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The Study of Technology Competence, Transforms Leadership, and Digital Resiliency Impact on Thailand SMEs Business During COVID-19

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Abstract

Small and Medium Enterprises (SMEs) play a vital role in Thailand's economy. In 2019, the SMEs generated more than 14 million jobs and significantly contributed 42% of the country's GDP. The Securities and Exchange Commission forecasted that the Thai SMEs would account for 60% of the GDP growth in 2021. However, the unexpected global pandemic has gravely wounded the world economy and caused a sudden business shutdown, particularly the SMEs that failed to innovate or digitize their businesses. According to Cisco's 2020 Asia Pacific SMB Digital Maturity Study, over 80% of SMEs owners believe that digitalizing their companies will help them become more resilient and adaptable to market change or future crises. Considering this fact and figure, the purpose of this study is to contribute knowledge for an overall understanding of the antecedents and effect of Thailand SMEs business firm performance, and to investigate the impact of transformation leadership, technological competence, and digital resiliency which include top three technologies (Collaboration, CyberSecurity, and Cloud-managed technology) on SMEs firm performance. In particular, this study aims to identify how SMEs in Thailand can overcome critical challenges and accelerate success by using digital technology to enhance their business resilience and increase even a higher degree of business performance and success. A quantitative research method applied, Structure Equation Modelling (SEM), the statistics of data analysis were descriptive statistic, reliability and validity using CFA were adopted in this study. Total 588 respondents came from manager positioning and above. The practical implication for SMEs management, transformation leadership, technological competence combined with core digital technology that is extremely necessary and a priority to bring in to digitize the business, especially while we are in a crisis & pandemic globe condition to improve Thailand SMEs business firm performance

Keywords: Transformation Leadership; Technological Competence; Digital Resiliency, and Firm performance

Introduction

"The impact of transformation leadership, technological competence, and digital resiliency on Thailand SME's firm performance during the pandemic outbreak of COVID-19." Since the previous decade, plenty of empirical research in the areas of leadership, technical competency, product, and process innovation as well as financial firm performance have been conducted on Enterprise businesses or large organizations, which are larger in terms of firm size, complexity and diversity, and large business revenue. There are no well-known comprehensive studies that focus on SMEs (Small and Medium Enterprises) overall key constructs combined with core technology that is extremely necessary and a priority to bring in to digitize the business, especially while we are in a crisis & pandemic globe condition. Most of the digital technology investment is made by large organizations, which have greater preparation and budget. When COVID-19 occurs unexpectedly, the first impact is primarily felt by SMEs, since they have less preparedness, resources, and technological capabilities. The digital transformation strategy for SMEs will be long-term and beneficial to all participants in the global digital market. Despite economic constraints, digital transformation can help businesses decrease costs, stimulate investment, enhance employment, increase revenues, and result in ongoing corporate success. This will assist our SMEs to become more resilient and future-ready according to The Nation News (March 2018), Dr. Nuttapon Nummanphatcharin, President and CEO of DEPA (The Digital Economy Promotion Agency). Thailand DEPA acknowledges Thai SMEs' growing need and ambition to take advantage of new opportunities in the region by leveraging digital solutions. This is also in keeping with the government's latest Digital Government Plan, which intends to expand digital capabilities across all business sectors, including SMEs.

Small and medium businesses (SMEs) are critical to Thailand's economy. In 2019, SMEs created over 14 million employment and contributed a significant 42 percent of the country's GDP. Thai SMEs are expected to account for 60% of GDP growth in 2021, according to the Securities and Exchange Commission. The unforeseen global pandemic, on the other hand, has severely harmed the global economy and resulted in a rapid business shutdown, particularly among SMEs that have failed to innovate or automate their operations. Over 80% of business owners believe that digitalizing their companies will help them become more robust and flexible to market changes, according to Cisco's 2020 Asia Pacific SMB Digital Maturity Study.

Research objectives and questions

The main purpose of this study is to contribute knowledge for an overall understanding of the antecedents and effect of Thailand SMEs business firm performance, a firm who have between 50-499 employees especially when we are

facing the Covid-19 situation, and to investigate the impact of transformation leadership, technological competence, and digital resiliency which include three technologies (Collaboration, CyberSecurity, and Cloud-managed technology) on SMEs firm performance in Thailand.

The further objective is to examine the relationship between transformation leadership and firm performance, technological competence and firm performance, and digital resiliency which included Collaboration, CyberSecurity, and Cloud-managed technology, and its effects on the success of overall firm performance.

Finally, this study also aims to identify how SMEs in Thailand can overcome critical challenges and accelerate success by using digital technology to enhance their business resilience and increase even higher degree of firm performance and success.

Research Question

(1) What are the major impact factors of the independent variable which included transformation leadership, technological competence, and digital resiliency with the top three technology which appear to influence firm performance as the dependent variable for Thailand SMEs, especially in the COVID-19 situation?

(2) Is there a meaningful relationship between transformational leadership, technological competency, and digital resiliency in Thailand SME's firm performance?

(3) Is there a major influence on Thailand SMEs company performance with a difference in digital resiliency between collaboration, cybersecurity, and cloud-managed technology approach?

Literature review

Small and Medium Enterprise (SMEs); SMEs are defined as businesses with less than 500 employees that operate on their own (Baird et al., 1994; Hodgetts and Kuratko, 1998; Beamish 1999; Wolff and Pett, 2000; Jane W., 2001). This research focuses on SMEs in Thailand with a workforce of 50 to 499 individuals, which is large enough for our research context of transformation leadership, digital resiliency, technological competence, and firm performance.

