Chief Information Officer and Organizational Agility: Exploring CIO Power and Demand-Side Leadership

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Abstract

Understanding how Chief Information Officers (CIOs) may help businesses to achieve information technologies (IT) enabled organizational agility has become increasingly important in the digital era. Previous research has emphasized the role of CIO in leading business transformation (i.e., CIO demand-side leadership), but little research has been performed to examine how CIOs can leverage IT to enable business transformation and promote organizational agility. This study develops a theoretical model by integrating literatures on IS leadership and executive power. Specifically, we conjecture that CIO demand-side leadership can promote organizational agility, and top management team's (TMT) strategic IS knowledge can enhance the positive impact of CIO demand-side leadership on organizational agility. Additionally, we emphasize that three sources of CIO executive power (structural power, expert power, and prestige power) are key factors that enhance CIO demand-side leadership. The empirical results of analyzing matched-pair CIO/TMT survey data from 321 organizations largely support our research hypotheses.

Keywords: Organizational agility, CIO, power, CIO demand-side leadership

1. Introduction

Over the past years, the increasing environmental turbulence resulting from unexpected events such as the global pandemic and geopolitical clashes has put greater pressure for businesses to leverage information technologies (IT) to achieve organizational agility (Zhang et al., 2021). In general, IT is believed to enhance an organization's perception and speed in responding to environmental turbulence, strengthen cross-departmental coordination and decision-making, and enable timely responses to external changes (Liang et al., 2017; Lu & Ramamurthy, 2011). Therefore, companies hope to improve organizational agility by increasing IT investments (Lu & Ramamurthy, 2011; Tallon et al., 2019).

As the highest-ranking official responsible for enterprise IT investment and operations, the Chief Information Officer (CIO) is expected by the business executives to lead IT-enabled business transformation through demand-side leadership, defined as the CIO's capacity to lead the company in exploring innovative IT empowerment and new strategic opportunities (Chen et al., 2010). Compared to the traditional view on CIO supply-side leadership (which describes how the CIO leads the IT function to ensure operational efficiency), CIO demand-side leadership has begun to receive more attention from scholars in the digital innovation era (Tumbas et al., 2018). Therefore, in the current business context where organizations are facing enormously emerging digital technologies such as cloud computing, big data, artificial intelligence, and blockchain, the first research question of this study is whether and how CIO demand-side leadership can promote organizational agility. Going further, we are also interested in exploring the antecedents to CIO demand-side leadership. Whereas structural power has been proven to help CIOs enhance demand-side leadership (Chen et al., 2010), the strategic management literature suggests that there exist other types of executive power, which are also important sources to empower enterprise leaders (Finkelstein, 1992). Therefore, the second question of this research is whether/what types of CIO power may enhance CIO demand-side leadership.

To address these research questions, we constructed a theoretical model by integrating literatures on IS leadership and executive power. Specifically, following the findings of extant IS leadership research (Chen et al., 2010; Preston & Karahanna, 2009; Zhang et al., 2021), we posit CIO demand-side leadership positively affects organizational agility, and top management team (TMT)'s strategic IS knowledge enhances the positive relationship between CIO demand-side leadership and

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organizational agility. Then, based on executive power literature (Finkelstein, 1992), we identify three key influencing factors of CIO demand-side leadership: CIO's structural power, expert power, and prestige power. The study collected 321 pairs of CIO-TMT questionnaires for hypothesis testing, and the data analyses results supported our research hypotheses, thereby providing empirical evidence for the influential roles of CIO power and demand-side leadership to organizational agility.

This article makes some theoretical contributions. First, it proposes and confirms the positive impact of CIO demand-side leadership on organizational agility and highlights the important role of TMT strategic IS knowledge to enhance the effects of CIO demand-side leadership, thereby offering theoretical explanations for how CIOs can lead enterprises to improve organizational agility via innovatively leveraging digital technologies. Second, extending prior literature on the importance of structural power, the study finds all three types of executive power may influence CIO demand-side leadership, providing new theoretical and practical guidance to understand how CIOs may reinforce their demand-side leadership. The research findings of the study also provide some useful practical implications for enterprise executives on how to support CIOs in their efforts to enhance organizational agility.

