL13	.540		
	CHAL14	.487		
	CHAL18	.541		
	CHAL19	.676		
	CHAL20	.739		
	CHAL21	.592		
IT Infrastructure	INFR1_rec_r	.787	.746	.819
	INFR5	.934		
IT Priorities	PRI01	.461		
	PRI02	.594		
	PRI03	.575		
	PRI04	.630		
	PRI05	.469		
	PRI06	.494		
	PRI011	.481	.304	.792
	PRI012	.535		
	PRI014	.572		
	PRI015	.640		
	PRI016	.511		
	PRI018	.615		
IT Hiring	HIRE1	.665		
	HIRE2	.551		
	HIRE3	.613		
	HIRE4	.691		
	HIRE5	.557		
	HIRE6	.610		
	HIRE7	.376	0.353	.861
	HIRE8	.454		
	HIRE9	.654		
	HIRE10	.568		
	HIRE11	.733		
	HIRE12	.568		

Table 11 – Consolidated Standardized Factor Loadings, CR and AVE

To assess the discriminant validity, Fornell-Larcker criterion and Heterotrait-Monotrait ratio (HTMT) was examined for all variables. Firstly, Fornell-Larcker criterion suggested that the square-root of all latent variables should be higher than all the correlation values between the latent variables (Garson, 2016; Hair et al., 2017) (Table 4). Secondly, Heterotrait-Monotrait ratio (HTMT) for all variables were less than 0.85, indicating that the correlation of indicators across constructs was lower than the correlations of indicators within a construct (Table 5). The higher HTMT ratio between IT Strategy and IT Hiring can be anticipated as hiring was also a form of strategy specified to workforce. Hence, the discriminant validity was achieved.

	1	2	3	4	5	6	7	8
1. IT Challenges	0.570							
2. IT Hiring	0.247	0.594						
3. IT Infrastructure	0.006	-0.033	0.864					
4. CIO Position	0.113	0.094	0.004	0.769				
5. IT Priorities	0.650	0.247	-0.039	0.023	0.551			
6. Organization Size	0.138	0.294	-0.165	-0.091	0.191	1		
7. IT Spending	-0.079	-0.121	-0.173	-0.039	-0.123	-0.022	0.786	
8. IT Strategy	0.145	0.337	0.116	0.091	0.156	0.066	-0.208	0.721

Table 12 – Discriminant Validity – Fornell-Larcker Criterion

	1	2	3	4	5	6	7	8
1. IT Challenges								
2. IT Hiring	0.281							
3. IT Infrastructure	0.180	0.133						
4. CIO Position	0.268	0.203	0.195					
5. IT Priorities	0.757	0.273	0.238	0.217				
6. Organization Size	0.153	0.274	0.189	0.146	0.216			
7. IT Spending	0.199	0.150	0.274	0.237	0.175	0.049		
8. IT Strategy	0.745	1.318	0.543	0.691	0.637	0.360	0.818	

Table 13 – Discriminant Validity – Heterotrait-Monotrait Ratio (HTMT)

Variance Inflation Factor (VIF) was used to assess the collinearity assumption of PLS-SEM analysis (Table 6). The accepted threshold level of VIF score ranges between 5 and 10 (Hair et al. (2017)). In this model, all items of the variables under study fell under the accepted threshold, including to have no issue of collinearity.

Constructs	Construct	VIF
CIO Position	CPOS3	1.039
	CPOS5	1.039
IT Strategy	STRA2	1.002
	STRA3	1.002
IT Spending	SPEN1	2.973
	SPEN2_rec_r	1.999
	SPEN3_rec_r	1.821
IT Challenges	CHAL1	1.278
	CHAL2	1.531
	CHAL4	1.675
	CHAL5	1.611
	CHAL6	1.666
	CHAL7	1.608
	CHAL9	1.229
	CHAL11	1.694
	CHAL12	1.177
	CHAL13	1.422
	CHAL14	1.273
	CHAL18	1.379
	CHAL19	1.813
	CHAL20	1.946
CHAL21	1.415	
IT Infrastructure	INFR1_rec_r	1.359
	INFR5	1.359
IT Priorities	PRIO1	1.307
	PRIO2	1.777
	PRIO3	1.764
	PRIO4	1.498
	PRIO5	1.249
	PRIO6	1.194
	PRIO11	1.316
	PRIO12	1.266
	PRIO14	1.453
	PRIO15	1.403
	PRIO16	1.243
PRIO18	1.343d	
IT Hiring	HIRE1	1.491

Constructs	Construct	VIF
	HIRE2	1.483
	HIRE3	1.549
	HIRE4	1.519
	HIRE5	1.413
	HIRE6	1.470
	HIRE7	1.447
	HIRE8	1.527
	HIRE9	1.505
	HIRE10	1.530
	HIRE11	1.777
	HIRE12	1.675

Table 14 – Collinearity Statistics (VIF)

The coefficient of determination (R-square) ideally should be higher than 0.25 (Hair et al, 2017) or at least higher than 0.10 (Falk & Miller, 1992). Here, the coefficient of determination (R^2) for IT Hiring was higher than 0.10, indicating to have explained 13.3% variances in IT Hiring due to changes in underlying predictors (Table 7). Moreover, the coefficient of determination (R^2) for IT Priorities was higher than 0.25, which indicated that 44.2% of variances in IT Priorities was explained due to changes in its preceding predictors.

	R-square	R-square adjusted
IT Challenges	0.051	0.047
IT Hiring	0.133	0.130
IT Infrastructure	0.027	0.026
CIO Position	0.008	0.007
IT Priorities	0.442	0.439
Organization Size	0.043	0.042

Table 15 – R-Square

From a completely different perspective, the study also considered the effect size (f^2) to evaluate the relative predictive relevance of a predictor construct over other endogenous construct (Hair et al., 2017). If the values of f-square are 0.02, 0.15, or 0.25, the effect size is interpreted as small, medium or large respectively (Cohen, 1988). Table 8 showed that there was no sufficient effect of CIO Position on IT Challenges ($f^2 = 0.014$), CIO Position on IT Priorities ($f^2 = 0.004$), IT Spending on IT Hiring ($f^2 = 0.010$), IT Spending on IT Priorities ($f^2 = 0.007$), IT Strategy on CIO Position ($f^2 = 0.016$), and IT Strategy on IT Priorities ($f^2 = 0.004$).

	f-square
IT Challenges → IT Priorities	0.675
CIO Position → IT Challenges	0.014
CIO Position → IT Priorities	0.004
IT Priorities → HIRING	0.038
Size → IT Challenges	0.020
Size → IT Hiring	0.073
Size → IT Infrastructure	0.028
Size → IT Priorities	0.016
IT Spending → IT Hiring	0.010
IT Spending → IT Priorities	0.007
IT Strategy → IT Challenges	0.016
IT Strategy → CIO Position	0.008
IT Strategy → IT Priorities	0.004
IT Strategy → IT Spending	0.045

Table 16 – f^2 Effect Size

Finally, the evaluation of overall PLS model was closed by assessing the path coefficient analysis. Paths were found to be significant at 5% level if the p-value was less than 5% or T-Statistics is greater than 1.96. Results in Table 9 further indicated that there was no significant effect of CIO Position on IT Priorities at 5% significant level ($\beta = -0.048, t = 1.157, p = 0.247$). Moreover, the effect of IT Strategy on CIO Position was also non-significant at 5% level ($\beta = 0.091, t = 1.524, p = 0.128$). Furthermore, the effect of IT Strategy on IT Priorities was also non-significant at 5% level ($\beta = 0.049, t = 1.569, p = 0.117$). Care should be taken in determining the significant of said relationship while testing the relevant hypotheses (i.e., H3 and H4).

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
IT Challenges → IT Priorities	0.631	0.634	0.028	22.564	0.000
CIO Position → IT Challenges	0.114	0.113	0.051	2.217	0.027
CIO Position → IT Priorities	-0.048	-0.042	0.042	1.157	0.247
IT Priorities → IT Hiring	0.184	0.188	0.042	4.419	0.000
Size → IT Challenges	0.140	0.140	0.034	4.166	0.000
Size → IT Hiring	0.258	0.260	0.035	7.377	0.000
Size → IT Infrastructure	-0.165	-0.168	0.033	4.962	0.000

Size → IT Priorities	0.094	0.094	0.027	3.513	0.000
IT Spending → IT Hiring	-0.093	-0.096	0.039	2.370	0.018
IT Spending → IT Priorities	-0.062	-0.063	0.028	2.163	0.031
IT Strategy → IT Challenges	0.124	0.129	0.040	3.125	0.002
IT Strategy → CIO Position	0.091	0.088	0.060	1.524	0.128
IT Strategy → IT Priorities	0.049	0.049	0.031	1.569	0.117
IT Strategy → IT Spending	-0.208	-0.212	0.036	5.788	0.000

Table 17 – Path Coefficients

4.4 Hypothesis Testing

4.4.1 Hypothesis 1

H1. IT strategy has a direct effect on IT hiring.

Partial Least Square – Structural Equation Modelling (PLS-SEM) approach was used to analyze the direct effect of IT strategy on IT hiring. The PLS-SEM model for hypothesis 1 was shown in Figure 4, along with Average Variances Extracted (AVE) and outer loadings. The PLS-SEM model with bootstrapping of 5000 cases for hypothesis 1 was shown in Figure 5, along with T-values.

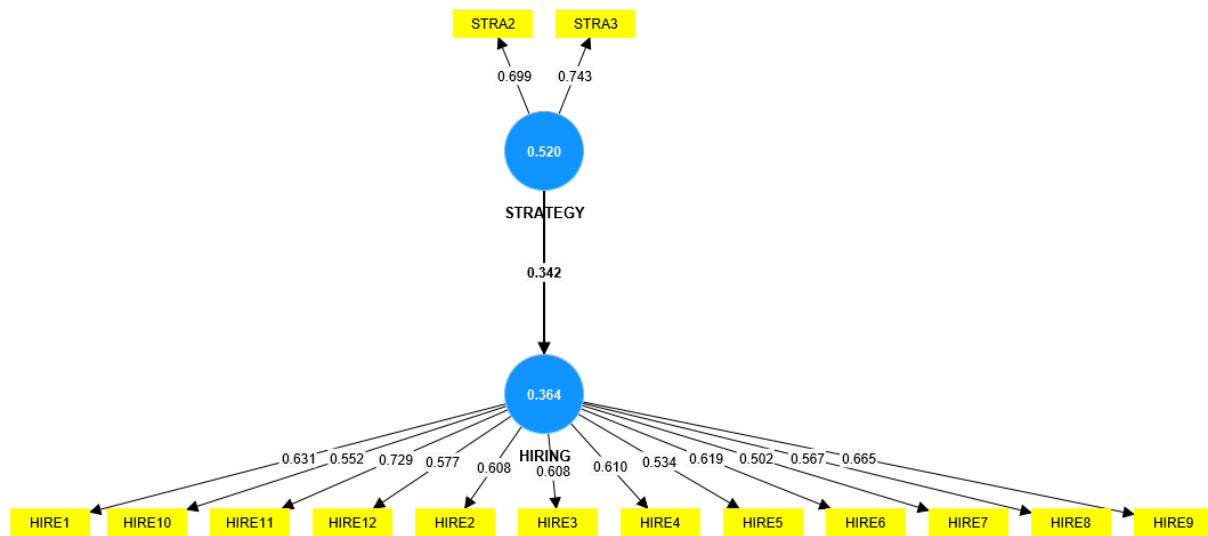


Figure 5 – H1 AVEs and Outer Loadings

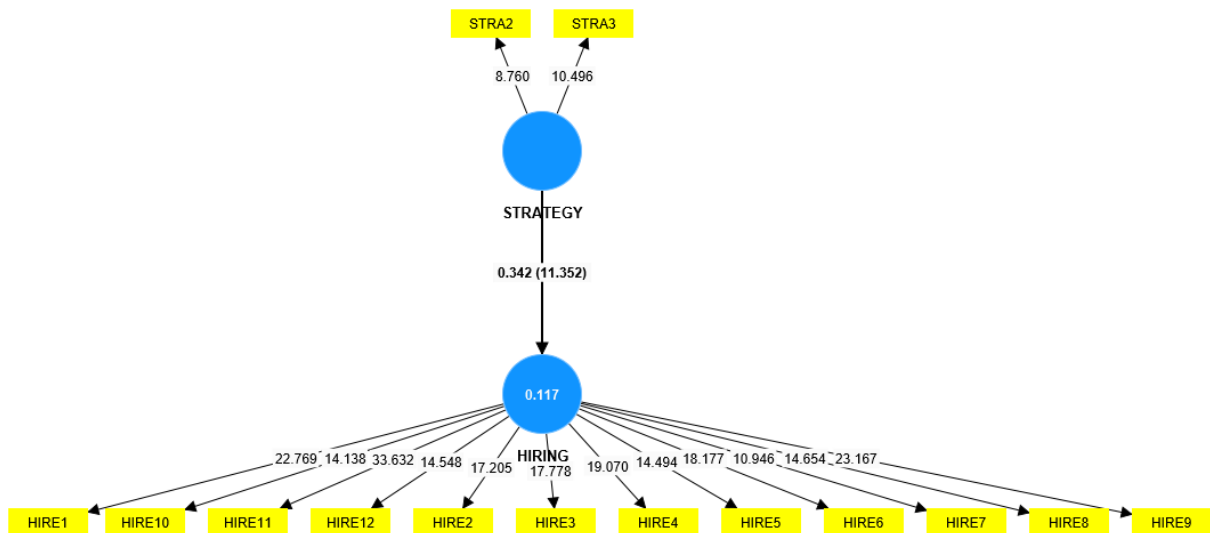


Figure 6 – H2 Bootstrap and T-values

Firstly, the reliability and validity of the variables were tested using confirmatory factor analysis. Holland (1999) and Hair et al. (2017) suggested that all standardized factor loadings should be higher than 0.70, and all standardized factor loadings between 0.40 and 0.70 could be accepted if they do not improve the composite reliability or validity. The standardized factor loadings of all items was higher than 0.40, indicating to have acceptable reliability (Table 10).

The composite reliability (CR) of all variables ranged between 0.703 and 1.000, which were greater than the suggested threshold level of 0.70 (Hair et al., 2017) (Table 11). Hence, reliability has been achieved. Moreover, the Average Variances Extracted (AVE) was computed to assess the convergent validity. According to Hair et al. (2017), the AVE scores of all variables should be higher than 0.50. In this model, the AVE score of the variable ‘IT infrastructure’ was 0.755 – only one with AVE score higher than the threshold level. The AVE scores of ‘IT challenges’, ‘IT hiring’, and ‘IT priorities’ were 0.298, 0.360, and 0.290 respectively, which were less than the threshold level as suggested by Hair et al. (2017). Hence, the convergent validity has not been met.

Variables & Items	Loadings	CR	AVE
IT Strategy		0.684	0.520
STRA2	0.699		
STRA3	0.743		
IT Hiring		0.840	0.364
HIRE1	0.631		

Variables & Items	Loadings	CR	AVE
HIRE10	0.552		
HIRE11	0.729		
HIRE12	0.577		
HIRE2	0.608		
HIRE3	0.608		
HIRE4	0.61		
HIRE5	0.534		
HIRE6	0.619		
HIRE7	0.502		
HIRE8	0.567		
HIRE9	0.665		

Table 18 – Standardized Factor Loadings, CR and AVE for H1

	IT_Hiring	IT_Strategy
IT_Hiring		
IT_Strategy	1.318	

Table 19 – Discriminant Validity for H1 – Heterotrait-Monotrait Ratio (HTMT)

	IT_Hiring	IT_Strategy
IT_Hiring	0.603	
IT_Strategy	0.342	0.721

Table 20 – Discriminant Validity for H1 – Fornell-Larcker Criterion

To test the discriminant validity, Heterotrait-Monotrait ratio and Fornell-Larcker criterion were assessed for all variables in the model. Firstly, all Heterotrait-Monotrait ratio scores should be less than 0.85 in order to achieve discriminant validity (Henseler et al., 2015). In this model, all scores in Heterotrait-Monotrait matrix were less than 0.85, indicating the discriminant validity (Table 11). Secondly, the Fornell-Larcker criterion suggested that the square-root of all latent variables should be higher than all the correlation values between the latent variables (Garson, 2016). All the scores of square root of latent variables were higher than the correlation between the latent variables (Table 12). Hence, the discriminant validity has been met.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
IT_Strategy → IT_Hiring	0.342	0.349	0.030	11.352	0.000

Table 21 – PLS-SEM Results with 5000 Bootstrapping for H1

PLS-SEM approach with 5000 bootstrapping was used to analyze the direct effect of IT strategy on IT hiring (Table 13). Results indicated that the direct impact of organization size on IT hiring was significant at 1% ($\beta = 0.342, t = 11.352, p < .001$). Hence, hypothesis H1 was accepted.

Falk & Miller (1992) suggested that the coefficient of determination (R^2) should be at least equivalent to or higher than 0.10. Ideally, the R-square should be higher than 0.25 (Hair, et al., 2017). In this model, the coefficient of determination scores (R^2) were greater than 0.10, indicating that 11.7% variance in IT hiring was explained by IT strategy (Table 14).

	R-square	R-square adjusted
IT_Hiring	0.117	0.116

Table 22 – R-Square for H2

4.4.2 Hypothesis 2

H2. Organization Size has a direct effect on IT hiring, IT priorities, IT challenges, and IT infrastructure.

Partial Least Square – Structural Equation Modelling (PLS-SEM) approach was used to analyze the direct effect of organization size on IT hiring, IT priorities, IT challenges, and IT infrastructure. For the purpose of analysis, IT infrastructure was recoded from percentage scale to 5-point Likert scale (1: 0% to 19.9%; 2: 20% to 39.9%, 3: 40% to 59.9%; 4: 60% to 79.9%; 5: 80% to 100%). This allowed us to test the reliability of the measure and match the scale with the scales of other dependent variables.

The PLS-SEM model for hypothesis 2 was shown in Figure 4, along with Average Variances Extracted (AVE) and outer loadings. The PLS-SEM model with bootstrapping of 5000 cases for hypothesis 2 was shown in Figure 7, along with T-values.