Transformational leadership creates confidence in their followers, gives a clear vision, and emphasizes their followers' strengths (Bass, 1985, 1998). Many academics have identified leadership as one of, if not the most, important factors influencing employees' creative behaviors and performance (Amabile, 1998; Jung, 2001; Mumford & Gustafson, 1988) for firm performance, innovation, and success (Amabile, 1998; Jung, 2001; Mumford & Gustafson, 1988). Transformational leaders boost organizational creativity, as well as organizations' proclivity to innovate. Leaders must use motivating motivation and intellectual stimulation to drive corporate innovation (Elkins and Keller, 2003). These leaders engage the assistance of their followers to ensure the idea's success (Jung et al, 2003; Keller, 1992). Based on four interrelated aspects (Bass, 1985; Seltzer and Bass, 1990): regarding the current economic & pandemic crisis for this study focuses on initiating change and innovation among followers and related to the success of firm performance.

1. Idealized influence refers to the ability to provide vision, pride, and value to the employees.

2. Inspiration refers to the extent to which the leader articulates high expectations for achievement.

3. Intellectual stimulation is the way a leader stimulates his employees to think in creative ways.

4. Individualized consideration refers to the degree to which a leader treats his/her employees individually and provides personal attention.

Furthermore, regarding to The fortune 500 CEO post -covid thinking & trends related leadership intention and what they have seen, what will be right after Covid-19. About workplace transformation will happen, we will do more on mobile worker rather than full operation as physical at the office like before. Reduce all the business traveling, means that the business required a few technologies that can help business resilience, for example, web, video conference platform, or collaboration architecture to keep internal and external including customers, vendors, partners, or suppliers) engaged. Figure 1 shows the analysis of 500 CEO post-covid thinking & trends.

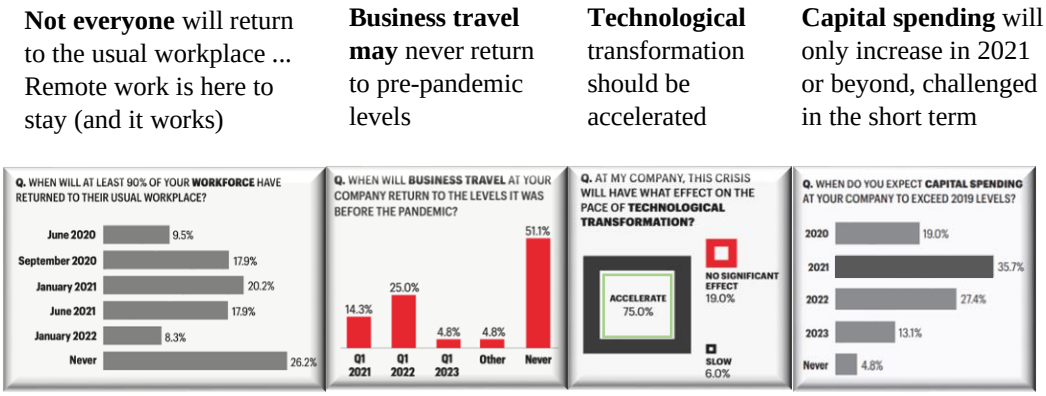

Figure 1 The fortune 500 CEO post -covid thinking & trends

(Source: Fortune Magazine Survey June 2020; Cisco Analysis)

Technological Competence, internally, a company's capacity to identify, utilize and exploit important state-of-threat technologies. This competence enables a company/organization to become more IT resources, IT capabilities, and market pioneer through new product development, new production processes, and one of the key factors of firm performance and success (Ritter, 1998; Chakravarty, 2013) than organizations with a low level of technological

competence. We will concentrate on technological partnership motives and technical expertise in this investigation.Technological competence, particularly in high-tech industries, has come to be considered as a strategic resource that allows companies to build performance differentials within their industry (Duysters & Hagedoorn, 2000; Henderson & Cockburn, 1994; Nelson, 1991). Because technological knowledge is primarily acquired through a dynamic learning process (Kim, 2000), technological aptitude features are generally tacit and complicated in nature, inhibiting copying and therefore extending exceptional performance (McEvily & Chakravarthy, 2002). Obviously, a corporation gains its competitive edge by building its technological capabilities from a resource-based perspective (Dierickx & Cool, 1989; Wernerfelt, 1995).

Digital resiliency

Referring to Fika, 2020 recently defined Digital Resiliency is a balance of taking advantage of opportunities, managing digital risks faced, and balancing between human resources, process, and technology requirements. Collaboration is one of the key technologies call out to be the road to the success of digital resiliency, especially in the recent year of the COVID-19 outbreak. Simitowith Cisco Systems Inc, report shown that during this pandemic, the explosive growth in videoconferencing (Collaboration technology) because of remote work, has been grown 30X (Cisco Systems Inc, resilience architecture, 2020). Also, similarity with the International Data Corporation (IDC) report early of this year (Mar 2021), provides more solid of digital resiliency definition as the ability for an organization to rapidly adapt to business disruptions by leveraging digital capabilities to not only restore business operations but also capitalize on the changed conditions and digital resiliency is also a central tenet of the future enterprise. For this study we will focus on top 3 architectures, first Collaboration technology, to support collaboration and helps to coordinate work effectively as well as reduce obstacles in terms of distance especially for the pandemic situation. Second, Cyber Security technology refer to processes and practices that are designed to protect networks, devices, programs and data from attacks, damage, or unauthorized access from third parties this is call cybersecurity. And third Cloud managed technology that will be suited and flexible to SMEs business in Thailand.

1. Collaboration, work from anywhere with any device. Employees can easily join in team meetings whether they are working from home or outside. All distant employees will be able to use video conferencing to help them create and maintain relationships within their companies and with their own customers, thanks to this technology. Employees will also have access to team workspaces where they may share data securely and collaborate with one another.

Utilize technical expertise and information from the top three global technology vendors (Cisco, Zoom, and Microsoft) to learn how a collaborative platform can assist SMEs in being more digitally resilient in the present and future.