The rest of the article is organized as follows. In Section 2, we introduce the theoretical basis and provide literature review, elaborating the current research status of organizational agility, CIO demand-side leadership, and the executive power perspective. In Section 3, we present the hypotheses and the research model. In Section 4, we describe the research methodology, including questionnaire construction and data collection processes. In Section 5, we report the results of data analyses. Finally, we discuss the theoretical contributions and practical significance of the study.

2. Literature review and theoretical foundation

2.1 Organizational agility and CIO responsibilities

Prior IT strategic management literature emphasizes that IT is an important factor in improving organizational agility (Overby et al., 2006; Sambamurthy et al., 2003). Organizational agility refers to the ability of an organization to perceive and respond to competitors' moves and market demands in a timely manner (Overby et al., 2006). IT is recognized as a platform to help enterprises scan the environment, quickly perceive and collect data on changing customer needs and external environmental changes (Roberts & Grover, 2012; Tallon et al., 2019), and enable real-time cross-departmental knowledge sharing and collaboration, thereby promoting organizational agility (Liang et al., 2017).

As the highest-ranking official responsible for enterprise IT, the CIO is expected to help top business executives make appropriate strategic decisions using timely business intelligence generated by advanced IT (Bendig et al., 2022; Li et al., 2021), invest in and manage the right IT/IS to energize businesses to quickly innovate and adapt to the changing competitive environment (Lu & Ramamurthy, 2011), and lead IT-driven business transformation to allow enterprises to establish a leading edge in the fiercely competitive environment on a regular basis (Ravichandran, 2018). However, currently, there is still little research on how CIOs can leverage IT to enable business transformation and promote agility (Chen et al., 2010; Liang et al., 2017; Zhang et al., 2021).

2.2 CIO demand-side leadership

The IS leadership literature reveals CIOs should transition from traditional supply-side leaders (i.e., IT service providers) to more desirable demand-side leaders as business strategists (Chen et al., 2010). Empirical results further indicate that CIO demand-side leadership can not only improve the quality of IT systems and IT contributions to organizational performance (Chen et al., 2010), but strengthen the positive relationship between innovative IT strategies and business value creation as well (Chen et al., 2015).

Although scholars have recognized the importance of CIO demand-side leadership and the necessity for CIO role transition, there are few studies on how CIOs may enhance their demand-side leadership. Our comprehensive search on IS leadership literature shows that, at the time of this writing, Chen et al. (2010) is the only study that has identified three key factors influencing CIO leadership: CIO human capital, CIO structural power, and organizational support for IT. Among them, CIO structural power is the only factor receiving empirical support for its impact on CIO demand-side leadership. On the one hand, businesses expect their CIOs to lead digital innovations and transformations. On the other hand, many CIOs have been struggling to lead business transformations (Gerth & Peppard, 2016; Gonzalez et al., 2019). Therefore, in a turbulent digital era, there is an urgent need to further examine how

CIOs may be empowered to effectively assume the role of demand-side leader within the organization.

2.3 Executive Power

The strategic management literature suggests that the personal power of corporate executives is a key factor that influences organizational decision-making and behavior (Daily & Johnson, 1997; Finkelstein, 1992). Power can be defined as the ability to influence or act on other entities in a certain way, driving them to act or change in the direction of a particular intention (Finkelstein, 1992). As organizational leaders, executives exercise their power to set up a company's business strategy and influence organizational performance (Ferris et al., 2007). Therefore, power-related research has always been a sustainable topic in the field of strategic management for decades.