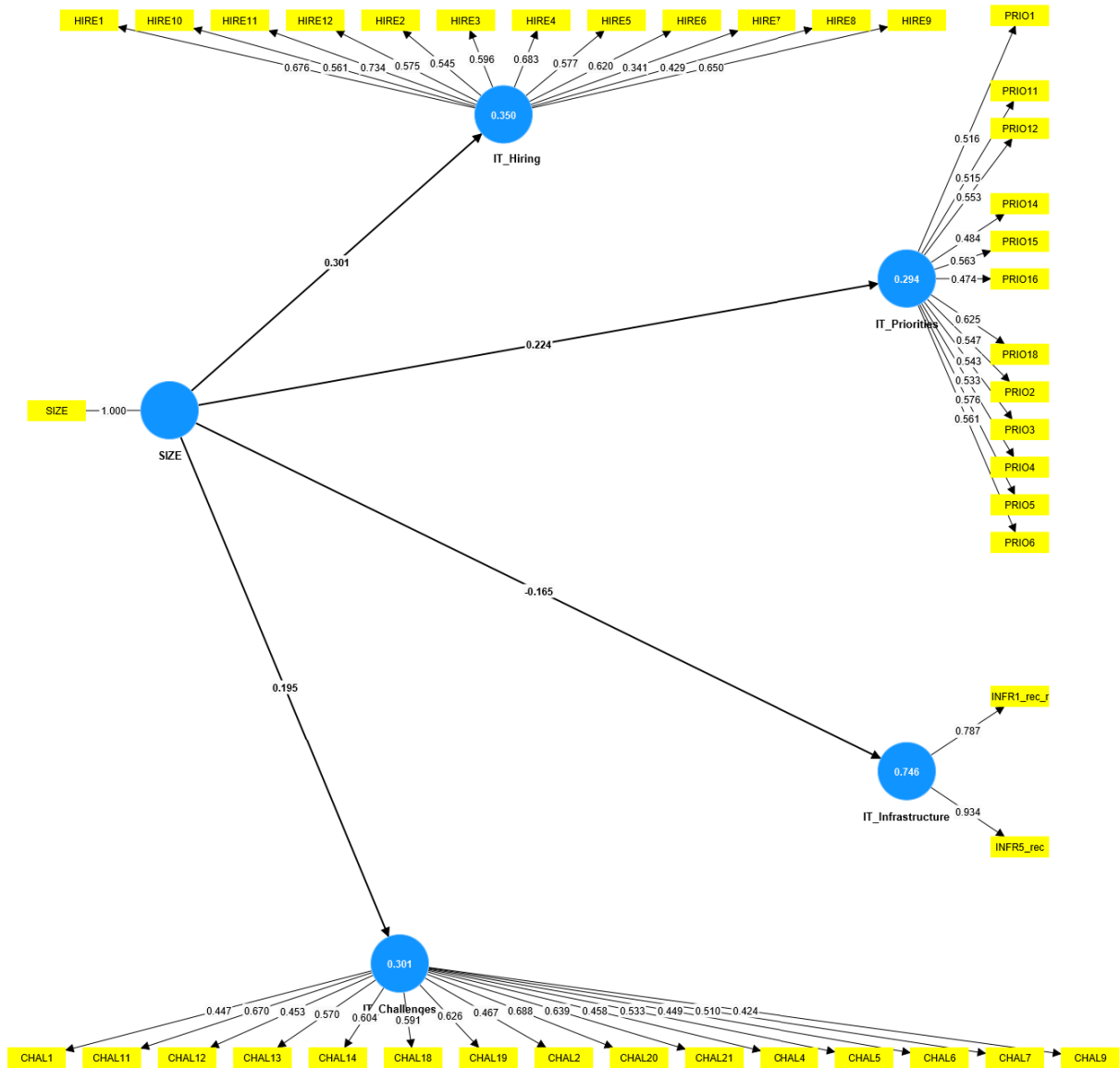


Figure 7 – H2 AVEs and Outer Loadings

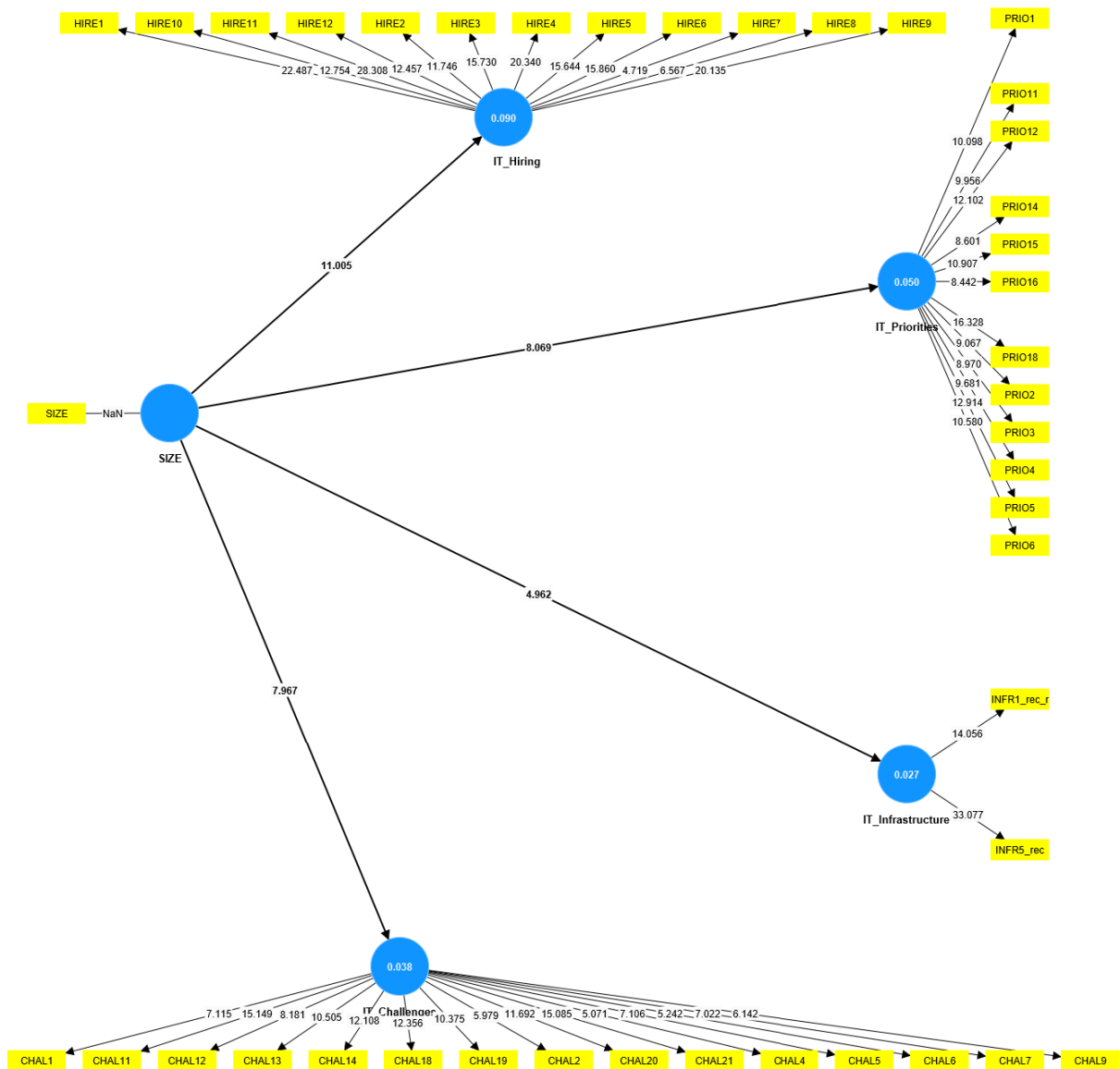


Figure 8 – H2 Bootstrap and T-values

Firstly, the reliability and validity of the variables were tested using confirmatory factor analysis (Table 15). Holland (1999) and Hair et al. (2017) suggested that all standardized factor loadings should be higher than 0.70, and all standardized factor loadings between 0.40 and 0.70 could be accepted if they do not improve the composite reliability or validity. All standardized factor loadings less than 0.40 should be deleted from the model (Holland, 1999; Hair et al., 2017).

Initially, the standardized factor loadings of INFR1 and INFR4 was negative score, i.e., -0.712 and -0.365 respectively. These items was reversed coded in order to avoid a cancelling out

between items with positive and negative factor loadings on the same factor while constructing summed scale (Hair et al., 2009).

In this model, the standardized factor loadings of items ‘CHAL3’, ‘INFR2’, ‘INFR3’, ‘INFR4’, ‘PRIO10’, ‘PRIO13’, and ‘PRIO17’ was 0.358, 0.206, 0.219, 0.365, 0.300, 0.379, and 0.318 respectively. Considering the criteria as specified by Holland (1999) and Hair et al. (2017), these items had the standardized factor loadings less than 0.40 and were deleted from the model.

The composite reliability (CR) of all variables ranged between 0.703 and 1.000, which were greater than the suggested threshold level of 0.70 (Hair et al., 2017). Hence, reliability has been achieved. Moreover, the Average Variances Extracted (AVE) was computed to assess the convergent validity. According to Hair et al. (2017), the AVE scores of all variables should be higher than 0.50. In this model, the AVE score of the variable ‘IT infrastructure’ was 0.755 – only one with AVE score higher than the threshold level. The AVE scores of ‘IT challenges’, ‘IT hiring’, and ‘IT priorities’ were 0.298, 0.360, and 0.290 respectively, which were less than the threshold level as suggested by Hair et al. (2017). Hence, the convergent validity has not been met.

Variables & Items	Loadings	CR	AVE
IT Challenges		0.817	0.298
CHAL1	0.500		
CHAL11	0.635		
CHAL12	0.500		
CHAL13	0.626		
CHAL14	0.585		
CHAL18	0.616		
CHAL19	0.616		
CHAL2	0.501		
CHAL20	0.669		
CHAL21	0.564		
CHAL4	0.496		
CHAL5	0.516		
CHAL6	0.404		
CHAL7	0.439		
CHAL9	0.428		

Variables & Items	Loadings	CR	AVE
IT Hiring		0.848	0.360
HIRE1	0.649		
HIRE10	0.567		
HIRE11	0.734		
HIRE12	0.605		
HIRE2	0.588		
HIRE3	0.543		
HIRE4	0.616		
HIRE5	0.621		
HIRE6	0.641		
HIRE7	0.424		
HIRE8	0.504		
HIRE9	0.648		
IT Infrastructure		0.703	0.755
INFR1_rec_r	0.836		
INFR5_rec	0.900		
IT Priorities		0.792	0.290
PRI01	0.501		
PRI011	0.494		
PRI012	0.515		
PRI014	0.487		
PRI015	0.583		
PRI016	0.494		
PRI018	0.636		
PRI02	0.524		
PRI03	0.522		
PRI04	0.525		
PRI05	0.571		
PRI06	0.592		

Table 23 – Standardized Factor Loadings, CR and AVE for H2

	IT_Challenges	IT_Hiring	IT_Infrastructure	IT_Priorities	Size
IT_Challenges					
IT_Hiring	0.281				
IT_Infrastructure	0.18	0.133			
IT_Priorities	0.757	0.273	0.238		
Size	0.153	0.274	0.189	0.216	

Table 24 – Discriminant Validity for H2 – Heterotrait-Monotrait Ratio (HTMT)

	IT_Challenges	IT_Hiring	IT_Infrastructure	IT_Priorities	Size
IT_Challenges	0.549				
IT_Hiring	0.282	0.592			
IT_Infrastructure	-0.021	-0.043	0.864		
IT_Priorities	0.613	0.258	-0.07	0.542	
Size	0.195	0.301	-0.165	0.224	1

Table 25 – Discriminant Validity for H2 – Fornell-Larcker Criterion

To test the discriminant validity, Heterotrait-Monotrait ratio and Fornell-Larcker criterion were assessed for all variables in the model. Firstly, all Heterotrait-Monotrait ratio scores should be less than 0.85 in order to achieve discriminant validity (Henseler et al., 2015). In this model, all scores in Heterotrait-Monotrait matrix were less than 0.85, indicating the discriminant validity (Table 16). Secondly, the Fornell-Larcker criterion suggested that the square-root of all latent variables should be higher than all the correlation values between the latent variables (Garson, 2016). Results in Table 17 indicated that the square root of the IT challenges was found to be lower than the correlation between IT challenges and IT priorities. However, all remaining scores of square root of latent variables were higher than the correlation between the latent variables. Hence, the discriminant validity has been met.

PLS-SEM approach with 5000 bootstrapping was used to analyze the direct effect of organization size on IT hiring, IT priorities, IT challenges, and IT infrastructure (Table 18). Firstly, the impact of organization size on IT hiring was tested using PLS-SEM approach. Results indicated that organization size had a significant positive relationship with IT challenges ($\beta = 0.195, t = 7.967, p < .001$), IT hiring ($\beta = 0.301, t = 11.005, p < .001$), and IT priorities ($\beta = 0.224, t = 8.069, p < .001$). However, organization size had a significant negative relationship with IT infrastructure ($\beta = -0.165, t = -4.962, p < .001$). Hence, hypothesis H2 was accepted.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Size → IT_Challenges	0.195	0.214	0.024	7.967	0.000
Size → IT_Hiring	0.301	0.308	0.027	11.005	0.000
Size → IT_Infrastructure	-0.165	-0.168	0.033	4.962	0.000
Size → IT_Priorities	0.224	0.236	0.028	8.069	0.000

Table 26 – PLS-SEM Results with 5000 Bootstrapping for H2

Falk & Miller (1992) suggested that the coefficient of determination (R^2) should be at least equivalent to or higher than 0.10. Ideally, the R-square should be higher than 0.25 (Hair, et al., 2017). In this model, all coefficient of determination scores (R^2) were less than 0.10 (Table 19). This indicated that there are factors other than organization size that could potentially account for changes in IT challenges, IT infrastructure, IT hiring and IT priorities.

	R-square	R-square adjusted
IT_Challenges	0.038	0.037
IT_Hiring	0.090	0.089
IT_Infrastructure	0.027	0.026
IT_Priorities	0.050	0.049

Table 27 – R-Square for H2

4.4.3 Hypothesis 3

H3. Higher CIO position is necessary (mediation effect) for alignment of IT strategy with IT challenges.

In this study, the mediation analysis was conducted using a two-tailed percentile bootstrap test using 5,000 iterations. The confidence level was set at 95%, and the corresponding t-test was computed to be 1.96. Using MacKinnon's (2011) equation for mediation, the coefficient of total effect that IT Strategy can have on IT Challenges is 0.115 (Figure 8). The coefficient of indirect effect of IT Strategy on IT Challenges (adjusted by CIO Position) is 0.112 (Figure 9). Finally, the coefficient of the effect of IT Strategy on the mediator CIO Position is 0.121 (Figure 10).