2. Cyber Security Platform, work safely from any location. End-to-end encryption protects all critical information throughout web, video conferences, and

meeting sessions. All video conferencing, phone, and team communication solutions are trustworthy and capable of meeting compliance standards. Before causing corporate damage, cyber threats must be recognized, detected, and stopped. Companies have enjoyed benefits from giving their staff with a flexible working environment, and SMEs believe that remote work or work from home policies are here to stay following Covid. They're also seeking for cloud-based solutions that are nimbler.

Leverage Technology knowledge and information from Top 3 world largest tech vendor (Cisco, Palo Alto Network, and Fortinet) about how Security Technology can help SMEs to be more digital resilience for now and future.

3. Cloud Managed Network from anywhere. While away from the office, this technology allows all remote and traveling employees to safely access the network. For commercial applications, all user identities may be readily confirmed and authorized. Data is protected with tight access control in business applications.

Leverage Technology knowledge and information from Cisco, The World Largest Tech Vendor about how Cloud Managed Network Technology can help SMEs to be more digital resilience for now and future.

For every IT who, what, and where-here's your how. In today's digital world, there is nothing more important than ensuring your users, employees, and customers have an exceptional network experience — whether they know it or not. Meet ever-changing IT demands with our cloud network platform that easily adapts to your vision through robust APIs, insights, and apps.

Benefit for Cloud Managed and really fit for SMEs business because SMEs have less IT person to manage, and they have limited for the budget investment.

Firm Performance, business performance is a measure of how successfully a firm achieves its aims and objectives in comparison to its key rivals (Cao & Zhang 2011). Profitability, expansion, and how successful innovation may make an organization more competitive are regularly used to define corporate performance. This is due to rising innovation costs, shorter invention timelines, and higher technological complexity. Cooper (1997); Cooper and Kleinschmidt (1995). (1995). The success of a company may be measured in a variety of ways. For this study, we will focus on both financial performance (measured by revenue and growth) and innovation success (measured by product and process innovation). Firm performance with innovations is crucial for the economic survival of SMEs since it is the foundation for achieving and sustaining a sustainable competitive advantage (Bolwijn and Kumpe, 1990; Cozijnsen et al., 2000; Hadjimanolis, 2000; Hyland and Beckett, 2004). For many years, most firms' strategy plans have prioritized digital transformation and transformation leadership. The COVID-19 health and economic problems have cleared the year 2019-2021, bringing to light a new reality: rigid work arrangements, operations, and technological readiness. The epidemic and its consequences exposed the flaws in long-held assumptions about how organizations and individuals should

operate (Technology Innovation and Accenture Labs Report, 2020).

Theoretical supportive, resource-based view, and dynamic capability related to this study

The resource-based view (RBV) of the firm is a starting point for investigating firms' internal resources as sources of competitive advantages, such as knowledge and capabilities (Barney, 1991; Wernerfelt, 1984). The resource-based perspective considers only those resources that are scarce, non-substitutable, and difficult to replicate as the foundation for long-term competitive advantage (Barney, 1991). Following that, knowledge and technological capabilities were included, which are important for the development of competitive advantage because they are often unique and difficult for competitors to imitate (Deeds et al., 1998; Henderson and Cockburn, 1994). For this RBV is focused more on product development alliance, technology resources and production, marketing, and included management capabilities that are all related and very useful for hypothesis development.

The dynamic capabilities perspective, which extends the resource-based viewpoint, emphasizes the ongoing development of capabilities that underpin firm resources (Lado and Wilson, 1994; Mowery et al., 1996; Teece et al., 1997). It is not only resources that are important, but also how managers coordinate and integrate activities within the firm in order to best utilize and improve these resources over time (Teece et al., 1997). The knowledge-based view of the firm (Grant and Baden-Fuller, 1995; Conner and Prahalad, 1996) emphasizes the firm's ability to integrate external sources of explicit and tacit knowledge, which is consistent with the evolutionary perspective of building and extending firm capabilities. A fundamental tenet of the dynamic capabilities view of the firm is that firms acquire new knowledge, skills, expertise, and capabilities through organizational learning (Deeds et al., 1998; Mowery et al., 1996), which can be defined as "the act of bringing in or creating new knowledge" (Bierly and Chakrabarti, 1996). Furthermore, dynamic capabilities are referred as "first-order" capabilities because they typically describe to a firm's product, production process, scale, and market served being intentionally changed (Winter, 2003).

The requirement for continuous development through organizational learning is required due to the constant changes in technology (Steele, 1989), the rapidity of technical progress (D'Aveni, 1994), and large changes in the overall competitive landscape for most organizations (Bettis and Hitt, 1995; Prahalad, 1998). Organizational learning is not restricted to the firm's internal operations but is frequently the consequence of the assimilation and integration of external knowledge (Cohen and Levinthal, 1990).

As firms have a limited number of people and their ability to hire and fervor is limited by such things as employment contracts, market conditions, and regulatory constraints, organizations are limited in the number of skills and knowledge they can develop and maintain internally (Hamel and Prahalad, 1994). Furthermore, ongoing organizational rightsizing can stifle the inflow of new

people, making the incumbent pool of people a core-rigidity (Leonard-Barton, 1995), and limiting the assimilation of new knowledge (Cohen and Levinthal, 1990). No organization can be completely self-sufficient due to the rapid pace of technological change in many fields, rendering skills and knowledge obsolete (Bettis and Hitt, 1995). (Pfeffer and Salancik, 1978).

According to resource based view and dynamic capability focus how firms integrate, build and reconfigure their internal and external firm's competencies into new competencies that match their turbulent environment (Teece et al., 1997) with related to wholistic of firm's management, technology competency that digital technology is playing a very important role especially helping firm to create new innovation of products and process in order to able improve adaptability and finally create a sustainable business and being competitiveness while facing environment change or any new coming crisis. With this knowledge and theoretical background also helping for the researcher to develop more solid of the hypothesis.