Structural power, expert power, and prestige power are important sources of executive power within an enterprise [1] (Finkelstein, 1992; Ke et al., 2021). Among them, structural power is the legitimate power an executive obtained based on an organization's formal structure and his/her hierarchal position, giving the leader the ability to directly influence and impact subordinates (Patel & Cooper, 2014); expert power is usually based on an individual's professional knowledge and skills, demonstrating his/her capacity to respond effectively to external environmental emergencies; prestige power is typically acquired through informal relationships and is based on one's abilities, reputation, and status. Managers with good reputations can often help enterprises gain more support and reduce the negative effects of external environmental uncertainty (Daily et al., 1997; Finkelstein, 1992). Organizational research has shown that executive power can be obtained through formal or informal interactions (Blagoeva et al., 2020). While most CIO studies emphasize the importance of a CIOs' formal or structural power (Bendig et al., 2022; Feng et al., 2021), recent literature has suggested that CIOs also need to increase their influence through informal activities such as issue selling and political interactions within the business (Chen et al., 2021; Zhang et al., 2021). In addition, professional knowledge and reputation are also important forces for CIOs to exert influence (Chen et al., 2021; Gerow et al., 2017; Preston & Karahanna, 2009). Therefore, we draw upon the perspective of executive power along with findings of prior IS leadership literature to study whether all three types of CIO power: structural power, expert power and prestige power, can enhance CIO demand-side leadership. In Appendix Table A1, we present the IS literature on studying CIO power.

3. Research hypotheses

3.1 CIO demand-side leadership and organizational agility

CIO demand-side leadership is identified as a CIO capability for exploring potential business innovation opportunities driven by IT (Benitez et al., 2022; Chen et al., 2010). We argue CIOs exhibiting strong demand-side leadership help companies quickly perceive and respond to market changes and business opportunities brought by a turbulent environment. First, CIOs with demand-side leadership have outstanding strategic foresight, which enables them to quickly identify opportunities for changes. Demand-side leadership means that CIOs pay more attention to the developmental trends of the most recent digital technologies such as natural language models, artificial intelligence, and big data (Bendig et al., 2022; Li et al., 2021). Demand-side leaders are also good at discovering new business opportunities driven by novel IT as well as building them into a vision for necessary changes (Chen et al., 2010; Chen et al., 2017). Second, a CIO with demand-side leadership can effectively carry out IT strategic planning and respond to potential business change opportunities in a timely manner. Demand-side leadership enables the CIO to persuade and educate business executives about the innovation opportunities as well as the potential strategic value brought by emerging digital technologies (Chen et al., 2021), help business functions clarify how to deeply integrate digital technologies with business processes and explore potential business innovations (Banker et al., 2022), and thus prepare companies to meet the constantly changing business needs promptly, thereby creating a competitive advantage in the marketplace. Third, a CIO with demand-side leadership is able to effectively lead and execute IT-enabled organizational changes and legalize change activities within the firm through successful institutionalization (AlNuaimi et al., 2022; Tumbas et al., 2018). CIOs with high demand-side leadership are the ones to encourage more IT innovation activities within the organization (Scuotto et al., 2022), shape a culture and working atmosphere that actively pursue innovation (Chen et al., 2017), and facilitate cross-departmental cooperation and

[1] The strategy literature also mentions a fourth source of power, ownership power. Because stockownership is more relevant to CEO, this paper focuses on the other three dimensions of CIO power base: structural power, expert power, and prestige power.

knowledge sharing within the company (Liang et al., 2017; Zhang et al., 2021), all of which help with enabling companies to quickly adapt to the constantly changing marketplace and perceive and respond to threats and opportunities in the environment. Therefore, we propose:

Hypothesis 1*: CIO demand-side leadership is positively associated with organizational agility.*

3.2 The moderating role of TMT strategic IS knowledge

The IS leadership literature highlights the role of TMT to strengthen the organizational impacts of CIOs (Karahanna and Preston, 2013). In particular, TMT's strategic IS knowledge is recognized instrumental to create mutual understanding between the CIOs and business executives (Preston and Karahanna 2009; Chen et al. 2021). Strategic IS knowledge entails such understandings as the potential and limitations of enterprise IT infrastructure, the IT strategic actions of market competitors, and the potential of emerging information technology for organizational business (Armstrong & Sambamurthy, 1999; Preston & Karahanna, 2009). The professional knowledge and skills of enterprise leaders can help guide companies to make the right decisions and actions, but very few CIOs have the same decision-making powers as the executive team (Chen et al., 2021; Li et al., 2021). Therefore, TMT with greater level of strategic IS knowledge will be an important role in supporting CIOs to drive organizational agility. First, TMT with strategic IS knowledge can keep up with the latest development trends of digital technologies, discover and assess emerging IT-driven opportunities for change, and better understand the strategic value of IT (Firk et al., 2022; Tipple et al., 2023; Yayla & Hu, 2014). Second, TMT with strategic IS knowledge understand the IT-specific terms used by CIOs and can translate them into business terms particularly relevant to the enterprise. They are important aid for CIOs to explain the business innovation opportunities brought by IT to other functional managers who do not have the right IT knowledge (Armstrong & Sambamurthy, 1999; Cheng et al., 2023), thereby helping the business to effectively formulate corresponding strategic plans and strengthen the close cooperation between the IT department and the business department (Liang et al., 2017). Finally, TMT with strategic IS knowledge can work with the CIO to set up the appropriate timing and level of IT investments, and oversee the enterprise-wide IT implementation led by the CIO (Turedi, 2020), enabling the CIO to more effectively play his/her role in achieving IT-driven organizational agility. Therefore, we propose:

Hypothesis 2*: TMT strategic IS knowledge positively moderates the impact of CIO demand-side leadership on organizational agility.*

3.3 CIO power and CIO demand-side leadership

CIO structural power refers to the power that a CIO possesses due to his/her formal structural position within the organization (Finkelstein, 1992; Ke et al., 2021). We suggest the greater the structural power a CIO possesses, the more likely the CIO can leverage his/her demand-side leadership (Chen et al., 2010). First, if the CIO becomes a member of the TMT or reports directly to the CEO, s/he has the formal authority to participate in major decision-making processes within the enterprise, which is conducive to the communication and interaction between the CIO and the rest of the TMT (Banker et al., 2011; Feng et al., 2021; Karahanna & Preston, 2013), allowing the CIO to convey and explain the vision and strategic value of IT to the TMT, and persuade the TMT to timely grasp novel and potential IT-driven business transformation opportunities (Chen et al., 2021; Chen et al., 2017). Second, structural power can increase the trust of the CEO and TMT in their CIO and enhance the organization's recognition of and the commitment to the IT-enabled business transformation plan (Chen et al., 2021). Greater structural power helps the CIO address issues such as funding requirements and multi-department collaborations needed for business innovation activities, and accelerates the enterprise's business transformation. Third, structural power can promote the CIO's strategic autonomy (Chen et al., 2017; Preston et al., 2008) and enable the CIO to become a more effective cross-border leader (Chen et al., 2010). As such, the CIO is more likely to obtain support and collaboration across the business departments. The CIO will also have more flexibility to allocate organizational resources needed for business transformation. Thus, we propose:

Hypothesis 3a*: CIO structural power is positively associated with CIO demand-side leadership.*

CIO expert power refers to the knowledge and skill level that a CIO possesses in his/her professional field and the ability to contribute to the organization (Finkelstein, 1992; Ke et al., 2021). Due to insufficient attention from top management to IT development trend as well as the cognitive gap (between business and IT executives) in IT investment returns, TMT may find it difficult to truly recognize the strategic transformation opportunities brought by IT (Masli et al., 2016; Tipple et al., 2023). CIOs with high-level of IT knowledge are seen by TMT as powerful strategic

leaders, who can endow IT with greater strategic value from both a technical and a strategic perspective (Bendig et al., 2022; Li et al., 2021), thereby helping with addressing the cognitive deficiencies of top management regarding IT. First, a knowledgeable CIO can explain to TMT from a technical perspective on how emerging IT can be applied to the firm's business areas, leading to a deep integration of IT and business processes. In addition, the CIO can also explain the business priority, opportunities, and needs of using IT more confidently (Bandodkar & Grover, 2022). Second, the CIO with expert power is also a strategic planner (Singh & Hess, 2017; Tumbas et al., 2018). The CIO can use enterprise-specific business terms or a common language among top executives to explain to TMT regarding how IT can improve business processes or reconstruct business models. The CIO can also use his/her expertise to better elucidate the strategic value of IT, i.e., how IT may help the business respond to environmental turmoil and capture emerging business opportunities (Banker et al., 2022; Chen et al., 2021), as well as help TMT properly envision how to promote IT-driven business transformations (Benitez et al., 2022; Scuotto et al., 2022), thereby making more rational decisions on IT investments for the enterprise. Therefore, the greater the CIO's expert power, the more likely the TMT is willing to consult with the CIO and invite the CIO to participate in strategic decision-making processes, expecting that the CIO can lead IT-enabled business transformation activities and better exert his/her demand-side leadership. Thus, we propose:

Hypothesis 3b*: CIO expert power is positively associated with CIO demand-side leadership.*

CIO prestige power refers to the reputation accumulated by a CIO within the organization and among stakeholders (Finkelstein, 1992; Ke et al., 2021). CIOs can develop their reputation by building relationships with important figures within and outside the organizations, and use their reputation to enhance their organizational status. On the one hand, CIOs who have established connections within the organization are more likely to engage in social activities easily (Karahanna & Preston, 2013; Preston & Karahanna, 2009). CIOs who are integrated into the TMT and accepted by the TMT are more likely to understand critical organizational issues, actions, and attitudes, gain relevant company information, and combine their knowledge to make judgments (Gerow et al., 2017; Zhang et al., 2021), thereby effectively impacting strategic decision-making. On the other hand, CIOs with a strong external relationship network are likely to make corporate executives believe that they are reliable and trustworthy (Daily et al., 1997; Finkelstein, 1992). CIOs with great reputation often establish strong external relationships with their peers in the industry, which can help businesses absorb valuable information and resources about more advanced technologies and business opportunities, and also obtain valuable information on competitors and the industry (Chen et al., 2022), thereby allowing their organizations to timely respond to external changes and mitigate potential negative impacts resulting from environmental uncertainties (Liu & Preston, 2021). In summary, a CIO with good reputation receive upright trust from top-level corporate executives. Accordingly, IT implementation proposals launched by the CIO are more likely to receive support from the senior management, allowing the CIO to better leverage his/her demand-side leadership. Therefore, we propose:

Hypothesis 3c*: CIO prestige power is positively associated with CIO demand-side leadership.*

In summary, the theoretical model of this study is shown in Figure 1.

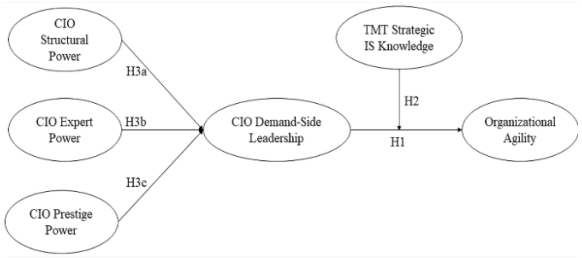

Figure 1. Theoretical Model

4. Research method

4.1 Questionnaire development

To validate our research model, we employed a matched-pair survey method to collect data from CIOs and top business executives through questionnaires. Using the paired data collection method allows us to customize measurement items best for each respondent's expertise, thereby reducing measurement bias (Karahanna and Preston 2013). Specifically, we developed the questionnaires using established measures from related literature sources. We operationalized organizational agility as a formative 2nd-order construct, consisting of two 1st-order dimensions (sensing and responding agility) reflected by multi-item five-point Likert scales. To ensure questionnaire validity, we followed three steps. First, we invited three experienced CIOs to evaluate the language of the items for content validity. After receiving their assessments, we modified the questionnaires to incorporate the feedback. Second, we carried out an item-sorting exercise to qualitatively evaluate the discriminant validity of each construct

measured. Finally, we statistically assessed the psychometric properties of the scales using the survey data.

To reduce potential self-reporting bias, we followed prior matched-pair survey practices in IS literature. Accordingly, we chose appropriate respondents based on their domain knowledge to assess measurement items. CIOs were asked to evaluate their own structural power, expert power, and prestige power. Moreover, we asked them to evaluate the TMT strategic IS knowledge. Business executives were requested to assess CIO demand-side leadership and organizational agility. Table A2 in Appendix summarizes the measures, literature sources, and informants for each construct. In addition, we identified several control variables in our research model, including industry type, ownership type, organization size and IT budget.