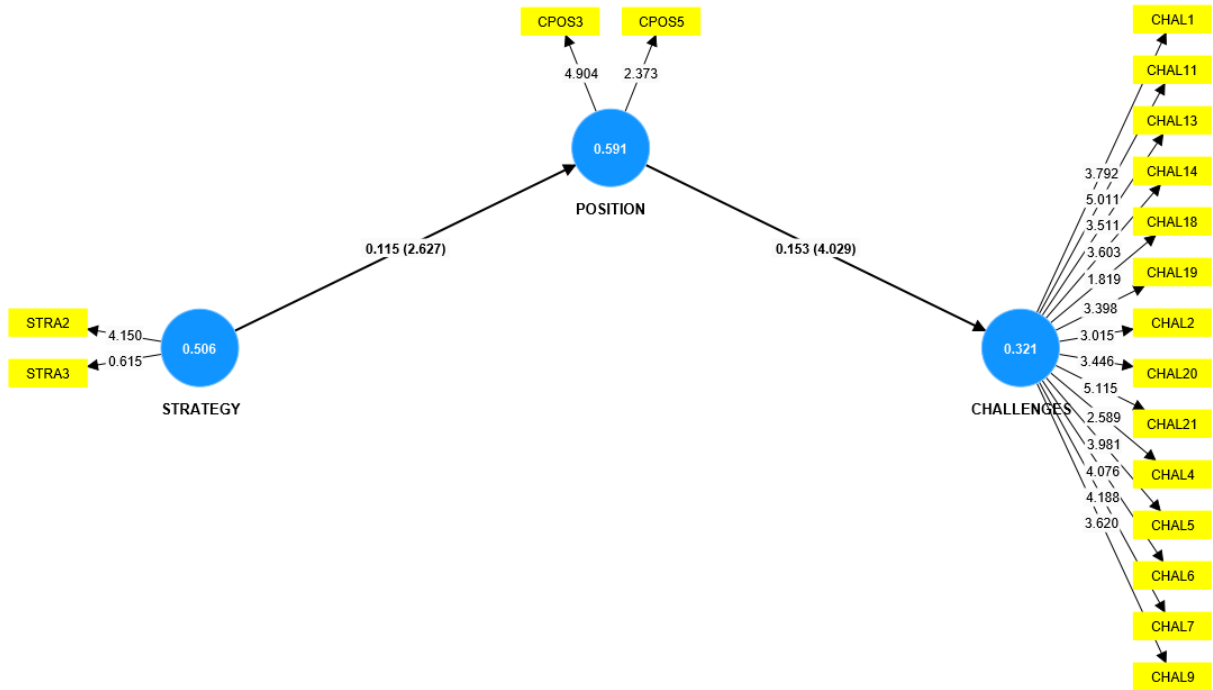


Figure 9 – Total Effect of IT Strategy on IT Challenges

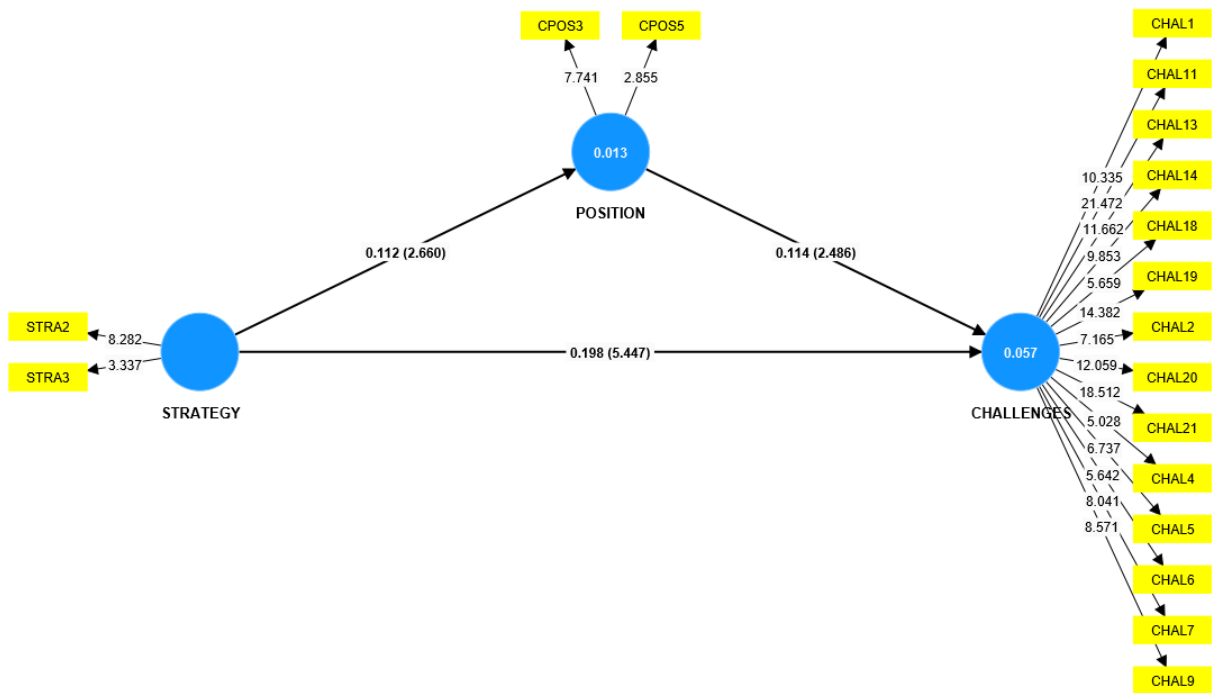


Figure 10 – Indirect Effect of IT Strategy on IT Challenges by CIO Position

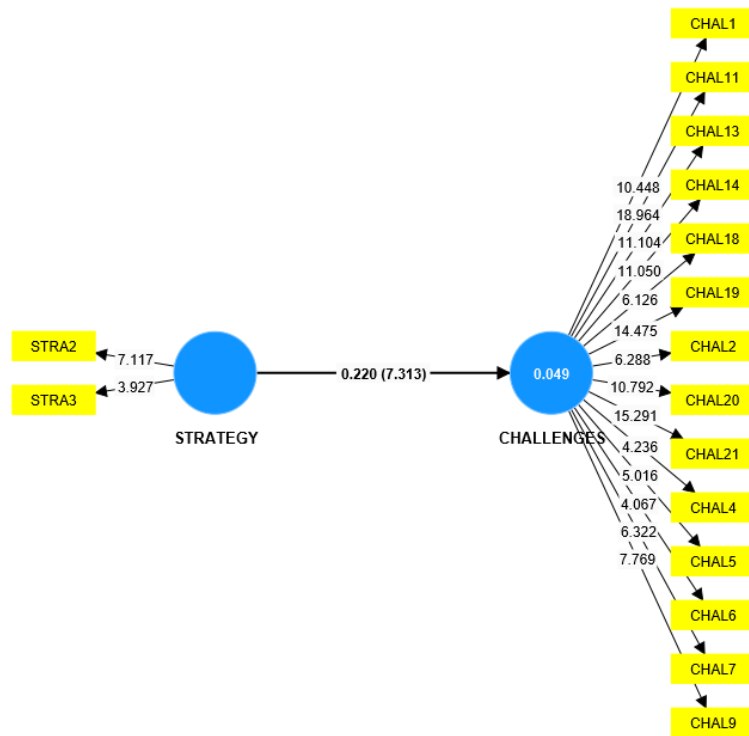


Figure 11 – Effect of IT Strategy on IT Challenges

It is also important to note that the coefficient of determination (R^2) for IT Challenges is 0.057 while all t-stat values are greater than 1.96 and significant at 5% (Table 20-22). Two Sobel tests were conducted to assess H3. The t-stats for the total effect of IT Strategy and IT Challenges was reported in Table 20, while the t-stats for the total effect of CIO Position and IT Priorities by IT Challenges was reported in Table 21.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
CIO Position → IT Challenges	0.153	0.188	0.038	4.029	0.000
IT Strategy → CIO Position	0.115	0.119	0.044	2.627	0.009

Table 28 – Total Effect of IT Strategy on IT Challenges

Here is the result:

Input:		Test statistic:	Std. Error:	p-value:	
a	0.115	Sobel test:	2.19224937	0.008026	0.02836151
b	0.153	Aroian test:	2.14617369	0.00819831	0.03185912
s _a	0.044	Goodman test:	2.24142601	0.00784991	0.02499849
s _b	0.038	Reset all	Calculate		

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O/STDEV))	P values
CIO Position → IT Challenges	0.114	0.123	0.046	2.486	0.013
IT Strategy → IT Challenges	0.198	0.209	0.036	5.447	0.000
IT Strategy → CIO Position	0.112	0.114	0.042	2.660	0.008

Table 29 – Total Effect of IT Strategy on IT Challenges by CIO Position

Here is the result:

Input:		Test statistic:	p-value:	
t _a	2.627	Sobel test:	2.20055514	0.02776753
t _b	4.029	Aroian test:	2.15448243	0.03120236
		Goodman test:	2.24971592	0.02446698
		Reset all	Calculate	

Since the p-value of Sobel test was less than 5%, it can be concluded that the CIO Position mediates the relationship between IT Strategy and IT Challenges.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics ((O/STDEV))	P values
CHAL1 ← IT CHALLENGES	0.51	0.502	0.049	10.335	0.000
CHAL11 ← IT CHALLENGES	0.733	0.723	0.034	21.472	0.000
CHAL13 ← IT CHALLENGES	0.579	0.572	0.05	11.662	0.000
CHAL14 ← IT CHALLENGES	0.543	0.535	0.055	9.853	0.000
CHAL18 ← IT CHALLENGES	0.418	0.413	0.074	5.659	0.000
CHAL19 ← IT CHALLENGES	0.687	0.678	0.048	14.382	0.000
CHAL2 ← IT CHALLENGES	0.502	0.494	0.07	7.165	0.000

CHAL20 ← IT CHALLENGES	0.687	0.678	0.057	12.059	0.000
CHAL21 ← IT CHALLENGES	0.693	0.683	0.037	18.512	0.000
CHAL4 ← IT CHALLENGES	0.46	0.454	0.091	5.028	0.000
CHAL5 ← IT CHALLENGES	0.51	0.502	0.076	6.737	0.000
CHAL6 ← IT CHALLENGES	0.45	0.443	0.08	5.642	0.000
CHAL7 ← IT CHALLENGES	0.512	0.506	0.064	8.041	0.000
CHAL9 ← IT CHALLENGES	0.46	0.454	0.054	8.571	0.000
CPOS3 ← POSITION	0.907	0.878	0.117	7.741	0.000
CPOS4 ← POSITION	0.587	0.569	0.206	2.855	0.000
CPOS5 ← POSITION	0.867	0.846	0.105	8.282	0.004
STRA2 ← STRATEGY	0.523	0.523	0.157	3.337	0.000
STRA3 ← STRATEGY	0.51	0.502	0.049	10.335	0.001

Table 30 – External Loadings of H3

4.4.4 Hypothesis 4

H4. Higher IT challenges are necessary (mediation effect) for alignment of CIO position with IT priorities.

In this study, the mediation analysis was conducted using a two-tailed percentile bootstrap test using 5,000 iterations. The confidence level was set at 95%, and the corresponding t-test was computed to be 1.96. Using MacKinnon's (2011) equation for mediation, the coefficient of total effect that CIO Position can have on IT Priorities is 0.115 (Figure 11). The coefficient of indirect effect of CIO Position on IT Priorities (adjusted by IT Challenges) is 0.115 (Figure 12). Finally, the coefficient of the effect of CIO Position on the mediator IT Challenges is 0.150 (Figure 13).

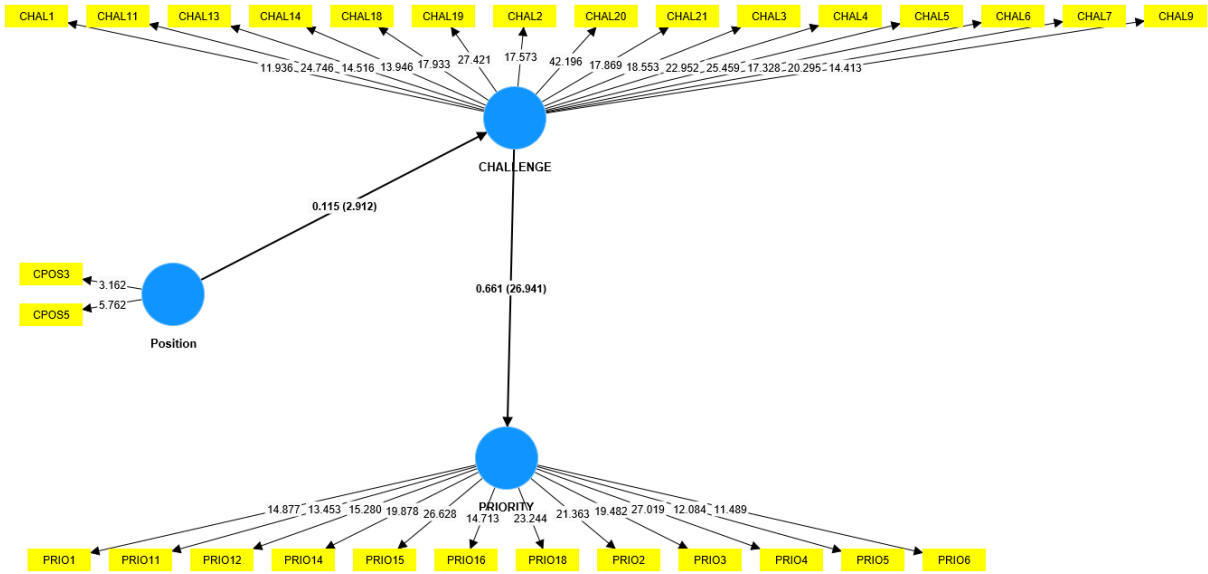


Figure 12 – Total Effect of CIO Position on IT Priorities

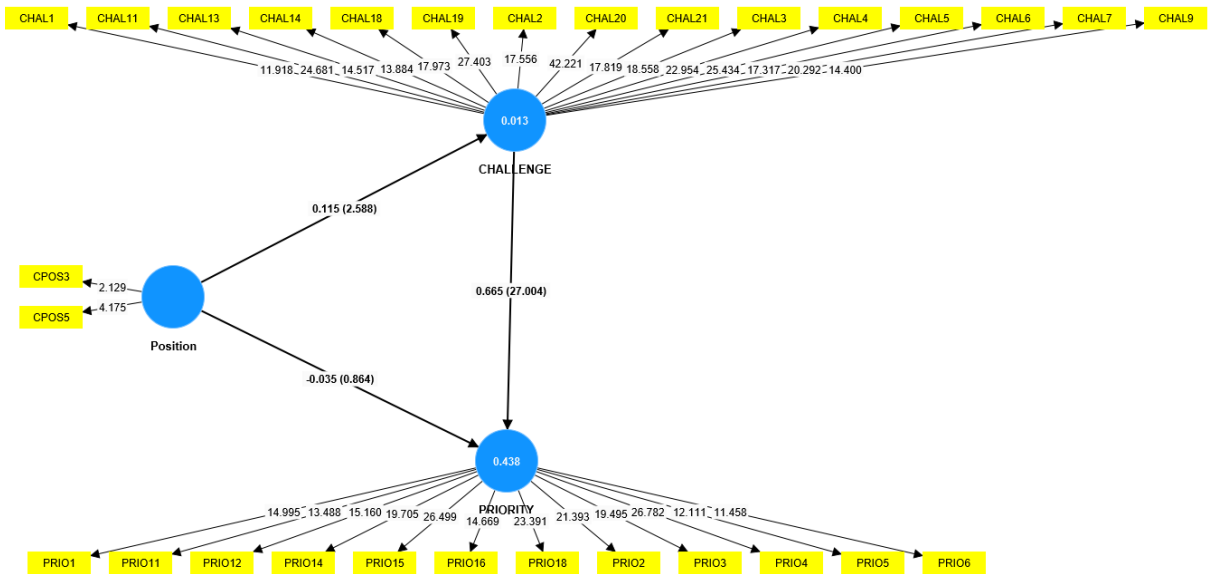


Figure 13 – Indirect Effect of CIO Position on IT Priorities by IT Challenges

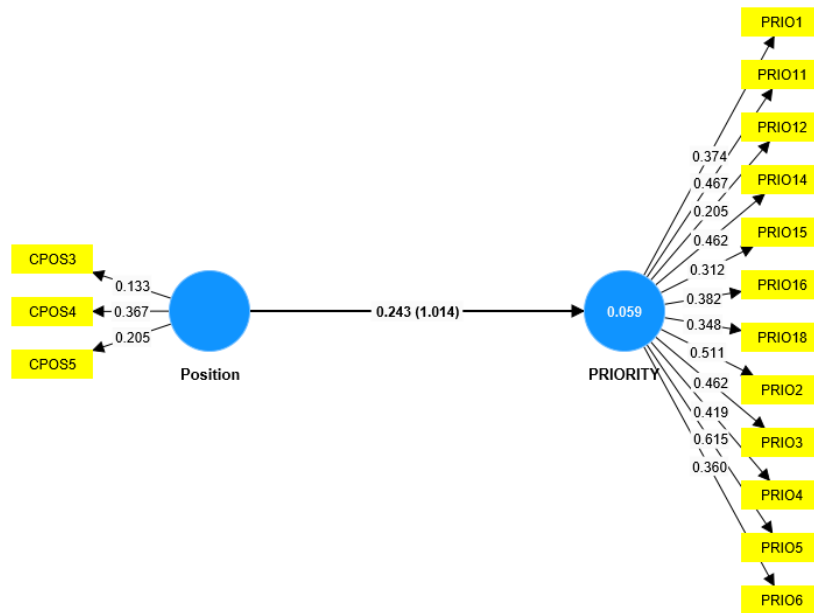


Figure 14 – Effect of CIO Position on IT Priorities

It is also important to note that the coefficient of determination (R^2) for IT Priorities is 0.438 while all t-stat values, except for the impact of CIO Position on IT Position, are greater than 1.96 and significant at 5% (Table 23-25). Two Sobel tests were conducted to assess H4. The t-stats for the total effect of CIO Position and IT Priorities was reported in Table 23, while the t-stats for the total effect of CIO Position and IT Priorities by IT Challenges was reported in Table 24.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
IT Challenges → IT Priorities	0.661	0.665	0.025	26.941	0.000
CIO Position → IT Challenges	0.115	0.121	0.04	2.912	0.004

Table 31 – Total Effect of CIO Position on IT Priorities

Here is the result:

Input:	Test statistic:	Std. Error:	p-value:
a 0.115	Sobel test: 4.43150938	0.0171533	0.00000936
b 0.661	Aroian test: 4.42399797	0.01718242	0.00000969
s _a 0.025	Goodman test: 4.43905917	0.01712412	0.00000904
s _b 0.040	Reset all	Calculate	

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
IT Challenges → IT Priorities	0.665	0.669	0.025	27.004	0.000
CIO Position → IT Challenges	0.115	0.119	0.045	2.588	0.010
CIO Position → IT Priorities	-0.035	-0.032	0.04	0.864	0.387

Table 32 – Total Effect of CIO Position on IT Priorities by IT Challenges

Here is the result:

Input:		Test statistic:	p-value:
t_a	26.941	Sobel test: 2.89513713	0.00378993
t_b	2.912	Aroian test: 2.89316777	0.00381378
		Goodman test: 2.89711051	0.00376617
Reset all		Calculate	

Since the p-value of Sobel test was less than 5%, it can be concluded that the IT Challenges mediates the relationship between CIO Position and IT Priorities.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
CHAL1 ← IT Challenges	0.431	0.43	0.036	11.918	0.000
CHAL11 ← IT Challenges	0.624	0.624	0.025	24.681	0.000
CHAL13 ← IT Challenges	0.513	0.512	0.035	14.517	0.000
CHAL14 ← IT Challenges	0.456	0.456	0.033	13.884	0.000
CHAL18 ← IT Challenges	0.541	0.541	0.03	17.973	0.000
CHAL19 ← IT Challenges	0.662	0.662	0.024	27.403	0.000
CHAL2 ← IT Challenges	0.581	0.58	0.033	17.556	0.000
CHAL20 ← IT Challenges	0.737	0.736	0.017	42.221	0.000
CHAL21 ← IT Challenges	0.566	0.566	0.032	17.819	0.000
CHAL3 ← IT Challenges	0.555	0.555	0.03	18.558	0.000
CHAL4 ← IT Challenges	0.63	0.629	0.027	22.954	0.000
CHAL5 ← IT Challenges	0.637	0.636	0.025	25.434	0.000
CHAL6 ← IT Challenges	0.574	0.573	0.033	17.317	0.000
CHAL7 ← IT Challenges	0.59	0.59	0.029	20.292	0.000
CHAL9 ← IT Challenges	0.478	0.478	0.033	14.4	0.000
CPOS3 ← CIO Position	0.597	0.573	0.281	2.129	0.033

CPOS5 ← CIO Position	0.902	0.825	0.216	4.175	0.000
PRI01 ← IT Priorities	0.487	0.486	0.032	14.995	0.000
PRI011 ← IT Priorities	0.49	0.489	0.036	13.488	0.000
PRI012 ← IT Priorities	0.513	0.513	0.034	15.16	0.000
PRI014 ← IT Priorities	0.585	0.585	0.03	19.705	0.000
PRI015 ← IT Priorities	0.644	0.643	0.024	26.499	0.000
PRI016 ← IT Priorities	0.5	0.5	0.034	14.669	0.000
PRI018 ← IT Priorities	0.607	0.607	0.026	23.391	0.000
PRI02 ← IT Priorities	0.614	0.613	0.029	21.393	0.000
PRI03 ← IT Priorities	0.593	0.591	0.03	19.495	0.000
PRI04 ← IT Priorities	0.648	0.648	0.024	26.782	0.000
PRI05 ← IT Priorities	0.455	0.455	0.038	12.111	0.000
PRI06 ← IT Priorities	0.441	0.441	0.039	11.458	0.000

Table 33 – External Loadings of H4

4.4.5 Hypothesis 5

H5. Higher IT priorities are necessary (mediation effect) for alignment of IT spending with IT hiring.