Furthermore, while the COVID 19 situation has had a significant impact on our SMEs business, this study conducted empirical work in Thailand. Developing a culture of innovation can help SMEs maintain long-term growth and survive future crises. The hypothesis is developed after a review of the relevant literature. Following that, there will be a report on the empirical study, and the paper will end with a discussion. A report of the empirical study follows this, and this paper will conclude with a discussion of the implication of the key finding.

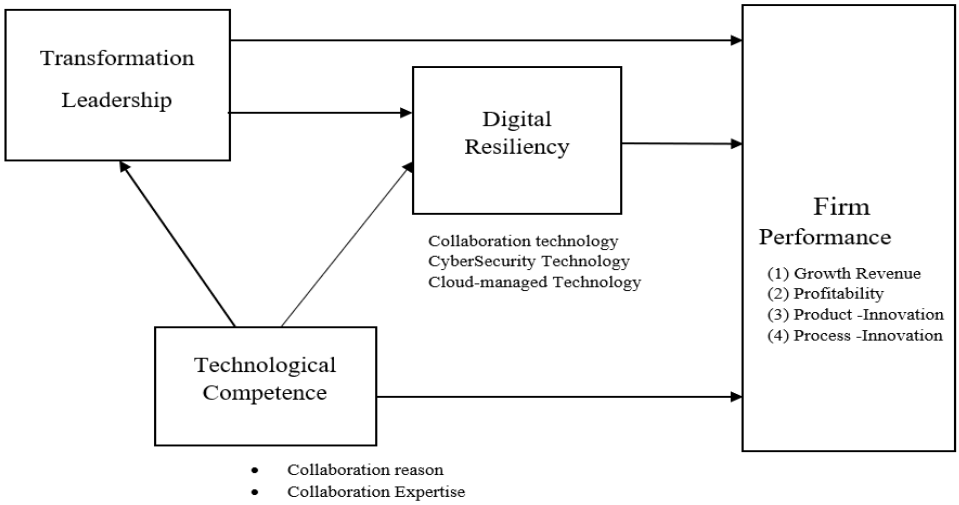

Figure 2 The literature framework

Hypothesis development

Based on the literature review, report, and various trend and technology discussed above, the researcher proposed that transformation leadership have both direct and indirect effect on firm performance respectively. The specific hypothesis is discussed below.

Transformation Leadership, Firm Performance and Digital Resiliency (Included Collaboration technology, CyberSecurity technology, and Cloud-managed technology). Regarding to a group of relationship, this study thus processes for the following hypothesis:

H1 Transformation leadership has significantly positive related to Firm performance
H2 Transformation leadership has significantly positive related to Firm's digital resiliency (Collaboration technology)
H3 Transformation leadership has significantly positive related to Firm's digital resiliency (CyberSecurity technology)
H4 Transformation leadership has significantly positive related to Firm's digital resiliency (Cloud-managed technology)

Companies with a high level of technological competence will have greater firm performance than companies with only a low level of technological competence (for empirical results, see Malerba and Marengo, 1995). Regarding to a group of relationship, this study thus processes for the following hypothesis:

H5 Technological competence has significantly positive related to Firm performance
H6 Technological competence has significantly positive related to Firm's digital resiliency (Collaboration technology)
H7 Technological competence has significantly positive related to Firm's digital resiliency (CyberSecurity technology)
H8 Technological competence has significantly positive related to Firm's digital resiliency (Cloud-Managed technology)
H9 Technological competence has significantly positive related to Transformation leadership

Resilience definition and measurement were transformed and various examine from more research. More referring to people behavior, leadership, empowerment, organization, and firm's capability across the industry. Refer to Resilience Thinking: Integrating Resilience, Adaptability, and Transformability (Carl Folke, Stephen R., Brian Walker, Marten Scheffer, Terry Chapin, Johan Rockström, Scott and Law, 2006). The businesses showed resilience in three different ways: survival, adaptation, and innovation. Then we proposed the following hypothesis:

Based on the above proposal that digital resiliency will mediate the relationship between transformation leadership and firm performance, regarding to a group of relationship, this study thus processes for the following hypothesis:

H10 Firm's digital resiliency (CyberSecurity technology) has significantly positive related to Firm performance

H11 Firm's digital resiliency (Cloud-Managed technology) has significantly positive related to Firm performance

H12 Firm's digital resiliency (Collaboration technology) has significantly positive related to Firm performance

H13 Firm's digital resiliency (CyberSecurity technology) has significantly positive related Collaboration technology

H14 Firm's digital resiliency (Cloud-Managed technology) has significantly positive related to CyberSecurity technology

Digital resiliency also possible to mediate between Technological and firm performance as well. Regarding to a group of relationship, this study thus processes for the following hypothesis:

H15 The relationship between Transformation leadership to Firm performance will mediate by Firm's digital resiliency (Collaboration technology)

H16 The relationship between Transformation leadership to Firm performance will mediate by Firm's digital resiliency (CyberSecurity technology)

H17 The relationship between Transformation leadership to Firm performance will mediate by Firm's digital resiliency (Cloud-managed technology)

H18 The relationship between Technological competence to Firm performance will mediate by Firm's digital resiliency (Collaboration technology)

H19 The relationship between Technological competence to Firm performance will mediate by Firm's digital resiliency (CyberSecurity technology)

H20 The relationship between Technological competence to Firm performance will mediate by Firm's digital resiliency (Cloud-managed technology)

Regarding to the positive impact of technological competence and possibility to play as a moderator role of motivating transformation leadership and firm performance, this study thus processes for the following hypothesis:

H21 The relationship between Transformation leadership to Firm performance will moderate by Technological competence

Conceptual Framework

Building on the background literature review and discussed above come out with a research model and hypothesis (Figure 8). The study proposed that transformation leadership, and digital resiliency has an indirect effect on a firm's performance. In addition, transformation leadership also has a direct effect on a firm's performance through the mediating effect of digital resiliency. And firm's technological competence will be influenced by more positive relationship between transformation leadership and digital resilience: the stronger firm's technological competence will be a stronger relationship, all conceptual framework and hypothesis on the Figure 3.