4.2 Survey distribution and data collection

We utilized two parallel data collection approaches in China to overcome the difficulties and enhance the quality of matched-pair data collected from top executives. First, we sought the contact information of top-level business executives by collaborating with five leading Chinese universities' Executive MBA (EMBA) programs. Second, we partnered with a CIO Association composed mostly of CIOs and senior IT managers to tap their member network. Subsequently, we extended an invitation to complete online questionnaires to business executives from the EMBA programs, CIOs and IT leaders from the CIO Association. The targeted respondents were then asked to invite their respective CIOs or business executives to participate in completing the requisite questionnaires. All single-source and incomplete questionnaires, together with those from business managers who were not actively part of their corporate TMT, were eliminated. Ultimately, we were able to acquire matched responses from CIOs and business executives from 321 organizations, representing diverse industries, sizes, and ownership types. Table A3 in Appendix provides a summary of the respondents' and their organizations' characteristics.

5. Data analysis and results

5.1 Measurement model

We assessed the measurement items' validity and reliability for each construct (Chin, 1998). To assess the items' reliability, we used composite reliability (CR) and Cronbach's alpha coefficients (CA), which are typically acceptable if they exceed 0.70. Table A4 in Appendix depicts that both CA and CR are above 0.80, indicating satisfactory reliability. Furthermore, the square roots of each construct's average variance extracted (AVE) are higher than their correlations with any other constructs, indicating acceptable discriminant validity.

We also examined the presence of common method variance (CMV) in our measurement model. CMV does not seem to be a significant concern in our study after validation. In particular, our study had different respondents, thereby minimizing potential CMV (Karahanna and Preston 2013). In addition, we conducted two tests to ascertain the CMV effect's influence. The results of Harman's one-factor test and full collinearity test indicate that common method bias was not an issue.

5.2 Hypotheses testing

The OLS regression results for hypotheses testing are presented in Table 1. The dependent variable for Models 2 to 5 is CIO demand-side leadership, while Model 1 only contains control variables. We separately added three independent variables in Models 2 to 4, i.e., CIO structural power, expert power, and prestige power. The findings revealed that each of the three types of CIO executive power has a significant impact on CIO demand-side leadership. In Model 5, we included all three types of CIO power to evaluate their collective impact on CIO demand-side leadership. The results once again indicated a positive impact. Furthermore, Model 5 accounted for 16.7% of the variance in CIO demand-side leadership, substantiating H3a, H3b, and H3c.

Table 1. Regression Results

	CIO Demand-Side Leadership					Agility			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
STP		0.196***			0.147***				
		(3.55)			(2.62)				
EXP			0.239***		0.131**				
			(4.22)		(1.98)				
PRP				0.244***	0.139**				
				(4.22)	(2.00)				
DL							0.489***	0.459***	0.456***
							(8.08)	(7.46)	(7.54)
TMTIK								0.137**	0.144***
								(2.43)	(2.64)

DL * TMTIK									0.129** (2.23)
Control Variables									
Stuff	0.061** (2.35)	0.065** (2.53)	0.042* (1.66)	0.047* (1.90)	0.047* (1.83)	0.039 (1.34)	0.010 (0.35)	0.003 (0.11)	0.006 (0.22)
IT Budget	0.136*** (3.48)	0.116*** (3.07)	0.104*** (2.82)	0.122*** (3.36)	0.096*** (2.64)	0.045 (1.14)	-0.021 (-0.58)	-0.045 (-1.24)	-0.042 (-1.18)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Type	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.546 (-1.60)	-0.409 (-1.24)	-0.413 (-1.29)	-0.485 (-1.48)	-0.336 (-1.05)	-0.220 (-0.66)	0.047 (0.15)	0.120 (0.39)	0.001 (0.00)
N	321	321	321	321	321	321	321	321	321
R^2	0.080	0.115	0.132	0.137	0.167	0.055	0.275	0.290	0.305
Adjusted R^2	0.04	0.07	0.09	0.10	0.12	0.01	0.24	0.26	0.27

Note: STP: CIO Structural Power, EXP: CIO Expert Power, PRP: CIO Prestige Power, DL: CIO Demand-Side Leadership, TMTIK: TMT Strategic IS Knowledge. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

In Models 6 to 9, organizational agility was utilized as the dependent variable. As with Model 1, Model 6 only included the control variables. The results of Model 7 revealed that CIO demand-side leadership has a positive influence on organizational agility, lending support to H1. Models 8 and 9 present the outcomes of the moderating test conducted through hierarchical linear regression (HLM). The results indicated that the interaction of CIO demand-side leadership and TMT strategic IS knowledge has a notably beneficial effect on organizational agility, as illustrated in Model 9, providing evidence in support of H2.