In this study, the mediation analysis was conducted using a two-tailed percentile bootstrap test using 5,000 iterations. The confidence level was set at 95%, and the corresponding t-test was computed to be 1.96. Using MacKinnon's (2011) equation for mediation, the coefficient of total effect that can have on IT Priorities is -0.160 (Figure 14). The coefficient of indirect effect of CIO Position on IT Priorities (adjusted by IT Challenges) is -0.160 (Figure 15). Finally, the coefficient of the effect of CIO Position on the mediator IT Challenges is -0.187 (Figure 16).

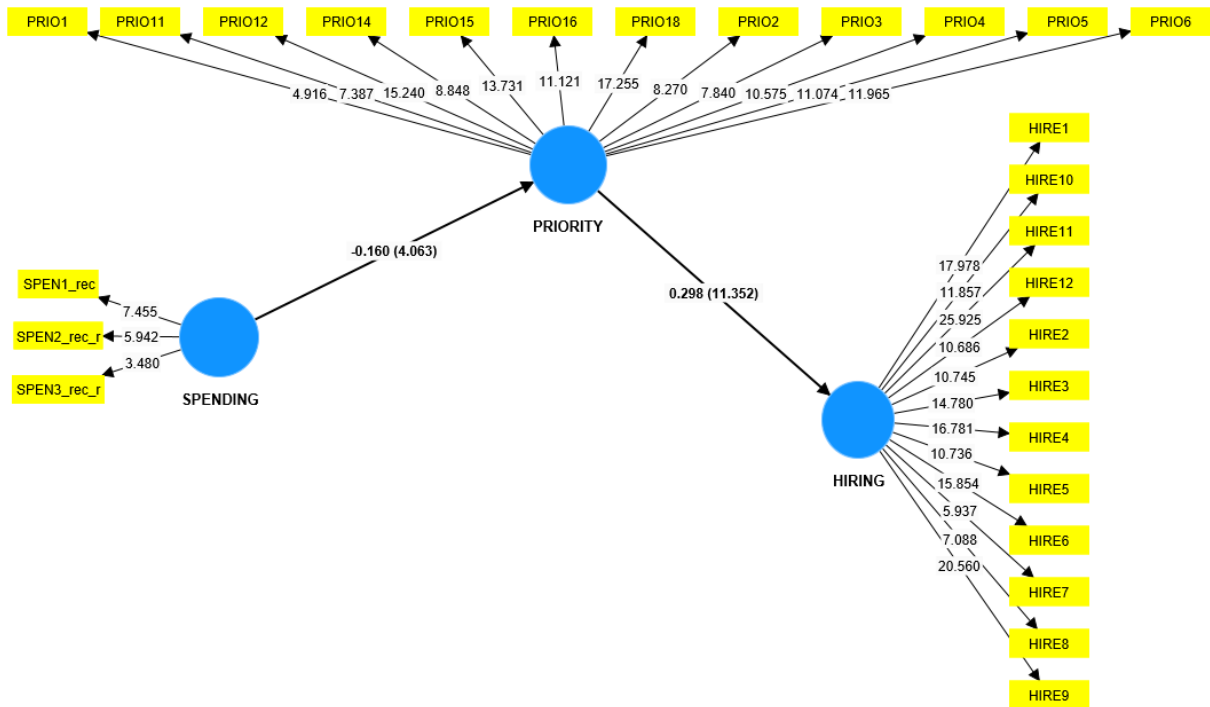


Figure 15 – Total Effect of IT Spending on IT Hiring

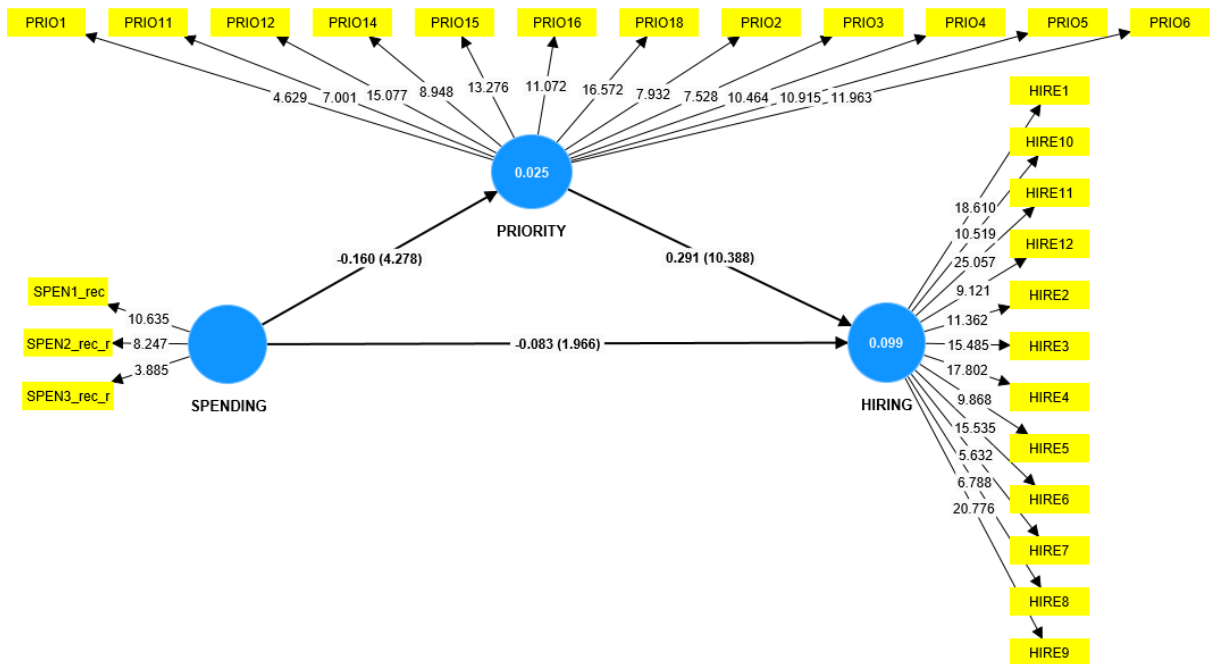


Figure 16 – Indirect Effect of IT Spending on IT Hiring by IT Priorities

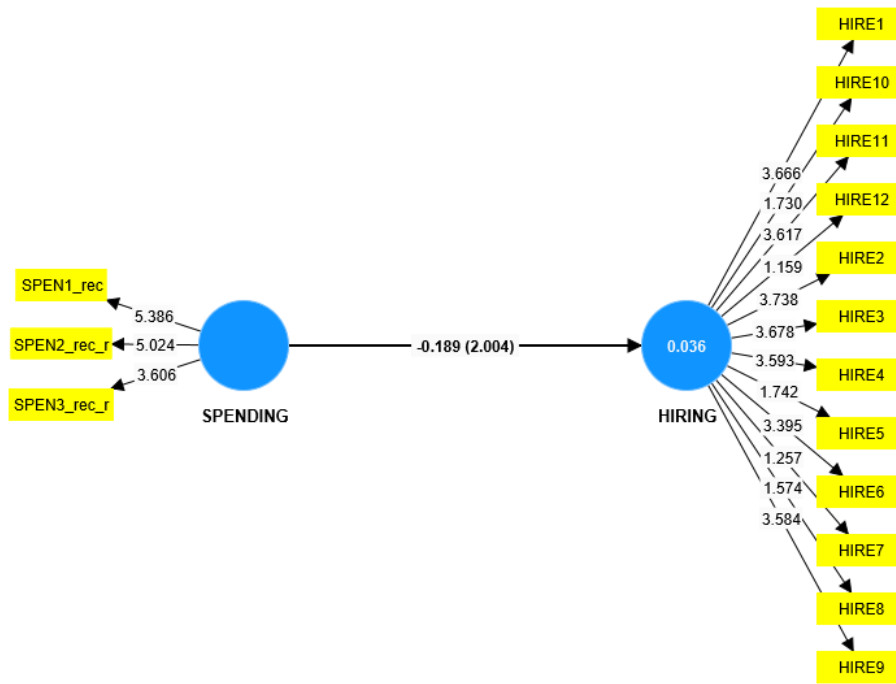


Figure 17 – Effect of IT Spending on IT Hiring

It is also important to note that the coefficient of determination (R^2) for IT Hiring is 0.099 while all t-stat values are greater than 1.96 and significant at 5% (Table 26-28). Two Sobel tests were conducted to assess H5. The t-stats for the total effect of IT Spending on IT Hiring was reported in Table 26, while the t-stats for the total effect of IT Spending on IT Hiring by IT Priorities was reported in Table 27.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
IT Priorities → IT Hiring	0.298	0.314	0.026	11.352	0.000
IT Spending → IT Priorities	-0.160	-0.170	0.039	4.063	0.000

Table 34 – Total Effect of IT Spending on IT Hiring

Here is the result:

Input:	Test statistic:	Std. Error:	p-value:
a -0.160	Sobel test: -3.86257809	0.01234409	0.0001122
b 0.298	Aroian test: -3.84961185	0.01238566	0.00011831
s _a 0.039	Goodman test: -3.87567624	0.01230237	0.00010633
s _b 0.026	Reset all	Calculate	

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
IT Priorities → IT Hiring	0.291	0.305	0.028	10.388	0.000
IT Spending → IT Priorities	-0.083	-0.083	0.042	1.966	0.049
IT Priorities → IT Hiring	-0.160	-0.168	0.038	4.278	0.000

Table 35 – Total Effect of IT Spending on IT Hiring by IT Priorities

Here is the result:

Input:		Test statistic:	p-value:
t_a	11.352	Sobel test: 3.82536638	0.00013058
t_b	4.063	Aroian test: 3.81227706	0.00013769
		Goodman test: 3.83859146	0.00012374
Reset all		Calculate	

Since the p-value of Sobel test was less than 5%, it can be concluded that the IT Priorities mediates the relationship between IT Spending and IT Hiring.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
HIRE1 ← HIRING	0.646	0.642	0.035	18.61	0.000
HIRE10 ← HIRING	0.558	0.556	0.053	10.519	0.000
HIRE11 ← HIRING	0.720	0.717	0.029	25.057	0.000
HIRE12 ← HIRING	0.542	0.541	0.059	9.121	0.000
HIRE2 ← HIRING	0.544	0.539	0.048	11.362	0.000
HIRE3 ← HIRING	0.644	0.639	0.042	15.485	0.000
HIRE4 ← HIRING	0.725	0.719	0.041	17.802	0.000
HIRE5 ← HIRING	0.518	0.516	0.053	9.868	0.000
HIRE6 ← HIRING	0.606	0.602	0.039	15.535	0.000
HIRE7 ← HIRING	0.392	0.390	0.070	5.632	0.000
HIRE8 ← HIRING	0.455	0.452	0.067	6.788	0.000
HIRE9 ← HIRING	0.655	0.651	0.032	20.776	0.000
PRIO1 ← PRIORITY	0.35	0.346	0.076	4.629	0.000
PRIO11 ← PRIORITY	0.442	0.437	0.063	7.001	0.000
PRIO12 ← PRIORITY	0.579	0.575	0.038	15.077	0.000
PRIO14 ← PRIORITY	0.504	0.498	0.056	8.948	0.000

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
PRIO15 ← PRIORITY	0.592	0.586	0.045	13.276	0.000
PRIO16 ← PRIORITY	0.504	0.499	0.046	11.072	0.000
PRIO18 ← PRIORITY	0.630	0.625	0.038	16.572	0.000
PRIO2 ← PRIORITY	0.507	0.501	0.064	7.932	0.000
PRIO3 ← PRIORITY	0.485	0.479	0.064	7.528	0.000
PRIO4 ← PRIORITY	0.551	0.544	0.053	10.464	0.000
PRIO5 ← PRIORITY	0.508	0.505	0.047	10.915	0.000
PRIO6 ← PRIORITY	0.657	0.652	0.055	11.963	0.000
SPEN1_rec ← SPENDING	0.952	0.938	0.090	10.635	0.000
SPEN2_rec_r ← SPENDING	0.828	0.814	0.100	8.247	0.000
SPEN3_rec_r ← SPENDING	0.501	0.498	0.129	3.885	0.000

Table 36 – External Loadings of H5

4.4.6 Hypothesis 6

H6. Higher IT spending is necessary (mediation effect) for alignment of IT strategy with IT priorities.

In this study, the mediation analysis was conducted using a two-tailed percentile bootstrap test using 5,000 iterations. The confidence level was set at 95%, and the corresponding t-test was computed to be 1.96. Using MacKinnon's (2011) equation for mediation, the coefficient of total effect of IT Strategy that can have on IT Priorities is -0.199 (Figure 17). The coefficient of indirect effect of IT Strategy on IT Priorities (adjusted by IT Spending) is -0.200 (Figure 18). Finally, the coefficient of the effect of IT Strategy on the mediator IT Spending is -0.199 (Figure 19).