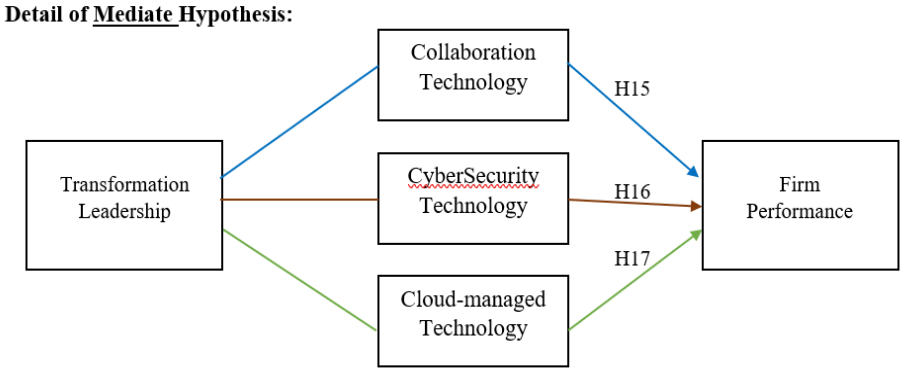

Figure 3 The conceptual framework and hypothesis

Hypothesis testing on the role of mediator (H15-H20) and moderator role (H21) will be adding into this study in order to provide a better understanding of the overall impact of each variable that could be beneficial to SMEs firm performance.

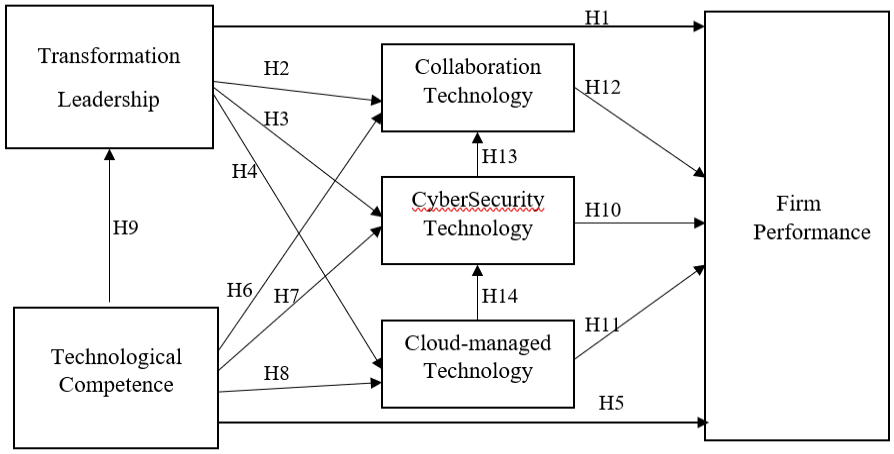

Figure 4 Mediator role of digital resiliency

Detail of Mediate Hypothesis:

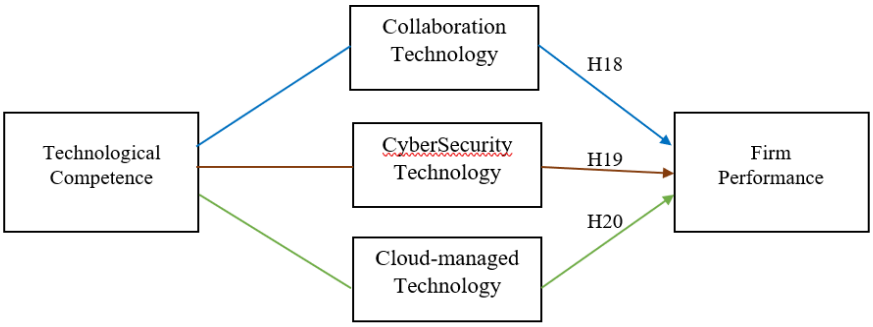

Figure 5 Mediator role of digital resiliency

Detail of Moderator Hypothesis:

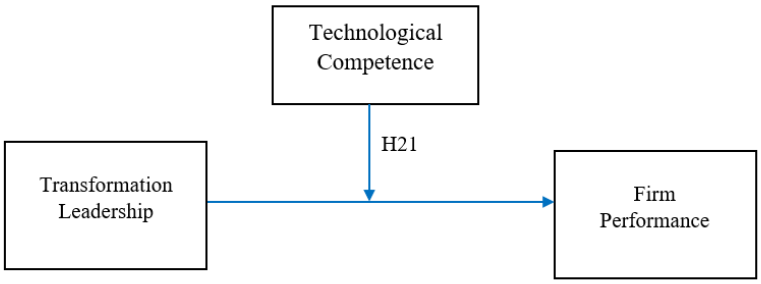

Figure 6 Moderator role of technological competence

Research methodology and data collection

The positivist philosophical assumption is reflected in the quantitative design. Answering questions and hypotheses through surveys and experiments requires examining the relationship between and among variables. This method establishes criteria for evaluating a theory. The validity and reliability of instrument scores will be investigated in this study, which will lead to a meaningful interpretation of data and generalized findings.

The purpose of this study was to contribute knowledge for an overall understanding of the antecedents and effect of Thailand SMEs business firm performance, a firm who have between 50-499 employees especially when we are facing the Covid-19 situation, and to investigate the impact of transformation leadership, technological competence, and digital resiliency which include three technologies (Collaboration, CyberSecurity, and Cloud-managed

technology) on SMEs firm performance in Thailand. The further objective is to examine the relationship between transformation leadership and Firm performance, technological and firm performance, and digital resiliency which included Collaboration, CyberSecurity, and Cloud-managed technology, and its effects on the success of overall firm performance. The survey method where primary data was collected formed the basis of the chosen methodology for this research study. This study, therefore, uses a quantitative approach to test the research model.