To effectively demonstrate the moderate effect of TMT strategic IS knowledge, we plotted simple slopes for both high and low levels, as depicted in Figure 2. We can find that the steepness of the high TMT strategic IS knowledge (solid line) compared to low TMT strategic IS knowledge (dashed line) suggests that TMT strategic IS knowledge amplifies the positive consequence of CIO demand-side leadership on organizational agility. It highlights a valuable moderate effect.

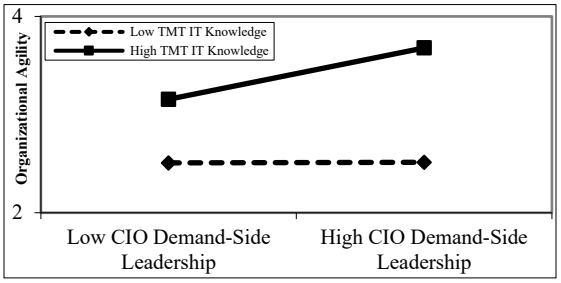

Figure 2. The Moderate Effect of TMT Strategic IS Knowledge

5.3 Robustness check

We conducted several supplemental tests to ensure the robustness of our research findings. Initially, we selected the robustness option in all OLS regression models to mitigate the impact of heteroscedasticity. Next, we utilized K-fold cross-validation to enhance the utilization of our sample data and minimize the model's generalization error. We partitioned the sample into five groups to conduct the tests and achieve stable results. Finally, we employed the quantile regression method to assess the impact of the sample data's non-uniform distribution. The outcomes of the quantile regression were congruent with those of OLS regressions. Therefore, we concluded that the outcomes of our research are robust. Hence, the hypotheses posited in this research are substantiated, and the outcome of the hypothesis testing utilizing OLS is depicted in Figure 3.

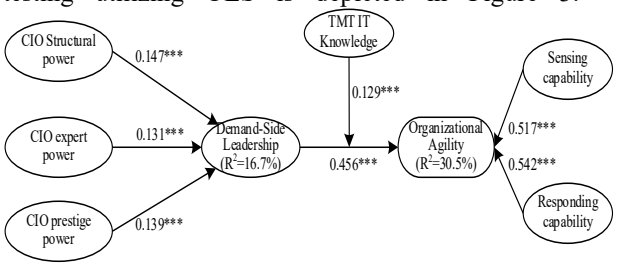

Figure 3. Results of Hypotheses Testing

6. Discussion

IT is an important resource for enterprises to enhance organizational agility, with an important premise in that CIOs must help companies make sensible use of IT and lead IT-driven business innovations. Based on the perspectives of IS leadership and executive power, this study explores how CIO power and CIO demand-side leadership affect organizational agility. The results of our data analyses support our research hypotheses. Specifically, CIO demand-side leadership positively influences organizational agility. This finding is consistent with the previous emphasis on the importance of CIO demand-side leadership in IS literature (Chen et al., 2010). As an important indicator

of the CIO's capacity to lead the business to actively explore IT innovations, demand-side leadership stimulates the corporate initiatives to explore technology-driven business innovations, which is instrumental to help companies achieve strategic goals in a turbulent environment. At the same time, we also highlight the role of TMT's strategic IS knowledge, which amplifies the positive influence of CIO demand-side leadership on organizational agility. In addition, based on the executive power literature, we provide empirical evidence of the three significant power sources enabling CIO demand-side leadership: structural power, expert power, and prestige power. Thus, the findings of the study enrich the understanding of how CIOs may enhance their demand-side leadership by looking beyond a narrow emphasis on structural power in previous research. Our study also extends the findings in executive power literature (which suggests strategic leaders' power influences organizational decision-making behavior) to the context of CIO strategic influences.