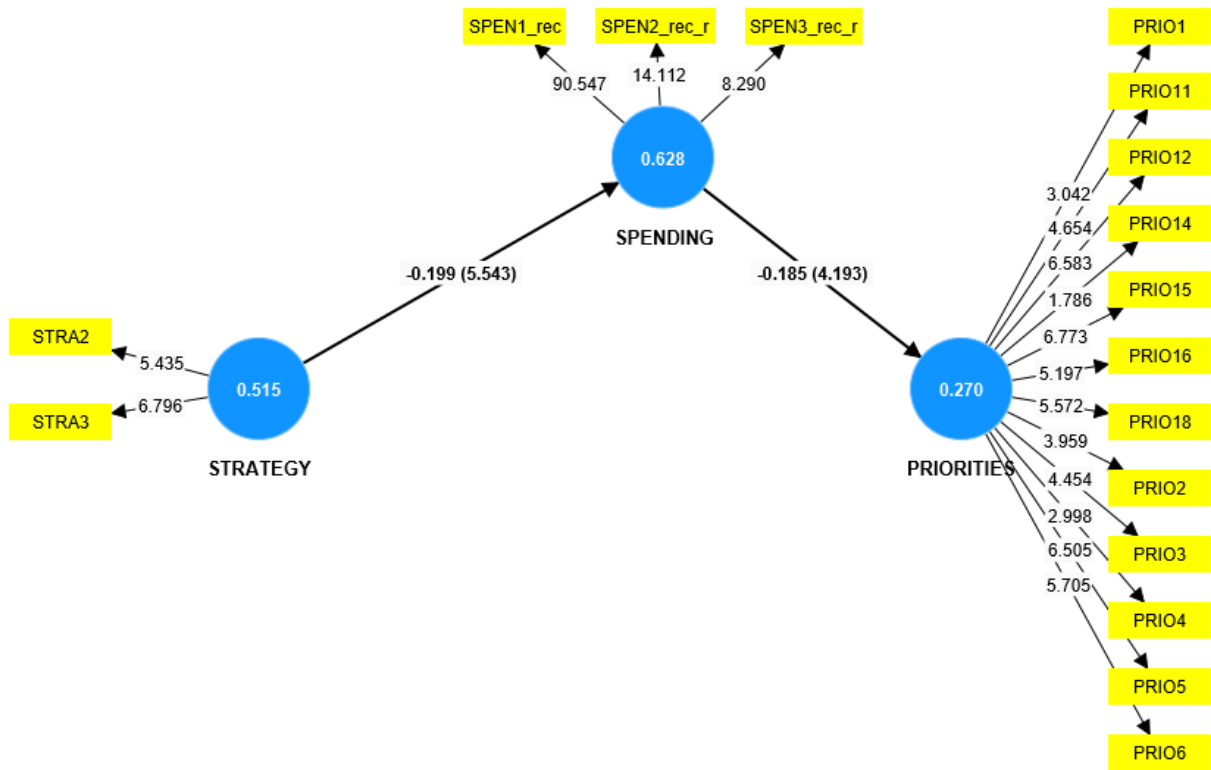


Figure 18 – Total Effect of IT Strategy on IT Priorities

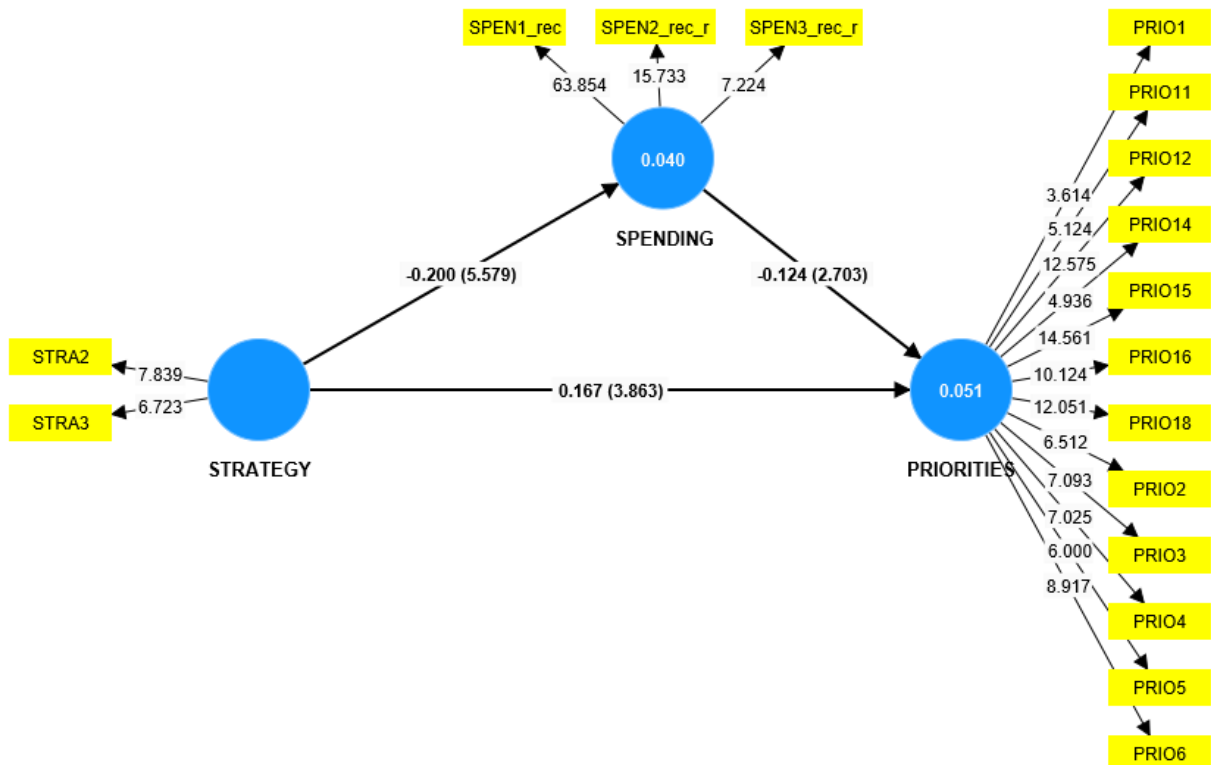


Figure 19 – Indirect Effect of IT Strategy on IT Priorities by IT Spending

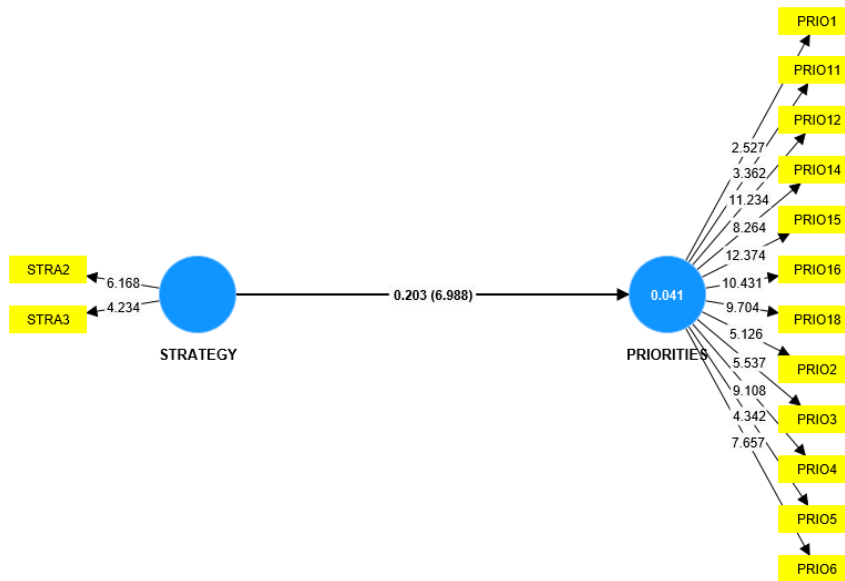


Figure 20 – Effect of IT Strategy on IT Priorities

It is also important to note that the coefficient of determination (R^2) for IT Hiring is 0.051 while all t-stat values are greater than 1.96 and significant at 5% (Table 29-31). Two Sobel tests were conducted to assess H6. The t-stats for the total effect of IT Strategy on IT Priorities was reported in Table 29, while the t-stats for the total effect of IT Strategy on IT Priorities by IT Spending was reported in Table 30.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O/STDEV))	P values
IT Spending → IT Priorities	-0.185	-0.208	0.044	4.193	0.000
IT Strategy → IT Spending	-0.199	-0.204	0.036	5.543	0.000

Table 37 – Total Effect of IT Strategy on IT Priorities

Here is the result:

Input:	Test statistic:	Std. Error:	p-value:
a -0.199	Sobel test: 3.34649826	0.01100105	0.00081839
b -0.185	Aroian test: 3.31233864	0.01111145	0.00092519
s _a 0.036	Goodman test: 3.38173701	0.01088642	0.00072029
s _b 0.044	Reset all	Calculate	

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O/STDEV))	P values
IT Spending → IT Priorities	-0.124	-0.133	0.046	2.703	0.007
IT Strategy → IT Priorities	0.167	0.177	0.043	3.863	0.000
IT Strategy → IT Spending	-0.200	-0.204	0.036	5.579	0.000

Table 38 – Total Effect of IT Strategy on IT Priorities by IT Spending

Here is the result:

Input:		Test statistic:	p-value:
t_a	5.579	Sobel test: 3.35187494	0.00080266
t_b	4.193	Aroian test: 3.31798696	0.00090669
		Goodman test: 3.38682293	0.00070707
Reset all		Calculate	

Since the p-value of Sobel test was less than 5% (0.05), it can be concluded that the IT Spending mediates the relationship between IT Strategy and IT Priorities.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O/STDEV))	P values
PRI01 ← PRIORITIES	0.320	0.313	0.089	3.614	0.000
PRI011 ← PRIORITIES	0.404	0.396	0.079	5.124	0.000
PRI012 ← PRIORITIES	0.609	0.598	0.048	12.575	0.000
PRI014 ← PRIORITIES	0.461	0.443	0.093	4.936	0.000
PRI015 ← PRIORITIES	0.679	0.666	0.047	14.561	0.000
PRI016 ← PRIORITIES	0.563	0.550	0.056	10.124	0.000
PRI018 ← PRIORITIES	0.611	0.600	0.051	12.051	0.000
PRI02 ← PRIORITIES	0.519	0.507	0.080	6.512	0.000
PRI03 ← PRIORITIES	0.529	0.518	0.075	7.093	0.000
PRI04 ← PRIORITIES	0.554	0.537	0.079	7.025	0.000
PRI05 ← PRIORITIES	0.466	0.463	0.078	6.000	0.000
PRI06 ← PRIORITIES	0.586	0.576	0.066	8.917	0.000
SPEN1_rec ← SPENDING	0.96	0.956	0.015	63.854	0.000
SPEN2_rec_r ← SPENDING	0.793	0.786	0.05	15.733	0.000
SPEN3_rec_r ← SPENDING	0.568	0.572	0.079	7.224	0.000
STRA2 ← STRATEGY	0.743	0.737	0.095	7.839	0.000
STRA3 ← STRATEGY	0.692	0.682	0.103	6.723	0.000

Table 39 – External Loadings of H6

Line	Hypothesis	Paths	coef-a	coef-b	coef-c'	coef-c	stdev-a	stdev-b	stdev-c'	stdev-c	tval-a	tval-b	tval-c'	tval-c	r ² a	r ² b	r ² b,c'	r ² c	Sobel	Aroian	Goodman
1	H3a	a,b	0.115	0.153			0.044	0.038			2.627	4.029			0.014	0.022			2.192	2.146	2.241
2	H3a1	a,b,c'	0.112	0.114	0.198		0.042	0.046	0.036		2.660	2.486	5.447		0.013		0.056		2.200	2.154	2.249
3	H3a2	c				0.220				0.030			7.313					0.049			
4	H4b	a,b	0.115	0.661			0.039	0.025			2.912	26.941			0.013	0.439			4.432	4.424	4.439
5	H4b1	a,b,c'	0.115	0.665	-0.035		0.044	0.025	0.041		2.588	27.004	0.864		0.013		0.438		2.895	2.893	2.897
6	H4b2	c				0.243				0.240			1.014					0.059			
7	H5a	a,b	-0.160	0.298			0.039	0.026			4.063	11.352			0.026	0.089			-3.863	-3.849	-3.876
8	H5a1	a,b,c'	-0.083	0.291	-0.160		0.042	0.028	0.038		1.966	10.388	4.278		0.025		0.099		3.825	3.812	3.838
9	H5a2	c				-0.189				0.094			2.004					0.036			
10	H6b	a,b	-0.199	-0.185			0.036	0.044			5.543	4.193			0.040	0.034			4.010	3.987	4.034
11	H6b1	a,b,c'	-0.200	-0.124	0.167		0.036	0.046	0.043		5.579	2.703	3.863		0.040		0.051		3.351	3.317	3.386
12	H6b2	c				0.203				0.029			6.988					0.041			

Table 40 – Summary of Mediation Hypothesis Tests

4.5 *Multi-group Analysis for Years*

The study conducted a multi-group comparison analysis to confirm if the relationship between variables remained the same across years. In other words, the study aimed to determine whether the relationship between variables is different in different years. Confirmatory factor analysis was conducted before the structural equation modelling in order to determine the validity and reliability of the results. Later, partial least squares – structural equation modelling (PLS-SEM) was conducted separately for each separate year to determine the significance of relationship between variables. Multi-group comparison analysis with 5000 bootstrapping was lastly done to determine whether the relationship between variables, either direct or indirect, was significantly different from each other.

4.5.1 *Multi-Group Analysis: Hypothesis 1*

Hypothesis 1 stated that IT strategy was significantly related with IT hiring. For the purpose of the analysis, IT strategy and IT hiring was entered in the measurement and structural model. Firstly, the confirmatory factor analysis showed that one item (STRA3) from IT strategy was low factor loading in year 2019 (SFL = 0.387), while some items from IT hiring had factor loadings lower than 0.40 (Table 33). The items were retained in the model to replicate the same model in all years. The composite reliability of IT strategy was low throughout in all years, even though all items had acceptable factor loadings in all years. However, IT strategy had acceptable level of average variance extracted (AVE), indicating to have acceptable convergent validity. Meanwhile, IT hiring had acceptable level of composite reliability (CR) but lacks in convergent validity with low scores of average variances extracted (AVE) in all years. After confirmatory factor analysis, results from PLS-SEM indicated that IT strategy had a significant relationship with IT hiring in all years ($p < 0.001$) (Table 34). Results from multi-group comparison analysis indicated that the relationship between IT strategy and IT hiring was the same across the years ($p > 0.05$) (Table 32). This supported the findings that the IT strategy had a significant relationship with IT hiring in all years at same strength and direction.

	2016	2017	2018	2019	2020	2021	2022
<i>Standardized Factor Loadings</i>							
IT Strategy							
STRA2	0.710	0.649	0.707	0.946	0.611	0.616	0.547
STRA3	0.755	0.683	0.766	0.387	0.867	0.806	0.831
IT Hiring							
HIRE1	0.655	0.680	0.583	0.446	0.653	0.408	0.672
HIRE2	0.551	0.543	0.620	0.067	0.749	0.472	0.636
HIRE3	0.573	0.588	0.693	0.280	0.719	0.297	0.619
HIRE4	0.606	0.579	0.628	0.641	0.683	0.418	0.598
HIRE5	0.510	0.482	0.608	0.666	0.524	0.626	0.478
HIRE6	0.617	0.670	0.628	0.721	0.683	0.572	0.633
HIRE7	0.487	0.406	0.256	0.425	0.621	0.612	0.379
HIRE8	0.534	0.493	0.486	0.381	0.646	0.627	0.540
HIRE9	0.780	0.653	0.438	0.367	0.639	0.723	0.677
HIRE10	0.506	0.505	0.370	0.804	0.659	0.760	0.402
HIRE11	0.736	0.803	0.665	0.803	0.721	0.611	0.672
HIRE12	0.581	0.616	0.481	0.685	0.564	0.714	0.547
<i>Composite Reliability</i>							
IT Strategy	0.140	0.253	0.158	0.143	0.237	0.058	0.023
IT Hiring	0.849	0.831	0.793	0.848	0.881	0.829	0.820
<i>Average Variances Extracted</i>							
IT Strategy	0.537	0.444	0.543	0.522	0.562	0.514	0.495
IT Hiring	0.361	0.353	0.306	0.319	0.433	0.343	0.336
<i>Hypothesis Testing</i>							
H1: IT Strategy → IT Hiring	0.280*** (0.000)	0.408*** (0.000)	0.457*** (0.000)	0.470*** (0.239)	0.407*** (0.000)	0.412*** (0.000)	0.346*** (0.000)
R ²	0.078	0.166	0.209	0.220	0.166	0.169	0.120
f ²	0.085	0.199	0.265	0.283	0.199	0.204	0.136

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 41 – H1 Standardized Factor Loadings, CR, AVE, Hypothesis Testing, R², f²

	2016	2017	2018	2019	2020	2021	2022
	<i>Differences</i>						
2016	–	–0.128	–0.177	–0.189	–0.127	–0.132	–0.066
2017	0.128	–	–0.050	–0.062	0.001	–0.004	0.061
2018	0.177	0.050	–	–0.012	0.050	0.046	0.111
2019	0.189	0.062	0.012	–	0.058	0.123	0.122
2020	0.127	–0.001	–0.050	–0.062	–	–0.004	0.061
2021	0.132	0.004	–0.046	–0.058	0.004	–	0.065
2022	0.006	–0.061	–0.111	–0.123	–0.061	–0.064	–
	<i>p-values</i>						
2016	–	0.149	0.057	0.243	0.144	0.149	0.411
2017	0.149	–	0.644	0.307	0.938	0.998	0.451
2018	0.057	0.644	–	0.398	0.574	0.645	0.215
2019	0.243	0.307	0.398	–	0.287	0.308	0.249
2020	0.144	0.938	0.574	0.287	–	0.940	0.475
2021	0.149	0.998	0.645	0.308	0.940	–	0.455
2022	0.411	0.451	0.215	0.249	0.475	0.455	–

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 42 – H1 Multi-group Analysis – Differences & *p-values*

4.5.2 Multi-Group Analysis: Hypothesis 2

Hypothesis 2 stated that organization size had a significant relationship with IT challenges, IT hiring, IT infrastructure, and IT priorities. Firstly, confirmatory factor analysis in Table 33 was conducted to confirm the reliability and validity of the constructs. Some items of IT challenges had very low factor loadings in 2019, but overall the scale was found to be reliable with an acceptable composite reliability of 0.705. Some items from IT hiring had very factor loadings in 2017, but overall the scale was reliable with a good composite reliability of 0.831. One item from IT infrastructure had a very factor loading in year 2019, but had a good composite reliability of 0.703. Some items from IT priorities had very factor loading in years 2019 and 2021, but had good composite reliability of 0.699 and 0.702 in both years. Results from PLS-SEM analysis indicated that organization size had a significant positive relationship with IT challenges in year 2018 only ($p < 0.001$). Similarly, organization size had a significant positive relationship with IT hiring in years 2016, 2018, 2019, 2020, and 2022 only ($p < 0.001$). Likewise, organization size had a

significant negative relationship with IT infrastructure in year 2022 ($p < 0.05$). Lastly, organization size had a significant positive relationship with IT priorities in years 2017, 2018, 2019, 2020, and 2022 only. Multi-group comparison analysis indicated that there was a significant differences in the relationship between organization size and IT hiring between year 2016 and 2019 ($\beta = -0.165$, $p < 0.05$). The relationship between organization size and IT hiring was higher in year 2019 ($\beta = 0.474$, $p < 0.001$), while the impact of organization size on IT hiring was lower in year 2016 ($\beta = 0.308$, $p < 0.001$). Although both years have positive impact, in year 2019, the organization of larger size preferred to hire more employees than year 2016. Among remaining relationships, none of years had significant differences in relationship between variables ($p > 0.05$) (Table 35-39).

	2016	2017	2018	2019	2020	2021	2022
<i>Standardized Factor Loadings</i>							
IT Challenges							
CHAL1	0.432	0.487	0.329	0.419	0.414	0.635	0.455
CHAL2	0.399	0.365	0.240	-0.354	0.678	0.583	0.263
CHAL4	0.383	0.282	0.518	-0.414	0.739	0.267	0.167
CHAL5	0.485	0.462	0.522	-0.136	0.635	0.506	0.377
CHAL6	0.443	0.322	0.324	0.077	0.395	0.546	0.322
CHAL7	0.509	0.519	0.422	0.145	0.527	0.519	0.454
CHAL9	0.394	0.216	0.523	0.002	0.610	0.440	0.272
CHAL11	0.663	0.362	0.557	-0.020	0.709	0.843	0.664
CHAL12	0.624	0.258	0.259	-0.153	0.606	0.537	0.125
CHAL13	0.626	0.619	0.539	0.293	0.506	0.533	0.544
CHAL14	0.669	0.766	0.648	0.601	0.561	0.381	0.748
CHAL18	0.586	0.428	0.504	0.422	0.590	0.477	0.511
CHAL19	0.585	0.284	0.557	-0.204	0.762	0.704	0.573
CHAL20	0.675	0.294	0.697	0.101	0.697	0.627	0.669
CHAL21	0.553	0.527	0.669	0.292	0.514	0.658	0.659
IT Hiring							
HIRE1	0.626	0.695	0.653	0.685	0.634	0.509	0.743
HIRE2	0.468	0.491	0.556	0.385	0.703	0.429	0.576
HIRE3	0.601	0.678	0.604	0.567	0.658	0.389	0.561
HIRE4	0.688	0.646	0.627	0.680	0.709	0.685	0.763
HIRE5	0.499	0.368	0.538	0.580	0.603	0.716	0.527

	2016	2017	2018	2019	2020	2021	2022
HIRE6	0.529	0.405	0.621	0.584	0.681	0.630	0.630
HIRE7	0.345	-0.177	0.038	0.492	0.594	0.408	0.211
HIRE8	0.390	-0.060	0.319	0.459	0.652	0.391	0.407
HIRE9	0.778	0.485	0.341	0.645	0.614	0.686	0.657
HIRE10	0.656	0.333	0.347	0.728	0.698	0.603	0.304
HIRE11	0.655	0.605	0.821	0.849	0.727	0.624	0.663
HIRE12	0.659	0.393	0.584	0.578	0.563	0.582	0.420
<i>IT Infrastructure</i>							
INFR1_rec_r	0.800	0.694	0.616	-0.101	0.868	0.999	0.856
INFR5_rec	0.897	0.959	0.990	0.781	0.831	0.489	0.949
<i>IT Priorities</i>							
PRI01	0.410	0.455	0.429	0.473	0.622	0.281	0.533
PRI02	0.452	0.579	0.573	0.422	0.566	0.245	0.506
PRI03	0.488	0.573	0.619	0.409	0.531	0.346	0.437
PRI04	0.583	0.535	0.611	0.110	0.467	0.553	0.330
PRI05	0.517	0.560	0.560	0.623	0.548	0.229	0.441
PRI06	0.509	0.487	0.502	0.161	0.506	0.827	0.707
PRI011	0.565	0.546	0.482	0.664	0.396	-0.046	0.476
PRI012	0.665	0.633	0.611	0.519	0.410	-0.039	0.441
PRI014	0.572	0.573	0.495	-0.027	0.518	0.608	0.248
PRI015	0.423	0.575	0.607	0.512	0.579	0.306	0.607
PRI016	0.417	0.479	0.371	0.212	0.559	0.378	0.414
PRI018	0.771	0.582	0.519	0.654	0.621	0.540	0.425
<i>Size</i>							
Size	1.000	1.000	1.000	1.000	1.000	1.000	1.000
<i>Composite Reliability</i>							
IT Challenges	0.861	0.846	0.801	0.705	0.881	0.876	0.833
IT Hiring	0.842	0.831	0.793	0.848	0.881	0.829	0.820
IT Infrastructure	0.624	0.632	0.667	0.703	0.617	0.694	0.787
IT Priorities	0.821	0.795	0.791	0.699	0.803	0.782	0.750
<i>Average Variances Extracted</i>							
IT Challenges	0.297	0.192	0.257	0.087	0.367	0.321	0.241
IT Hiring	0.345	0.233	0.294	0.378	0.429	0.321	0.317
IT Infrastructure	0.723	0.701	0.680	0.310	0.722	0.318	0.816