The survey method was developed using all literature reviewed, focus research, and information on current trends and technology knowledge. The survey method enables all transformational leadership, technological competence, digital resilience, and firm performance to be measured. We were able to examine and understand the relationships between these constructs and the proposed conceptual model as a result of the data collection process.

we are open and general criteria were applied for company/firm criteria and respondents' criteria as below:

1. Company name should be registered and operated under the Thailand Ministry of Commerce
2. Company must have the size of employees between 50-499 employees
3. Respondents should be employees of Thailand company
4. Respondents should hold a minimum of Manager title and above

To identify the target population, the screening question is applied

The step of the data collection process start from identifying potential respondents with both online and offline approaches for the individual company, association related to SMEs context. Then our structured questionnaires will distribute to the target respondent. For this study, we will leverage both online and offline channels to collect this data. The tentative period of data collection from February 15 – to end of April 2022 and total 588 solid responses.

Research result and key findings

This part of this study contains data analysis and key findings. The analysis included: demographics of respondents, reliability testing by using Cronbach's Alpha, descriptive statistics, SEM outcomes, and Hypothesis testing.

Demographics of respondents

The profile of respondents and firms will be examined in this area as part of the results. Gender, age, education, and work positioning are examples of personal information. For this study there is 2 screening question asking Positioning will need to be Manager and above, and the size of the firm will need to be within the range of 50-499 employees, refer to Table 1.

Table 1 Respondent Profile with Demographic Information

Demographic Features	Frequency	Percent (%)
Gender		
Male	275	46.8
Female	313	53.2
Age		
Below 30 Years	60	10.2
30 – 39 Years	245	41.7
40 – 49 Years	203	34.5
50 – 59 Years	80	13.6
60 or above	-	
Education		
Below Bachelor's Degree	20	3.4
Bachelor's degree	287	48.8
Master's Degree	257	43.7
Ph.D. or DBA	24	4.1
Position/Job Title		
Manager with Team	197	33.5
Manager without Team	330	56.1
Managing Director	56	9.5
CEOs	5	0.9
Number of Employees		
50-59 Employees	182	31
100-199 Employees	76	12.9
200-299 Employees	84	14.3
300-399 Employees	31	5.3
400-499 Employees	215	36.6

Reliability and validity test using CFA

In this investigation, the confirmatory factor analysis was performed using the CFA pooled measurement model approach and factor loading was tolerated at a value 0.50 and above. The CFA is solved using Structural Equation Modeling (SEM). Structural Equation Modeling (SEM) is a statistical methodology that applies a confirmatory, for example, hypothesis testing approach to the investigation of a structural theory bearing on some occurrence.

The summary of Confirmatory factor analysis (CFA) and factor loading/weight score by construct as below and from this process we will consider for the highest score for further step of validity and reliability testing. For the lowest score (below 0.50) item, we will remove out at this process step.

Transformation leadership, factor loading/weight result start from TL2= 0.548, TL3 = 0.696, TL4 = 0.808, TL5 = 0.546 and TL1(score less than 0.50) accordingly. From this analysis result, we will only consider from the highest score TL2, TL3 and TL4 for next step of validity & reliability test. [TL2, TL3 and TL4: Transformation leadership]

Digital resiliency (Collaboration Technology), factor loading/weight result start from DR1= 0.726, DR2 = 0.672, DR3 = 0.750, and DR4 = 0.612 accordingly. From this analysis result, we will only consider from the highest score DR1, DR2 and DR3 for next step

of validity & reliability test. [DR1, DR2 and DR3: Collaboration technology]

Digital Resiliency (CyberSecurity Technology), factor loading/weight result start from DR5= 0.626, DR6 = 0.684, DR7 = 0.693, and DR8 = 0.744 accordingly. From this analysis result, we will only consider from the highest scores DR6, DR7 and DR8 for next step of validity & reliability test. [DR6, DR7 and DR8: CyberSecurity technology]

Digital Resiliency (Cloud- Managed Technology), factor loading/weight result start from DR9= 0.623, DR10 = 0.542, and DR11 – DR12 score is below 0.50 accordingly. From this analysis result, we will only consider from the highest score DR9 and DR10 for next step of validity & reliability test. [DR9 and DR10: Cloud-Managed technology]

Technological Competence (Collaboration Reason and Expertise), factor loading/weight result start from TC1= 0.590, TC2 = 0.687, TC3 = 0.677, TC4 =0.629, TC5 =0.553, TC6=0.669, and TC7 = 0.562 accordingly. From this analysis result, we will only consider from the highest score TC1 – TC3 for next step of validity & reliability test. [TC1, TC2 and TC3: Technological Competence]

Firm Performance, factor loading/weight result start from FP1= 0.552, FP2 = 0.533, FP3 = 0.725, and FP4=0.711 accordingly. From this analysis result, we will only consider from the highest score FP1, FP3, and FP4 for next step of validity & reliability test. [FP1, FP3, and FP4: Firm Performance]

The reliability test in this study uses the Cronbach's Alpha method which is considered reliable if it has a Cronbach's Alpha value of more than 0.6 and a Composite Reliability. Composite reliability (sometimes called construct reliability) is a measure of internal consistency in scale items, much like Cronbach's alpha (Netemeyer, 2003). It can be thought of as being equal to the total amount of true score variance relative to the total scale score variance (Brunner & Süß, 2005). Composite Reliability (CR) value should greater than 0.6 - 0.7 for investigative research (Ghozali, 2014, p. 76). If the alpha coefficient for all variables is more than 0.6 and the composite reliability is greater than 0.6 will acceptable

This suggests that the questionnaire used in this study is trustworthy since it has a high degree of consistency and accuracy. Composite validity test, as a method that is better than the Cronbach alpha value in testing the reliability of the structural equation modeling. Composite reliability, which measures a construct, can be evaluated with two kinds of measures, namely internal consistency, and Cronbach's alpha (Ghozali 2014). The loading value, Cronbach alpha, and composite reliability (All values indicated that all constructs met the tests for validity and reliability) are demonstrated in Table 2.