6.1 Theoretical contributions

This study has made some theoretical contributions. First, as a complement to extant research that largely addresses how CIO supply-side leadership ensures corporate IT function's contribution to organizational performance, this study proposes and confirms the positive impact of CIO demand-side leadership on organizational agility. The findings provide a theoretical explanation for how CIOs can lead strategic initiatives of the businesses to explore IT-enabled business innovation, which helps enhance organizational agility. Although existing research suggests that CIOs should shift their focus to leading business innovations (Chen et al., 2010; Gerth & Peppard, 2016), there is still a lack of specific empirical examination into how CIOs can lead business transformation to promote organizational agility. This study speculates CIO demand-side leadership is key to enhancing organizational agility. CIO demand-side leadership is essential to inspire enterprises to actively explore new IT-driven business innovation, enabling them to quickly adapt to the constantly changing business environment. At the same time, based on the existing literature that confirms that TMT strategic IS knowledge can enhance IT assimilation and digital innovation (Armstrong & Sambamurthy, 1999; Firk et al., 2022), this study also finds that TMT strategic IS knowledge is an important boundary condition which helps strengthen the positive impact of CIO demand-side leadership on organizational agility. Second, extending previous research that highlights the role of hierarchical position to promote CIO organizational authority (Preston et al. 2008), this study identifies and confirms the positive impact of three sources of CIO executive power base: structural power, expert power, and prestige power. Although existing research have recognized the importance of CIO demand-side leadership for organizations, the discussion on how to enhance it is relatively limited. Existing research generally emphasizes the importance of the CIO's structural power, which is reportedly beneficial to elevate demand-side leadership (Chen et al., 2010). However, two other important sources of executive power, expert power and prestige power, are rarely mentioned. As most CIOs usually do not have extensive structural power (Li et al., 2021), this study, based on an executive power perspective, discovers that expert power and prestige power are at least equally important for nurturing CIO demand-side leadership, thus helps with growing the research on the antecedents of CIO leadership.

6.2 Practical implications

Our research results also bring some practical implications. First, CIOs need to value and develop demand-side leadership, keep exploring the strategic value of IT-driven business opportunities, and be confident in leading business innovations propelled by emerging IT, so as to keep the enterprise competitive in the constantly changing environment. At the same time, as CIOs often cannot obtain decision-making power comparable to those of the TMT, they need to continuously leverage their professional knowledge and reputation to strive for chance to participate in the organizational strategic decision-making process and exert their strategic influence. Second, enterprises need to not only recognize but also treasure the importance of CIOs for producing organizational agility. As such, top business executives should consider to grant their CIOs higher formal status to provide a friendly environment that fosters IT-driven innovation capabilities. In addition, firms need to nurture a culture that promotes strategic IS knowledge among business executives or recruit/groom business executives with IT backgrounds, so that their TMTs are versed with IT strategic value, may better support CIOs' work, and turn on greenlights for IT's contribution to organizational agility.

6.3 Limitations and future research

This study also has some limitations. Because it is difficult to collect matched-pairs data from TMT/CIO, the sampling framework of this study is not

completely random but is limited by researchers' data accessibility. In addition, future studies will consider collaborating with scholars from other countries to collect data samples from abroad and explore whether there are other factors that affect the relationship between CIO demand side leadership and organizational agility, as well as whether there are other antecedents that can enhance CIO demand side leadership. Meanwhile, we also call for more future research to provide additional insights into how to enhance CIO leadership in the digital age to promote organizational agility.

7. Conclusions

This study draws on two streams of literature, IS leadership and executive power, to establish a theoretical model that links CIO power, CIO demand-side leadership, and organizational agility. Empirical analyses of survey data collected from matched CIOs and senior executives from 312 firms suggest that CIO demand-side leadership is crucial for achieving organizational agility, and that varying types of CIO executive power can enhance CIO demand-side leadership. In addition, for better utilization of the positive impact of CIO demand-side leadership, TMT needs to accumulate more strategic IS knowledge. We hope our study will serve as a stepping stone to lay the groundwork for more future research to further examine the role of CIOs in promoting organizational agility and how power can enable CIOs to enhance their effectiveness.

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