	2016	2017	2018	2019	2020	2021	2022
IT Priorities	0.293	0.303	0.288	0.203	0.283	0.184	0.228
<i>Hypothesis Testing</i>							
H2a: Size → IT Challenges	0.218 (0.102)	0.326 (0.204)	0.382*** ($< .001$)	0.469 (0.312)	0.238 (0.098)	0.289 (0.206)	0.295 (0.111)
H2b: Size → IT Hiring	0.308*** ($< .001$)	0.433 (0.082)	0.425*** ($< .001$)	0.474*** ($< .001$)	0.352*** ($< .001$)	0.310 (0.165)	0.381*** ($< .001$)
H2c: Size → IT Infrastructure	-0.129 (0.112)	-0.126 (0.272)	-0.163 (0.264)	-0.191 (0.422)	-0.175 (0.080)	-0.071 (0.638)	-0.172* (0.042)
H2d: Size → IT Priorities	0.201 (0.152)	0.320*** ($< .001$)	0.331* (0.011)	0.413*** ($< .001$)	0.338*** ($< .001$)	0.357 (0.256)	0.358*** (.001)
R²							
IT Challenges	0.047	0.106	0.146	0.220	0.057	0.084	0.087
IT Hiring	0.095	0.188	0.180	0.224	0.124	0.096	0.145
IT Infrastructure	0.017	0.016	0.027	0.037	0.031	0.005	0.029
IT Priorities	0.041	0.102	0.109	0.171	0.114	0.127	0.128
f²							
IT Challenges	0.050	0.119	0.171	0.282	0.060	0.091	0.096
IT Hiring	0.105	0.231	0.220	0.289	0.142	0.106	0.169
IT Infrastructure	0.017	0.016	0.027	0.038	0.032	0.005	0.030
IT Priorities	0.042	0.114	0.123	0.206	0.129	0.146	0.147

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 43 – H2 Standardized Factor Loadings, CR, AVE, Hypothesis Testing, R², f²

	2016	2017	2018	2019	2020	2021	2022
<i>Differences</i>							
2016	–	-0.108	-0.165	-0.252	-0.021	-0.072	-0.078
2017	0.108	–	-0.057	-0.143	0.088	0.036	0.030
2018	0.165	0.057	–	-0.087	0.144	0.093	0.087
2019	0.252	0.143	0.087	–	0.231	0.180	0.174
2020	0.021	-0.088	-0.144	-0.231	–	-0.051	-0.057
2021	0.072	-0.036	-0.963	-0.180	0.051	–	-0.006
2022	0.078	-0.030	-0.087	-0.174	0.057	0.006	–
<i>p-values</i>							
2016	–	0.270	0.105	0.495	0.796	0.354	0.323

	2016	2017	2018	2019	2020	2021	2022
2017	0.270	–	0.941	0.468	0.307	0.667	0.583
2018	0.105	0.941	–	0.507	0.162	0.655	0.550
2019	0.495	0.468	0.507	–	0.493	0.474	0.484
2020	0.796	0.307	0.162	0.493	–	0.452	0.434
2021	0.354	0.667	0.655	0.474	0.452	–	0.934
2022	0.323	0.583	0.550	0.484	0.434	0.934	–

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 44 – H2a Multi-group Analysis – Differences & p-values (Size → IT Challenges)

	2016	2017	2018	2019	2020	2021	2022
	<i>Differences</i>						
2016	–	-0.125	-0.116	-0.165*	-0.044	-0.002	-0.072
2017	0.125	–	0.009	-0.040	0.081	0.123	0.053
2018	0.116	-0.009	–	-0.049	0.072	0.114	0.044
2019	0.165*	0.040	0.049	–	0.121	0.163	0.093
2020	0.044	-0.081	-0.072	-0.121	–	0.042	-0.028
2021	0.002	-0.123	-0.114	-0.163	-0.042	–	-0.070
2022	0.072	-0.053	-0.044	-0.093	0.028	0.070	–
	<i>p-values</i>						
2016	–	0.150	0.132	0.041	0.641	0.620	0.291
2017	0.150	–	0.558	0.865	0.278	0.297	0.266
2018	0.132	0.558	–	0.645	0.439	0.484	0.515
2019	0.041	0.865	0.645	–	0.240	0.273	0.248
2020	0.641	0.278	0.439	0.240	–	0.968	0.755
2021	0.620	0.297	0.484	0.273	0.968	–	0.815
2022	0.291	0.266	0.515	0.248	0.755	0.815	–

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 45 – H2b Multi-group Analysis – Differences & p-values (Size → IT Hiring)

	2016	2017	2018	2019	2020	2021	2022
	<i>Differences</i>						
2016	–	-0.003	0.034	0.062	0.046	-0.058	0.043
2017	0.003	–	0.038	0.066	0.050	-0.055	0.046
2018	-0.034	-0.038	–	0.028	0.012	-0.092	0.008
2019	-0.062	-0.066	-0.028	–	-0.016	-0.012	-0.020

2020	-0.046	-0.050	-0.012	0.016	–	-0.104	-0.004
2021	0.058	0.055	0.092	0.012	0.104	–	0.101
2022	-0.043	-0.046	-0.008	0.020	0.004	-0.101	–
	<i>p-values</i>						
2016	–	0.955	0.702	0.820	0.685	0.841	0.679
2017	0.955	–	0.757	0.795	0.748	0.820	0.758
2018	0.702	0.757	–	0.851	0.979	0.636	0.940
2019	0.820	0.795	0.851	–	0.880	0.673	0.869
2020	0.685	0.748	0.979	0.880	–	0.607	0.966
2021	0.841	0.820	0.636	0.673	0.607	–	0.616
2022	0.679	0.758	0.940	0.869	0.966	0.616	–

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 46 – H2c Multi-group Analysis – Differences & p-values (Size → IT Infrastructure)

	2016	2017	2018	2019	2020	2021	2022
	<i>Differences</i>						
2016	–	-0.118	-0.129	-0.212	-0.137	-0.155	-0.156
2017	0.118	–	-0.011	-0.094	-0.018	-0.037	-0.038
2018	0.129	0.011	–	-0.083	-0.007	-0.026	-0.027
2019	0.212	0.094	0.083	–	0.075	0.057	0.056
2020	0.137	0.018	0.007	-0.075	–	-0.019	-0.020
2021	0.155	0.037	0.026	-0.057	0.019	–	-0.001
2022	0.156	0.038	0.027	-0.056	0.020	0.001	–
	<i>p-values</i>						
2016	–	0.265	0.202	0.061	0.173	0.292	0.095
2017	0.265	–	0.794	0.325	0.798	0.361	0.581
2018	0.202	0.794	–	0.468	0.985	0.415	0.803
2019	0.061	0.325	0.468	–	0.442	0.759	0.578
2020	0.173	0.798	0.985	0.442	–	0.401	0.775
2021	0.292	0.361	0.415	0.759	0.401	–	0.449
2022	0.095	0.581	0.803	0.578	0.775	0.449	–

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 47 – H2d Multi-group Analysis – Differences & p-values (Size → IT Priorities)

4.5.3 Multi-Group Analysis: Hypothesis 3

Hypothesis 3 stated that CIO position significantly mediates the relationship between IT strategy and IT challenges. Firstly, confirmatory factor analysis in Table 40 was conducted to confirm the reliability and validity of the constructs. One item (STRA3) of IT strategy had very low factor loadings in years 2017 and 2018. Results from PLS-SEM analysis and Sobel test indicated that CIO position did not mediate the relationship between IT strategy and IT challenges ($p > 0.05$). Overall the reliability and validity, except for IT strategy, met the acceptable threshold level as suggested by Hair et al. (2017). Multi-group comparison analysis indicated that there were no significant differences in the indirect effects of CIO position in relationship between IT strategy and IT challenges in any year ($p > 0.05$) (Table 41).

	2016	2017	2018	2019	2020	2021	2022
<i>Standardized Factor Loadings</i>							
IT Strategy							
STRA2	0.685	0.975	0.877	0.888	0.743	0.932	0.996
STRA3	0.764	-0.375	-0.399	0.534	0.748	0.392	0.098
CIO Position							
CPOS3	0.518	0.609	0.635	0.535	0.763	0.398	0.939
CPOS4	0.624	0.714	0.594	0.531	0.442	-0.762	0.411
CPOS5	0.744	0.812	0.541	0.526	0.763	0.350	0.544
IT Challenges							
CHAL1	0.570	0.391	0.460	0.641	0.457	0.516	0.490
CHAL2	0.521	0.673	0.076	0.532	0.681	0.547	0.233
CHAL4	0.514	0.786	0.125	0.453	0.615	0.435	0.299
CHAL5	0.523	0.679	0.385	0.625	0.612	0.540	0.494
CHAL6	0.556	0.543	0.413	0.631	0.114	0.702	0.500
CHAL7	0.601	0.421	0.404	0.453	0.333	0.642	0.588
CHAL9	0.421	0.375	0.405	0.538	0.715	0.563	0.147
CHAL11	0.735	0.582	0.636	0.852	0.747	0.748	0.735
CHAL13	0.495	0.446	0.482	0.495	0.357	0.534	0.536
CHAL14	0.552	0.101	0.634	0.512	0.410	0.557	0.425
CHAL18	0.606	0.583	0.050	0.612	0.180	0.585	0.232
CHAL19	0.733	0.774	0.546	0.623	0.739	0.682	0.620

	2016	2017	2018	2019	2020	2021	2022
CHAL20	0.815	0.788	0.458	0.685	0.573	0.680	0.557
CHAL21	0.666	0.426	0.646	0.456	0.672	0.712	0.716
<i>Composite Reliability</i>							
IT Strategy	0.102	0.311	0.167	0.235	0.201	0.060	0.008
CIO Position	0.275	0.530	0.274	0.352	0.415	0.545	0.504
IT Challenges	0.864	0.842	0.804	0.858	0.875	0.875	0.835
<i>Average Variances Extracted</i>							
IT Strategy	0.527	0.537	0.464	0.534	0.556	0.511	0.500
CIO Position	0.404	0.513	0.350	0.462	0.442	0.287	0.449
IT Challenges	0.363	0.328	0.203	0.395	0.305	0.371	0.251
<i>Hypothesis Testing – Direct Effects</i>							
IT Strategy → CIO Position (a)	0.254 (0.001)	0.063 (0.759)	0.251 (0.372)	0.363 (0.072)	0.275 (0.045)	0.142 (0.521)	0.304 (0.013)
CIO Position → IT Challenges (b)	0.150 (0.104)	0.260 (0.138)	0.420 (0.688)	-0.140 (0.611)	0.122 (0.672)	0.060 (0.786)	0.216 (0.321)
IT Strategy → IT Challenges (c')	0.315 (<.001)	-0.205 (0.495)	0.099 (0.331)	0.482 (0.023)	0.160 (0.488)	0.327 (0.036)	0.246 (0.440)
<i>Hypothesis Testing – Indirect Effects</i>							
IT Strategy → CIO Position → IT Challenges	0.038 (0.204)	0.016 (0.780)	0.105 (0.432)	-0.051 (0.624)	0.033 (0.694)	0.009 (0.868)	0.066 (0.370)
Sobel test	1.453 (0.146)	0.237 (0.812)	0.657 (0.511)	-0.491 (0.623)	0.416 (0.678)	0.248 (0.804)	0.920 (0.358)
R ²	0.146	0.102	0.199	0.101	0.050	0.117	0.138
f ²	0.026	0.076	0.189	0.156	0.016	0.007	0.050

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 48 – H3 Standardized Factor Loadings, CR, AVE, Hypothesis Testing, R², f²

	2016	2017	2018	2019	2020	2021	2022
<i>Differences</i>							
2016	–	0.022	-0.067	0.020	0.005	0.030	-0.028
2017	-0.022	–	-0.089	0.030	-0.017	0.008	-0.049
2018	0.067	0.089	–	0.010	0.072	0.097	0.040
2019	-0.020	-0.030	-0.010	–	0.012	0.021	0.015

	2016	2017	2018	2019	2020	2021	2022
2020	-0.005	0.017	-0.072	-0.012	–	0.025	-0.032
2021	-0.030	-0.008	-0.097	-0.021	-0.025	–	-0.057
2022	0.028	0.049	-0.040	-0.015	0.032	0.057	–
	<i>p-values</i>						
2016	–	0.753	0.684	0.762	0.951	0.589	0.623
2017	0.753	–	0.596	0.695	0.837	0.914	0.556
2018	0.684	0.596	–	0.895	0.666	0.567	0.793
2019	0.762	0.695	0.895	–	0.888	0.877	0.855
2020	0.951	0.837	0.666	0.888	–	0.774	0.777
2021	0.589	0.914	0.567	0.877	0.774	–	0.479
2022	0.623	0.556	0.793	0.855	0.777	0.479	–

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 49 – H3 Multi-group Analysis – Differences & p -values (IT Strategy → CIO Position → IT Challenges)

4.5.4 Multi-Group Analysis: Hypothesis 4

Hypothesis 4 stated that IT challenges significantly mediates the relationship between CIO position and IT priorities. Firstly, confirmatory factor analysis in Table 42 was conducted to confirm the reliability and validity of the constructs. One item (CPOS3) of CIO position had very low factor loadings in years 2018 and 2020. However, overall CIO position had acceptable level of composite reliability in years 2017, 2019, 2020, 2021, and 2022. The remaining variables also had an acceptable level of reliability and validity as suggested by Hair et al. (2017). Results from PLS-SEM analysis and Sobel test indicated that IT challenges mediated the relationship between CIO position and IT priorities in year 2016 ($p < 0.05$). Multi-group comparison analysis indicated that there were no significant differences in the indirect effects of IT challenges in relationship between CIO position and IT priorities in any year ($p > 0.05$) (Table 43).

	2016	2017	2018	2019	2020	2021	2022
	<i>Standardized Factor Loadings</i>						
IT Priorities							
PRI01	0.530	0.467	0.381	0.381	0.559	0.616	0.426
PRI02	0.683	0.603	0.498	0.603	0.630	0.549	0.586
PRI03	0.633	0.611	0.499	0.499	0.591	0.551	0.595

	2016	2017	2018	2019	2020	2021	2022
PRIO4	0.740	0.620	0.588	0.740	0.645	0.612	0.534
PRIO5	0.529	0.426	0.436	0.461	0.247	0.472	0.556
PRIO6	0.447	0.383	0.547	0.581	0.310	0.528	0.479
PRIO11	0.555	0.566	0.497	0.555	0.515	0.481	0.343
PRIO12	0.453	0.595	0.680	0.595	0.495	0.382	0.491
PRIO14	0.676	0.613	0.500	0.500	0.676	0.334	0.456
PRIO15	0.619	0.663	0.707	0.707	0.597	0.686	0.701
PRIO16	0.425	0.527	0.547	0.527	0.614	0.513	0.489
PRIO18	0.613	0.518	0.644	0.555	0.729	0.755	0.505
<i>CIO Position</i>							
CPOS3	0.371	0.699	-0.343	0.362	-0.205	0.663	0.968
CPOS4	0.665	0.604	0.904	0.940	0.256	0.844	0.402
CPOS5	0.776	0.816	0.238	0.653	0.900	0.529	0.456
<i>IT Challenges</i>							
CHAL1	0.518	0.402	0.383	0.523	0.455	0.536	0.384
CHAL2	0.576	0.611	0.274	0.552	0.727	0.587	0.463
CHAL3	0.622	0.500	0.408	0.452	0.601	0.445	0.590
CHAL4	0.595	0.674	0.574	0.652	0.781	0.552	0.574
CHAL5	0.608	0.737	0.635	0.663	0.630	0.606	0.589
CHAL6	0.560	0.626	0.516	0.562	0.485	0.759	0.625
CHAL7	0.595	0.591	0.561	0.854	0.593	0.689	0.624
CHAL9	0.499	0.358	0.542	0.568	0.626	0.572	0.434
CHAL11	0.701	0.586	0.490	0.859	0.691	0.679	0.597
CHAL13	0.448	0.524	0.502	0.756	0.601	0.512	0.606
CHAL14	0.519	0.331	0.524	0.597	0.471	0.467	0.480
CHAL18	0.628	0.574	0.514	0.415	0.490	0.586	0.522
CHAL19	0.721	0.675	0.628	0.685	0.713	0.653	0.510
CHAL20	0.789	0.726	0.715	0.785	0.726	0.733	0.725
CHAL21	0.649	0.453	0.501	0.665	0.505	0.612	0.684
<i>Composite Reliability</i>							
IT Priorities	0.821	0.795	0.791	0.795	0.803	0.782	0.750
CIO Position	0.275	0.530	0.274	0.562	0.415	0.545	0.504
IT Challenges	0.873	0.845	0.810	0.863	0.878	0.874	0.846
<i>Average Variances Extracted</i>							

	2016	2017	2018	2019	2020	2021	2022
IT Priorities	0.340	0.309	0.304	0.366	0.322	0.304	0.271
CIO Position	0.394	0.507	0.330	0.352	0.306	0.477	0.436
IT Challenges	0.367	0.326	0.279	0.365	0.378	0.367	0.322
<i>Hypothesis Testing – Direct Effects</i>							
CIO Position → IT Challenges (a)	0.206 (0.040)	0.228 (0.264)	-0.179 (0.496)	0.071 (0.740)	0.215 (0.364)	-0.018 (0.919)	0.146 (0.330)
IT Challenges → IT Priorities (b)	0.779 ($< .001$)	0.588 ($< .001$)	0.718 ($< .001$)	0.714 ($< .001$)	0.713 ($< .001$)	0.707 ($< .001$)	0.725 ($< .001$)
CIO Position → IT Priorities (c)	-0.035 (0.475)	-0.135 (0.264)	-0.044 (0.697)	-0.093 (0.433)	-0.074 (0.567)	-0.179 (0.078)	-0.091 (0.311)
<i>Hypothesis Testing – Indirect Effects</i>							
CIO Position → IT Challenges → IT Priorities	0.160* (0.042)	0.134 (0.212)	-0.129 (0.523)	0.051 (0.758)	0.153 (0.372)	-0.013 (0.922)	0.106 (0.343)
Sobel test	2.052* (0.040)	1.305 (0.192)	-0.677 (0.498)	0.330 (0.741)	0.905 (0.366)	-0.102 (0.919)	0.972 (0.331)
R ²	0.042	0.327	0.532	0.327	0.488	0.536	0.512
f ²	1.468	0.485	1.057	0.585	0.941	1.074	1.048