The reliability test, show that every construct met the level of acceptance, Transformation leadership Cronbach's Alpha at 0.63, and Composite reliability (CR) at 0.65. For Digital resiliency (Collaboration Technology), Cronbach's Alpha at 0.79, and Composite reliability (CR) at 0.80. For Digital resiliency (CyberSecurity Technology), Cronbach's Alpha at 0.86, and Composite reliability (CR) at 0.82. For Digital resiliency (Cloud- Managed

Technology), Cronbach's Alpha at 0.76, and Composite reliability (CR) at 0.77. For Technological competence, Cronbach's Alpha at 0.76, and Composite reliability (CR) 0.76. And for Firm performance, Cronbach's Alpha at 0.72, and Composite reliability (CR) at 0.75.

Table 2 Reliability and validity of the constructs (N=588)

Variable	Indicators	Loading/ Weight	Cronbach's Alpha	Composite Reliability (CR)
TL (Transformation Leadership)	TL2	0.59	0.63	0.65
	TL3	0.70		
	TL4	0.80		
DR (Digital Resiliency) Collaboration Technology	DR1	0.73	0.79	0.80
	DR2	0.67		
	DR3	0.75		
DR (Digital Resiliency) CyberSecurity Technology	DR6	0.68	0.86	0.82
	DR7	0.69		
	DR8	0.74		
DR (Digital Resiliency) Cloud Managed - Technology	DR9	0.62	0.76	0.77
	DR10	0.54		
TC (Technological Competence)	TC1	0.58	0.76	0.76
	TC2	0.68		
	TC3	0.67		
FP (Firm Performance)	FP 1	0.55	0.72	0.75
	FP3	0.73		
	FP4	0.71		

Remark: *Reliability testing by Cronbach's Alpha is aimed at 0.7 or higher*

The following interpretation criteria were used to evaluate the level of agreement for each of the scales. The points on the original scales were used to create this guideline.

Descriptive statistic

In this part, the company's competency in terms of transformational leadership, digital resiliency, technological competence, and firm performance is described using means, standard deviations, and degree of agreement. The descriptive statistical analyses were performed using software and analytic tools.

For transformational leadership, digital resiliency, technological competence, and firm performance. The level of agreement for each was assessed by the scales of 1-7 as shown in figure 7.

Strongly disagree	very disagree	disagree	undecided	agree	very agree	Strongly agree
1	2	3	4	5	6	7

Figure 7 Scale for the level of agreement

Refer to Seven Likert Scale criteria building performance ranking

And Figure 8 shows the scales used to rate the firm's perceived performance in each category.

1----------7

Extremely Poor Excellence

Figure 8 Scale for perceived firm performance

Refer to the Seven Likert Scale criteria for building performance ranking
There are four constructions, each with at least four components. Each construct's description and analysis are detailed below.

Transformation leadership

Respondents were asked to rate their organization's Transformational leadership from 1 (strongly disagree) to 7 (strongly agree) in seven different aspects. The means of these items ranged from M=5.77 (SD=0.630) "The Management instills pride in me for being associated with him/her" to M=6.48 (SD=0.619) "The Management talks about his/her most important values". This indicates that in general, the respondent's level of agreement with the organization's transformational leadership is "strongly agree" Table 3 shows the full result of the descriptive analysis.

Table 3 Transformation leadership

Statement	Mean	Standard Deviation	Level of Agreement
The Management instills pride in me for being associated with him/her	5.77	0.630	Very agree
The Management goes beyond self-interest for the good of the group	6.14	0.669	Strongly agree
The Management acts in ways that build my respect	6.26	0.677	Strongly agree
The Management displays a sense of power and confidence	6.37	0.640	Strongly agree
The Management talks about his/her most important values	6.48	0.619	Strongly agree

Digital resiliency

Respondents were asked to rate their organization's Digital resiliency from 1 (strongly disagree) to 7 (strongly agree) in seven different aspects. The means of Collaboration technology items ranged from M=6.19 (SD=0.762) "All workers have the same experience and productivity as working in the office" to M=6.39 (SD=0.792) "Employees easily participate in team meetings while working from home". For Cyber security technology items ranged from M=6.10 (SD=0.785) "Cyberthreats be identified, detected, and blocked before they damage the business" to M=6.30 (SD=0.692) "Remote and traveling employees securely access the network while they are away from the office". For Cloud-managed technology items ranged from M=6.05 (SD=0.691) "Your current cloud solution provides complete visibility and management" to M=6.26 (SD=0.729) "Your current IT infrastructure is on subscription with reasonable and start with less payment/investment". This indicates that in general, the respondent's level of agreement with the organization's Digital resiliency is "strongly agree" Table 4 shows the full result of the descriptive analysis.