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 50 – H4 Standardized Factor Loadings, CR, AVE, Hypothesis Testing, R², f²

	2016	2017	2018	2019	2020	2021	2022
<i>Differences</i>							
2016	–	0.026	0.289	0.251	0.007	0.173	0.054
2017	-0.026	–	0.263	0.243	-0.020	0.147	0.028
2018	-0.289	-0.263	–	-0.256	-0.282	-0.116	-0.235
2019	-0.251	-0.243	0.256	–	0.256	0.102	0.002
2020	-0.007	0.020	0.282	-0.256	–	0.166	0.048
2021	-0.173	-0.147	0.116	-0.102	-0.166	–	-0.119
2022	-0.054	-0.028	0.235	-0.002	-0.048	0.119	–
<i>p-values</i>							
2016	–	0.858	0.202	0.198	0.880	0.287	0.711
2017	0.858	–	0.280	0.279	0.829	0.396	0.866
2018	0.202	0.280	–	0.256	0.302	0.653	0.338

	2016	2017	2018	2019	2020	2021	2022
2019	0.198	0.279	0.256	–	0.880	0.456	0.956
2020	0.880	0.829	0.302	0.880	–	0.460	0.735
2021	0.287	0.396	0.653	0.456	0.460	–	0.492
2022	0.711	0.866	0.338	0.956	0.735	0.492	–

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 51 – H4 Multi-group Analysis – Differences & p-values (CIO Position → IT Challenges → IT Priorities)

4.5.5 Multi-Group Analysis: Hypothesis 5

Hypothesis 5 stated that IT priorities significantly mediates the relationship between IT spending and IT hiring. Firstly, confirmatory factor analysis in Table 44 was conducted to confirm the reliability and validity of the constructs. A few items of IT spending, IT priorities, and IT hiring had standardized factor loadings lower than 0.40, but overall, all variables had acceptable level of composite reliability in all years, as suggested by Hair et al. (2017). Only IT spending had an acceptable level of convergent validity as suggested by Hair et al. (2017). Results from PLS-SEM analysis and Sobel test indicated that IT priorities did not mediate the relationship between IT spending and IT hiring in any year ($p > 0.05$). Multi-group comparison analysis indicated that there was no significant differences in the indirect effects of IT challenges in relationship between IT spending and IT hiring in any year ($p > 0.05$) (Table 45).

	2016	2017	2018	2019	2020	2021	2022
<i>Standardized Factor Loadings</i>							
IT Priorities							
PRI01	0.429	0.065	0.284	0.275	0.445	0.359	0.373
PRI02	0.571	0.515	0.394	0.332	0.642	0.606	0.447
PRI03	0.524	0.409	0.313	0.365	0.640	0.700	0.439
PRI04	0.693	0.332	0.484	0.331	0.606	0.091	0.298
PRI05	0.507	0.481	0.374	0.621	0.278	0.262	0.535
PRI06	0.602	0.830	0.739	0.351	0.440	0.172	0.754
PRI011	0.485	0.296	0.409	0.533	0.464	0.519	0.371
PRI012	0.556	0.612	0.750	0.705	0.456	0.494	0.411
PRI014	0.669	0.409	0.418	0.208	0.640	-0.440	0.152
PRI015	0.609	0.466	0.541	0.498	0.584	0.578	0.639

	2016	2017	2018	2019	2020	2021	2022
PRIO16	0.408	0.484	0.619	0.299	0.672	0.218	0.329
PRIO18	0.634	0.408	0.658	0.702	0.686	0.297	0.594
<i>IT Spending</i>							
SPEN1_rec	0.853	0.934	0.962	0.919	0.939	0.918	0.963
SPEN2_rec_r	0.920	0.796	0.716	0.803	0.480	0.520	0.864
SPEN3_rec_r	0.242	0.465	0.634	0.536	0.853	0.880	0.601
<i>IT Hiring</i>							
HIRE1	0.594	0.730	0.636	0.669	0.669	0.068	0.751
HIRE2	0.504	0.423	0.504	0.426	0.749	0.293	0.533
HIRE3	0.588	0.741	0.741	0.558	0.719	0.085	0.490
HIRE4	0.646	0.836	0.804	0.669	0.689	0.133	0.749
HIRE5	0.545	0.245	0.478	0.549	0.551	0.535	0.511
HIRE6	0.619	0.480	0.584	0.573	0.661	0.520	0.636
HIRE7	0.455	0.085	0.072	0.531	0.615	0.587	0.183
HIRE8	0.460	0.270	0.278	0.507	0.636	0.632	0.324
HIRE9	0.774	0.582	0.423	0.625	0.621	0.688	0.652
HIRE10	0.589	0.308	0.228	0.741	0.684	0.829	0.411
HIRE11	0.722	0.702	0.653	0.863	0.707	0.363	0.643
HIRE12	0.654	0.393	0.438	0.552	0.545	0.792	0.495
<i>Composite Reliability</i>							
IT Priorities	0.821	0.795	0.791	0.699	0.803	0.782	0.750
IT Spending	0.657	0.632	0.676	0.672	0.725	0.729	0.758
IT Hiring	0.842	0.795	0.793	0.848	0.881	0.829	0.820
<i>Average Variances Extracted</i>							
IT Priorities	0.318	0.226	0.272	0.216	0.313	0.189	0.223
IT Spending	0.544	0.574	0.613	0.593	0.614	0.629	0.678
IT Hiring	0.364	0.284	0.280	0.379	0.431	0.278	0.309
<i>Hypothesis Testing – Direct Effects</i>							
IT Spending → IT	-0.200	-0.161	-0.202	-0.186	-0.093	-0.459	-0.318
Priorities (a)	(0.209)	(0.272)	(0.507)	(0.300)	(0.630)	(0.222)	(0.034)
IT Priorities → IT Hiring	0.403	0.418	0.428	0.541	0.267	-0.059	0.270
(b)	(< .001)	(0.251)	(0.003)	(< .001)	(0.127)	(0.841)	(0.207)
IT Spending → IT Hiring	-0.013	-0.085	-0.094	-0.149	-0.171	0.364	-0.093
(c')	(0.900)	(0.756)	(0.672)	(0.227)	(0.375)	(0.306)	(0.411)

	2016	2017	2018	2019	2020	2021	2022
<i>Hypothesis Testing – Indirect Effects</i>							
IT Spending → IT Priorities → IT Hiring	-0.081 (0.248)	-0.036 (0.738)	-0.086 (0.546)	-0.101 (0.362)	-0.025 (0.731)	0.027 (0.837)	-0.086 (0.212)
Sobel test	-1.234 (0.217)	-0.298 (0.765)	-0.649 (0.517)	-1.015 (0.310)	-0.460 (0.646)	0.198 (0.843)	-1.084 (0.278)
R ²	0.170	0.210	0.227	0.346	0.109	0.152	0.096
f ²	0.191	0.216	0.232	0.428	0.079	0.006	0.070

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 52 – H5 Standardized Factor Loadings, CR, AVE, Hypothesis Testing, R², f²

	2016	2017	2018	2019	2020	2021	2022
<i>Differences</i>							
2016	–	-0.045	0.006	0.020	-0.056	-0.108	0.005
2017	0.045	–	0.051	0.065	-0.011	-0.063	0.050
2018	-0.006	-0.051	–	0.014	-0.062	-0.113	-0.000
2019	-0.020	-0.065	-0.014	–	-0.076	-0.128	-0.015
2020	0.056	0.011	0.062	0.076	–	-0.052	0.061
2021	0.108	0.063	0.113	0.128	0.052	–	0.113
2022	-0.005	-0.050	0.000	0.015	-0.061	-0.113	–
<i>p-values</i>							
2016	–	0.692	0.756	0.850	0.465	0.512	0.965
2017	0.692	–	0.678	0.629	0.854	0.727	0.688
2018	0.756	0.678	–	0.937	0.618	0.531	0.781
2019	0.850	0.629	0.937	–	0.451	0.458	0.856
2020	0.465	0.854	0.618	0.451	–	0.771	0.438
2021	0.512	0.727	0.531	0.458	0.771	–	0.501
2022	0.965	0.688	0.781	0.856	0.438	0.501	–

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 53 – H5 Multi-group Analysis – Differences & p-values (IT Spending → IT Priorities → IT Hiring)

4.5.6 Multi-Group Analysis: Hypothesis 6

Hypothesis 6 stated that IT spending significantly mediates the relationship between IT strategy and IT priorities. Firstly, confirmatory factor analysis in Table 46 was conducted to confirm the reliability and validity of the constructs. Some items of IT priorities had standardized factor loadings lower than 0.40 in year 2017 and 2018. However, overall all variables, except for IT strategy, had acceptable level of composite reliability in all years, as suggested by Hair et al. (2017). Only IT strategy and IT spending had an acceptable level of convergent validity as suggested by Hair et al. (2017). Results from PLS-SEM analysis and Sobel test indicated that IT spending did not mediate the relationship between IT strategy and IT priorities in any year ($p > 0.05$). Multi-group comparison analysis indicated that there was no significant differences in the indirect effects of IT spending in relationship between IT strategy and IT priorities in any year ($p > 0.05$) (Table 47).

	2016	2017	2018	2019	2020	2021	2022
<i>Standardized Factor Loadings</i>							
IT Priorities							
PRI01	0.368	-0.291	0.039	0.259	0.473	0.541	0.366
PRI02	0.613	0.022	0.072	0.586	0.638	0.587	0.437
PRI03	0.589	0.141	-0.037	0.552	0.645	0.599	0.432
PRI04	0.719	-0.216	-0.022	0.547	0.507	0.492	0.397
PRI05	0.470	0.603	0.222	0.277	0.221	0.424	0.598
PRI06	0.504	0.471	0.664	0.504	0.475	0.517	0.699
PRI011	0.424	-0.103	0.173	0.401	0.393	0.511	0.353
PRI012	0.574	0.377	0.649	0.437	0.414	0.472	0.463
PRI014	0.652	-0.337	0.026	0.366	0.612	0.173	0.167
PRI015	0.671	0.035	0.425	0.689	0.672	0.755	0.650
PRI016	0.516	0.332	0.726	0.232	0.646	0.582	0.355
PRI018	0.531	0.300	0.529	0.600	0.654	0.684	0.625
IT Spending							
SPEN1_rec	0.952	0.904	0.928	0.956	0.969	0.908	0.964
SPEN2_rec_r	0.797	0.442	0.695	0.682	0.763	0.486	0.853
SPEN3_rec_r	0.485	0.826	0.700	0.667	0.644	0.895	0.621
IT Strategy							

	2016	2017	2018	2019	2020	2021	2022
STRA2	0.716	0.676	0.995	0.577	0.724	0.980	0.883
STRA3	0.736	0.639	0.194	0.781	0.766	0.232	0.466
<i>Composite Reliability</i>							
IT Priorities	0.821	0.795	0.791	0.699	0.803	0.782	0.750
IT Spending	0.657	0.632	0.676	0.672	0.725	0.729	0.758
IT Strategy	0.102	-0.311	0.167	-0.127	0.201	0.060	-0.008
<i>Average Variances Extracted</i>							
IT Priorities	0.315	0.100	0.161	0.227	0.298	0.298	0.235
IT Spending	0.592	0.565	0.612	0.608	0.645	0.620	0.680
IT Strategy	0.527	0.433	0.513	0.471	0.556	0.507	0.498
<i>Hypothesis Testing – Direct Effects</i>							
IT Strategy → IT Spending (a)	-0.231 (0.004)	-0.255 (0.067)	-0.199 (0.238)	-0.474 (< .001)	-0.211 (0.039)	0.158 (0.407)	-0.298 (< .001)
IT Spending → IT Priorities (b)	-0.110 (0.359)	-0.112 (0.691)	-0.462 (0.274)	0.010 (0.975)	-0.076 (0.743)	-0.313 (0.144)	-0.261 (0.133)
IT Spending → IT Priorities (c')	0.307 (< .001)	0.296 (0.328)	-0.313 (0.363)	0.396 (0.095)	0.160 (0.554)	0.346 (0.070)	0.168 (0.341)
<i>Hypothesis Testing – Indirect Effects</i>							
IT Strategy → IT Spending → IT Priorities	0.025 (0.380)	0.028 (0.734)	0.092 (0.433)	-0.005 (0.975)	0.016 (0.777)	-0.050 (0.428)	0.078 (0.180)
Sobel test	0.875 (0.382)	0.388 (0.698)	0.802 (0.423)	0.031 (0.975)	0.324 (0.746)	0.721 (0.471)	1.408 (0.159)
R ²	0.123	0.122	0.218	0.139	0.033	0.184	0.121
f ²	0.015	0.039	0.194	0.004	0.011	0.113	0.066

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 54 – H6 Standardized Factor Loadings, CR, AVE, Hypothesis Testing, R², f²

	2016	2017	2018	2019	2020	2021	2022
<i>Differences</i>							
2016	–	-0.003	-0.067	0.030	0.009	0.075	-0.052
2017	0.003	–	-0.064	0.033	0.012	0.078	-0.049
2018	0.067	0.064	–	0.097	0.076	0.142	0.014
2019	-0.030	-0.033	-0.097	–	-0.021	0.045	-0.082

	2016	2017	2018	2019	2020	2021	2022
2020	-0.009	-0.012	-0.076	0.021	–	0.066	-0.062
2021	-0.075	-0.078	-0.142	-0.045	-0.066	–	-0.127
2022	0.052	0.049	-0.014	0.082	0.062	0.127	–
	<i>p-values</i>						
2016	–	0.914	0.538	0.918	0.929	0.275	0.310
2017	0.914	–	0.619	0.886	0.878	0.455	0.621
2018	0.538	0.619	–	0.600	0.527	0.319	0.815
2019	0.918	0.886	0.600	–	0.959	0.720	0.622
2020	0.929	0.878	0.527	0.959	–	0.426	0.386
2021	0.275	0.455	0.319	0.720	0.426	–	0.138
2022	0.310	0.621	0.815	0.622	0.386	0.138	–

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 55 – H6 Multi-group Analysis – Differences & p-values (IT Strategy → IT Spending → IT Priorities)

4.5.7 Summary of Multi-year Comparison Analysis

Multi-year comparison analysis showed that there were no differences in either direct or indirect relationship between the variables at year-wise analysis. However, there was one significant difference: that is, year 2016 and 2019 had a significant difference in the relationship between organization size and IT hiring, whereby the impact was higher in year 2019 as compared to year 2016.

5 Discussion & Conclusion

5.1 Discussion

The study seeks to assess the factors impacting the alignment of digital transformation strategies, technology, and talent and determine the context in which the identified factors are most favorable for digital transformation. The factors are categorized as IT strategy, CIO position, and IT hiring priorities, each of which is covered in three objectives discussed below:

5.1.1 Impact of IT Strategy in Alignment of Digital Transformation Strategies, Technology, and Talent

The first objective was to assess impact of IT strategy in the alignment of digital transformation strategies, technology, and talent. With respect to this objective, the results show that IT strategy does not operate in isolation. Rather, it influences IT priorities through mediating mechanism of IT spending. Similarly, organizational size shapes how IT strategy is reflected in hiring, priorities, challenges, and infrastructure decisions. The dynamics of structural constraints and resources allocation act as a critical translation mechanism, converting strategic objectives into actionable priorities. As a result, business–technology–talent alignment can be achieved in a coherent way, which is one of the contribution of the study.

To achieve this objective, the study indicated that the larger organization size is, the more complex will be IT priorities ($\beta = 0.224$), IT challenges ($\beta = 0.195$), and IT hiring priorities ($\beta = 0.301$). The study findings are supported with the studies of Baham et al. (2017), Boštjančič & Slana (2018), Carranza et al. (2022), Ophoff & Miller (2019), Rajapathirana & Hui (2018), and Ullah (2020). Optimizing the organizational size or number of employees is necessary for the alignment of required workforce expertise to technological expertise available in the organization. For large corporation, new technologies are acquired to address IT challenges such as cybersecurity and data management due to their more extensive resources (Wang et al., 2018). Meanwhile, for SMEs,

new technologies can have better capability to enhance customer agility and adopt robust and fertile decision-making capabilities (Gutierrez et al., 2009; Atasoy et al., 2016). This example reflects that both number of employees and their expertise in handling technologies can better determine the complexity of IT challenges through the availability of resources. Making right technological choices is necessary to accelerate digital transformation, as IT investment decision is highly dependent on IT priorities set in the context of digital transformation and technological advancement (Salge et al., 2015). The primary goal of IT priorities to set the integration of new technological capabilities into products, services, business processes, and operations with innovation (Bharadwaj et al., 2013; Tallon, 2007). Firms set digital culture to select suitable candidates for digital transformation and then develop their skills to operate technology that is aligned with vision, management, and culture of the organization (Cabot & Gagnon, 2021). Employees are urged to share knowledge and foster continuous learning and innovation, which maintain competitiveness in technology-driven industries (Gilch and Sieweke, 2021). Hence, talent become a resource of a firm, which is directly associated with organizational size (Boštjančič & Slana, 2018). Reflecting on the variability in number of employees, organizational size identifies the talent management needs and preferences in IT department to leverage IT strategy with customized IT solutions (Mankasingh and Ramsoomair, 2017). Consequently, IT priorities are set that are entirely distinct for all three forms of organization i.e., small-, medium-, and large-organization and that are clearly brought up IT-business alignment (Bharadwaj et al., 2013). When those priorities are pursued through the implementation of business processes by higher number of and better employees, they face critical IT challenges which they can address through IT hiring strategies i.e., in-house and outsourcing (Bordonaba-Juste et al., 2012); Tambe & Hitt, 2012). Hence, the increase in organizational size enhances IT priorities, increases the frequency and complexity of IT infrastructure, and improves IT hiring priorities in the context of digital transformation. However, the large organization size is, the less scalable infrastructure will be ($\beta = -0.165$). The study finding is contradicted with the studies of Wang et al. (2018) and Sen et al. (2023), which found that larger firms acquire scalable IT infrastructure than smaller firms. With the continuous innovation and digitalization, the technological advancement requires lesser employees to operate them due to automation of technological processes. For instance, larger firms such as Amazon now rely on robots to perform repetitive tasks with low possibility of errors and

better productivity. On the other hand, SMEs have limited resources and capabilities to innovate processes through research and development (R&D). Instead, they rely on their employees to perform all the necessary operations for the business-technology alignment (Tallon, 2007). Hence, there is an inverse relationship between organizational size and IT infrastructure.

Additionally, higher IT spending is necessary for alignment for IT strategy with IT priorities (Sobel test = 3.352). This finding is consistent with the studies of Grant & Yeo (2018), Suarez et al. (2016), and Tan et al. (2017). The finding implied that IT strategy can be defined to establish IT priorities, which both together can determine the amount of IT budget being spent on the IT infrastructure and employees. Firms map IT process priorities in accordance with organizational goals, plan the IT objectives, set the IT priorities, and develop IT processes to achieve those IT priorities (Hanafi et al., 2020). For instance, if an organization plans to outsource certain infrastructure, IT department can spend their investment on outsourcing the technologies instead of purchasing the entire infrastructure. IT investments can generate positive returns when IT strategic planning can be aligned with IT priorities. It shows that IT investment decisions were formulated right to select the right infrastructure and right process to achieve the needed IT priorities within an organization.

5.1.2 Impact of CIO Position in Alignment of Digital Transformation Strategies, Technology, and Talent

The second objective was to assess whether CIO position influences the alignment of digital transformation strategies, technology, and talent. With respect to this objective, the results established that CIOs within their structural power shapes the identification and management of IT challenges. While addressing the IT challenges, they formulate IT priorities. Most importantly, IT strategy provides a guideline for CIOs to align IT priorities as a response of IT challenges. This indicates that the influence of the CIO position operates through mediated relationships within the IT function, rather than through effects on IT priorities alone. More specifically, the results show that the relationship between the CIO position and IT priorities is mediated by IT challenges, through the relationships from CIO position to IT challenges and from IT challenges to IT priorities.

To achieve this objective, the study indicated that firstly, higher CIO position is necessary for the alignment of IT strategy with IT challenges (Sobel test = 2.201). This finding is consistent with the studies of Newbold & Azua (2007), Tzabbar, Silverman, & Aharonson (2015), and Shao et al. (2016). This highlighted that CIOs play a vital role in digital transformation by designing IT strategy and addressing IT challenges by integrating new technologies into business processes, transmitting valuable knowledge, influencing organizational culture, and promoting innovation. Rethinking organizational innovation capabilities can help develop stronger CIO champion roles for the digital transformation (Montreuil et al., 2020). CIOs have the authority to design IT strategies that have aligned with IT resources and organizational goals. They are responsible for the effective management of IT infrastructure and implementation of IT strategies so that the needed change for the digital transformation can be applied. In the context of digital transformation, CIO makes informed digital business strategies that enhance their digital capabilities and technical expertise while reshaping talent management and recruitment (Bharadwaj et al. 2013; Peppard, 2011). Hence, CIOs design IT strategies to address the current IT challenges to bring digital transformation within the entire organization.

Secondly, higher IT challenges are necessary for alignment for CIO position with IT priorities (Sobel test = 4.432). This finding is consistent with the studies of Gerth & Peppard (2016), Rizzo (2018), Kraus et al. (2021), Jones et al. (2020), and Montreuil et al. (2020), which highlighted that CIO's competencies, experience, and champion roles supports them in addressing IT challenges, including IT governance, IT controls, limited resources, insufficient strategic planning, security and privacy issues, and a lack of skilled personnel. CIOs usually underwent four types of transitions, including startup CIO transition, turnaround CIO transition, realignment CIO transition, and success-sustaining CIO transition. Each of these transitions highlights how CIOs address different and complex IT challenges through setting IT priorities determined in conjunction of organizational strategies and business value (Gerth & Peppard, 2016). In doing so, CIOs also sets IT priorities, including uptime/ availability, customer satisfaction, value of IT to the business, help-desk performance, workforce reduction, and projects delivered on budget. All these priorities have commonly implemented to bring digital transformation within the entire organization.

5.1.3 Impact of IT Hiring Priorities in Alignment of Digital Transformation Strategies, Technology, and Talent

The third objective was to assess whether IT hiring priorities influence the alignment of digital transformation strategies, technology, and talent. For this objective, results indicate that IT strategy does not translate into IT hiring decisions on its own. Instead, the influence of IT strategy operates through IT priorities, which define the types of skills and capabilities required. IT spending then conditions how these priorities are implemented in actual hiring decisions, i.e., if the focus is on growth, priority is to acquire and implement innovative technologies. The contribution of this objective is to show that IT strategy affects IT hiring through mediated relationships, specifically from IT strategy to IT priorities, and from IT priorities and IT spending to IT hiring.

To achieve this objective, the study findings indicated that firstly, IT strategy directly influenced IT hiring ($\beta = 0.342$). This finding is consistent with the studies of Tafti, Mahmoudsalehi, and Amiri (2017) and Montero Guerra and Danvila-Del Valle (2024), which highlighted that digital transformation strategies also directly influence on talent management, including talent attraction, hiring, and retention. Any digitized firm or IT based firms drive the technological advancements to match well-defined IT strategy with IT hiring practices. The signal theory also supports the relationship between IT strategy and IT hiring, as it explains the asymmetric information raised from the implementation of IT strategies that creates signal for a firm to hire qualified people and escalate the process of digital transformation (Chapman & Webster, 2006; Dang et al., 2019).

From a different perspective, IT hiring was achieved by aligning IT spending with IT priorities that informed an effective alignment of digital transformation strategies, technology, and talent. In other words, higher IT priorities are necessary for alignment for IT spending with IT hiring (Sobel test = 3.825). This finding is consistent with the Five-Stage growth model and the studies of Chege et al. (2020), Kane et al. (2019), Kohnke (2017), and Wang et al. (2020), which also explained the way in which IT spending influence IT priorities, which then set the foundation of IT hiring. Although the results showed that there was a direct significant relationship between IT spending and IT priorities, IT hiring partially mediated the significant relationship between IT spending and IT priorities. IT spending determines the IT projects or purpose of IT projects that

receive a substantial amount of money. Based on that, IT priorities or goals can often set to direct IT department toward a certain strategy. Once IT strategies and IT priorities are set, IT hiring priorities are defined or set to recruit talent to support those IT strategies and IT priorities (Wang et al., 2020).

Overall, all hypotheses, except for the relationship between organization size and IT infrastructure, yielded positive results. Year-wise comparison analysis identified an inconsistency in significance of results (only a few significant results are obtained). For instance, in all years, IT strategies can have a direct significant impact on IT hiring, indicating the persistence of this relationship over the years. However, organizational size did not significantly influence IT challenges and IT infrastructure across the years. It is more likely possible that organizational size might be changed or challenges or infrastructure corresponding to IT department might not change in response to size due to weak linkage with human resources, as highlighted by Collings and Mellahi (2009) and Dang et al. (2019). This only contributes toward identifying the need of acquiring more employees to achieve the digital transformation. Among mediation analysis, IT challenges significantly mediated the relationship between CIO position and IT priorities in the first year i.e., 2016 only. Other than that, all mediation analyses showed insignificant relationships across years. Their insignificant relationships over the years confirmed that time is an influencing factor; rather, the relationships are aligned with the long-term goals of organization in which digital transformation requires long-term investment and brings long-term results across multiple years as the strategy unfold. Hence, it can be concluded that digital transformation can only be successful if alignment of digital transformation strategies, technology, and talent.

5.2 *Theoretical Implications*

The study has several theoretical implications: Firstly, the study contributes to the existing literature by assessing the alignment of talent, technology, and digital transformation strategies. It explains how organizations develop digital transformation strategies in cohesive to talent and technology, making them the essential building blocks of digital project effectiveness. It explains the successful ways by which rapid technological change simultaneously become successful when they are set in accordance to IT priorities, IT hiring and IT challenges.

Secondly, the study addresses the research gap by explaining the role of IT strategy, CIO position, and IT hiring priorities in promoting digital transformation. Digital transformation combines technological and human resources and direct them towards innovation and digital culture. By selecting suitable candidates for digital leadership and recruits, firms develop their technology and accordingly develop employees' skills and competences in order to gain a competitive edge. Hence, it promotes digital learning, digital innovation, and digital workplace in respond to challenges faced during digital transformation.

Thirdly, the study extended the application of the signal theory in the context of digital transformation. It elaborated how organizations attract, develop, and retain IT talents by conveying suitable signals and asymmetric information necessary for digital transformation. The study findings explained how organizations address IT challenges and challenges in IT hiring in the presence of asymmetric information and external pressures like economic sanctions and market saturations.

Fourthly, the study also contributes to the literature by elaborating the role of CIO position in digital transformation. The research provides a detailed explanation of CIO's responsibility, competencies, and occupational challenges that also constitutes the digital transformation process within an organization, regardless of their industries or organization size. It also explains how digital transformation changes the way a firm operates (organizational processes) and the way a firm do things around (organizational culture) in order to maintain digital vision.

Fifthly, the study also introduced the concept of IT governance as a challenge CIO face during digital transformation. Hence, the research not only consider the opportunities available to CIO due to the digital transformation but also threats or challenges face during that transformation. Such an in-depth assessment induces the firm for smooth and successful transition into digital innovation and digital culture.

Sixthly and lastly, the theoretical contributions also fit within the scope of the ongoing renewal of Strategic Information Systems (SIS) theories. including Business–Technology Alignment Theory and Scott Morton's framework, by emphasizing internal IT-level mechanisms. Traditional theories

such as Business-Technology Alignment continue to be an important reference in the IS discipline, as it provides a coherent map for executive policy development and deployment (Gerow et al., 2015; Luftman et al., 1993; Saldanha et al., 2020). However, the challenges of digital innovation and transformation create a “post-alignment” context where business and technology strategies are no longer simply aligned but increasingly intertwined. The challenge shifts toward strategy development and deployment and the ability of executives to maintain digital vision (Hund et al., 2021; Wu et al., 2021)

5.3 *Practical Implications*

The study findings provided several practical implications: Firstly, Chief Information Officers (CIOs) can utilize the study findings by implementing the framework designed for the successful implementation of digital transformation strategies. Organization can target digital transformation strategies from three different angles: IT Strategy, CIO position, and IT hiring priorities, each having its own significance. CIOs can utilize the study findings for focusing on specific areas among these three factors to maximize the underlying outcomes.

Secondly, all C-executives of the organization can utilize the findings to better plan digital strategies as per the actual strengths and weaknesses of an organization, as demonstrated by the talent and technology its personnel can manage. By implementing the significant relationship found by the study, organizations can also align the business and technology strategies in order to turn their opportunities into strengths and avoid their threats. Such alignment allows C-executives in successfully implementing digital innovation through the support of a capable cross-functional team with diverse skills and expertise.

Thirdly, from the human resources management (HRM) perspectives, the study findings elaborated how the optimal number of employees is necessary for Business-Technology alignment and digital transformation and hence, contributes towards identifying and enhancing IT hiring, IT priorities, IT infrastructure, and IT challenges. Such alignment would provide a roadmap for cohesive executive policy development and deployment and support in achieving digital vision.

Fourthly, the study provides a conceptual framework of how IT priorities and IT spending/ investments can be set in accordance with industry/ sector and its underlying external environment. Consequently, key IT priorities can be assigned to correct resources in order to develop new technologies and improve weak strategic IT areas. It also elaborated how C-executives can implement IT governance that is necessary for developing and maintaining right organizational culture, either clan and adhocracy organizational culture.

Fifthly, the study findings also help CIOs and other C-executives understand the coordination within and between talent management (TM), supply chain management (SCM), and information technology (IT) discipline. Such understanding provides a strategic restructuring and re-engineering towards digitalization that would help firms to reduce operating costs and achieve diversification, leading to a significant increase in profitability. It requires establishing policies at the corporate level, divisional level, and at functional level in order to recruit and retain a healthier, skilled, and experienced workforce within an organization.

Sixthly and lastly, educational institutions, practitioners and academician can utilize the study findings by incorporating those skills in their courses that are in demand and required by the organizational digital transformation. These institutions can offer advanced digital skills certifications such as Business Technology Management (BTM) in order to increase the academic and professional standards of their institutions and match talents with projects.

5.4 Limitations & Suggestions for Future Studies

The research has several limitations: Firstly, the study acquired the data from third-party source, which have collected data for unequal number of respondents over the course of seven years. Such inequality in sample size may cause inaccurate and inconsistent results, making it difficult to generalize the study findings over a long period of time. Future studies can directly collect the primary data from a larger pool of CIO respondents in a cross-sectional study.

Secondly, the study relied on the complex research instrument/ survey developed by IT World Canada. Although the survey was validated through numerous validity and reliability measures in the present study, it was a secondary source of data and not an established instrument. Future

studies can adopt this survey to apply in different contexts and settings in order to increase the generalizability of the study findings.

Thirdly, the study focused on the questionnaire or quantitative research design for the collection of data. A better approach to this research study assessing the alignment between technology, talent, and digital transformation strategies would be a qualitative or mixed research design. Within this research design, the study can conduct an interview from Chief Information Officers (CIOs) and inquire about the digital transformation strategies they employed and their influence on the firm's technologies, personnel, and other financing decisions.

Fourthly, the study primarily focused on digital transformation as a primary means of organizational innovation. However, there are other forms of innovations as well: Management or organization innovation (non-technological innovation), which focuses on new management practices, new marketing concepts, new corporate strategies, and new business models (Torres & Augusto, 2019). Furthermore, technological innovation also typically termed as process innovation and product innovation (Torres & Augusto, 2019). Future studies can conduct a detailed analysis of how digital transformation and organization innovation can jointly influence different aspects within departments of organization such as marketing, finance, IT, customer services, procurements, HR, administrative and other departments. A promising area of research would be the joint role of digital transformation and organizational innovation on organizational and employee outcomes in a service industry like financial sector or healthcare sector. Future studies can also be studied the underlying topic in the context of sustainability and corporate social responsibility.

Fifthly, the research instrument was only covered CIO position, IT strategy, IT spending priorities, IT challenges, IT infrastructure, IT priorities, and IT hiring. Furthermore, all the variables were measured on well-known categorical metrics. However, transformation strategies imply a greater dependency on the nature of the solution implemented and its business benefits. Hence, the way transformation is measured in our study limits slightly the extent of our interpretation. This can be overcome by improving the *Canadian CIO census* with a new section asking for more details on digital strategies and their business impact.

Sixthly, the study conducted the underlying topic of alignment between technology, talent, and digital transformation strategies in Canada. Future studies can be conducted in developing and developed countries in order to increase the generalizability of the study findings. Considering the economic and cultural differences across countries, such analysis can identify how the resulting market frictions and regulations that differs across countries would affect the digital transformation.

Seventhly, the results from year-wise comparison showed insignificant in some years. Such inconsistency shows discrepancy in opinion of CIOs surveyed over the years. One possible explanation would be the differences in economic conditions, differences in industries or sectors, or market fluctuations that may have caused inconsistent results over years. Future studies can conduct longitudinal research design with equal sample sizes to identify and explore the inconsistency in significance of relationships between variables under study over the years.

Eighthly, the current study solely operationalized talent through IT hiring indicators. Here, it seeks to investigate how right talent can be acquired to digitalize transformation over time. However, it should be considered that IT hiring is closely linked to skill development, training, and employee engagement as well, as once the employees are hired, their skills need to be developed and trained according to operational activities of business. This creates a gap for future research to extend the scope toward how digital transformation can influence skill development, training, and work engagement of employees and managers. Furthermore, IT hiring strategies can be adjusted for skill development, training, and work engagement in direction of digital transformation, which can also be evaluated in future research.

Lastly, the current study mainly focused on strategic and technological dimensions of digital transformation. The human and cultural dimensions of digital transformation were not measured or analyzed in the current study. For instance, the talent acquisition through employee adaptability, collaboration, and mindset could be achieved to intensify the success of digital transformation. However, adaptability, collaboration, and mindset cannot be quantified or assessed by inquiring employees or C-executives themselves. These attributes reflect in their behaviour or actions they perform to achieve successful digital transformation. Considering that behavioural dimensions of

digital transformation was not primary objective of the research, future research could conduct an experimental research design to explore changes in these behavioural attributes when technological advancement aligned with digital transformation are applied. Such analysis could give a better idea of talent management at employee and managerial level.

5.5 Conclusion

This study concludes that digital transformation success is fundamentally driven by the alignment of business, technology, and talent through concrete IT-level decision mechanisms. These mechanisms include how IT priorities are defined, how budgets and investments are allocated, how hiring decisions are structured, and how IT challenges are identified and managed. Ultimately, alignment is not achieved through strategy statements or leadership roles alone, but through a coherent and coordinated set of operational and strategic decisions enacted over time.

The study explained that if the organizations focus on acquiring talent that aligns with its IT strategies for digital transformation, they can succeed in digitalizing the operational and business processes in the right direction. Similarly, the role and responsibilities of CIO were made clear in this instance as well: CIO can strategize the next goals according to the current capabilities of the firm, prioritize those strategies, hire the qualified and relevant talent to execute the respective strategies, and decide and spend the investment for each strategic goals, and address the ongoing and arising challenges as the new strategies are being implemented. Setting IT hiring priorities and acquiring right talent can be very challenging, as it requires matching the current capabilities with the new capabilities of the firm and then directing them in the direction of organization's mission and vision. Acquiring right talent can bring down the cost and operational procedure of the firm requires a clear understanding of the firm's

The study's findings were supported with the signal theory, Business-Technology alignment theory, and Morton's Five-Force influencing the organization's objectives, which validated the sequential influence of IT strategy on IT hiring, IT priorities, IT spending, and IT challenges as well as the role of CIO position and organization size in maintaining the alignment between technology, business, and talent. The study's findings also validated the role of external

technological and socioeconomic environment, which determines how IT strategies are formed to gain competitive advantage or neutralize the competitive disadvantage. Consequently, CIO position not only determines key technological capabilities needed corresponding to external opportunities but also bringing necessary technological changes through IT challenges, IT priorities, IT spending, and IT hiring while aligning them to IT strategy. This research is a modest step toward fully understanding the role of IT and CIOs in digital transformation at the firm level and at the employee level.

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