Table 4 Digital Resiliency

Statement (Collaboration)	Mean	Standard Deviation	Level of Agreement
Employees easily participate in team meetings while working from home	6.39	0.792	Strongly agree
Remote employees using video to help them build and maintain relationships with customers	6.23	0.777	Strongly agree
Employees access team workspaces to share files securely and collaborate with each other	6.36	0.704	Strongly agree
All workers have the same experience and productivity as working in the office	6.19	0.762	Strongly agree
Web meetings is protected with end-to-end encryption that keeps sensitive information safe	6.18	0.798	Strongly agree
Statement (CyberSecurity)			
Video conferencing, calling, and team collaboration tools reliable and able to support compliance requirements	6.16	0.801	Strongly agree
Cyberthreats be identified, detected, and blocked before they damage the business	6.10	0.785	Strongly agree
Remote and traveling employees securely access the network while they are away from the office	6.30	0.692	Strongly agree
Statement (Cloud-Managed)			
All user identities easily be verified and authenticated for business applications	6.17	0.758	Strongly agree
Your current cloud solution provides completely visibility and management	6.05	0.691	Strongly agree
Your current IT infrastructure is on subscription with reasonable and start with less payment/investment	6.26	0.729	Strongly agree
Your current IT infrastructure simplify deployment and management and scalable easily	6.19	0.762	Strongly agree

Technology competence

Respondents were asked to rate their organization's Technological competence from 1 (strongly disagree) to 7 (strongly agree) in seven different aspects. The means of items ranged from M=5.64 (SD=0.674) "Because we are the only firm which can use the results of this development project." to M=6.01 (SD=0.781) "Our production processes are highly complex with high technology involved" This indicates that in general, the respondent level of agreement with the organization's Technological competence is "very agree". Table 5 shows the full result of the descriptive analysis.

Table 5 Technological competence

Statement	Mean	Standard Deviation	Level of Agreement
Because we are the only firm with whom such products and processes can be developed.	5.65	0.697	Very agree
Because we are the only firm which can use the results of this development project.	5.64	0.674	Very agree
Because we have the excellent technological know-how.	5.83	0.761	Very agree
Because we are known for successful innovations	5.86	0.827	Very agree
We are very satisfied with the exclusiveness of our technological know-how.	5.97	0.835	Very agree
Our production processes are highly complex with high technology involved	6.01	0.781	Strongly agree
Considerable user know-how is required to use our products.	5.95	0.746	Very agree

Firm performance

Respondents were asked to rate their organization's Perceived Firm Performance from 1 (strongly disagree) to 7 (strongly agree) in seven different aspects. The means of items ranged from M=6.11 (SD=0.667) "Firm's Growth of Sale" to M=6.38 (SD=0.540) "Firm's Profitability" This indicates that in general, the respondent's level of agreement with the organization's Firm performance is "strongly agree". Table 6 shows the full result of the descriptive analysis.

Table 6 Perceived firm performance

Statement	Mean	Standard Deviation	Level of Agreement
Firm's Growth of Sale	6.11	0.667	Strongly agree
Firm's Profitability	6.38	0.540	Strongly agree
Firm's Products & Services Innovation	6.22	0.747	Strongly agree
Firm's Process Innovation	6.14	0.787	Strongly agree

Model fit test of construct

The confirmatory factor analysis requires the model fit test before evaluating the structural model's causal path. Referring of chapter 3, To reach the degree of acceptability for model fit, several fit indices are required. These indices was categorized into three categories:

Category **1. Absolute fit index**: Chi-Square P-value > 0.05. (Hair et al., 2006), RMSEA< 0.08 (Hair et al., 2006), RMR< 0.08 (Hair et al., 2006), GFI> 0.90 (Hair et al., 2006)

Category **2. Incremental fit index**: CFI> 0.90 (Marsh, Hau, & Wen, 2004), TLI/NFI > 0.90 (Bentler and Bonnet, 1980)

Category **3**. **Parsimonious fit index**: Chi-Square/df < 3.0 (Kline, 1998)

For this study, we will leverage **the Incremental fit index** as a reference to the level of acceptance of CFI> 0.90, and TLI/NFI > 0.90 for testing 4 individual constructs and the overall model. The fit indices as stated in Table 7.

Transformation leadership (TL), the construct has three items with fit indices results as follows: CFI, TLI, and NFI are 0.982, 0.963, and 0.968 accordingly. This indicates that the model accurately represents the data. All indices show that the model fit is satisfactory, and all elements may be employed in Structural Equation Modelling (SEM) path analysis.

Digital Resiliency (DR), the construct has 2 Difference Test:

First validity test result from combines 3 technology: Collaboration, CyberSecurity and Cloud Managed constructs together with eight items with fit indices result as follows: CFI, TLI, and NFI are 0.641, 0.561, and 0.545 accordingly. This indicates that the model has inaccurate and not able to present the data. All indices show that the model is not fit and unsatisfactory. All CFI, TLI, and NFI is below 0.9 and all elements may be unemployed in Structural Equation Modelling (SEM) path analysis. Regarding for this result, then the 2nd validity test for DR (Digital resiliency) was implemented and required.

Second validity test result by separate 3 technology: DR (Digital Resiliency) to 3 technology, include Collaboration Technology, CyberSecurity Technology and Cloud-Managed Technology. All the result was present in below and we keep no change for TL(Transformation Leadership, Technological Competence, and Firm Performance.

Result from separate DR (Digital Resiliency) 3 technology test as follow:

DR- Collaboration Technology, the construct has three items with fit indices results as follows: CFI, TLI, and NFI are 0.957, 0.929, and 0.924 accordingly. This indicates that the model accurately represents the data. All indices show that the model fit is satisfactory, and all elements may be employed in Structural Equation Modelling (SEM) path analysis.

DR- CyberSecurity Technology, the construct has three items with fit indices results as follows: CFI, TLI, and NFI are 0.939, 0.94, and 0.938 accordingly. This indicates that the model accurately represents the data. All indices show that the model fit is satisfactory, and all elements may be employed in Structural Equation Modelling (SEM) path analysis.

DR- Cloud Managed Technology, the construct has two items with fit indices results as follows: CFI, TLI, and NFI are 0.931, 0.994, and 0.929 accordingly. This indicates that the model accurately represents the data. All indices show that the model fit is satisfactory, and all elements may be employed in Structural

Equation Modelling (SEM) path analysis.

Technological Competence (TC), the construct has three items with fit indices results as follows: CFI, TLI, and NFI are 0.901, 0.908, and 0.905 accordingly. This indicates that the model accurately represents the data. All indices show that the model fit is satisfactory, and all elements may be employed in Structural Equation Modelling (SEM) path analysis.

Firm Performance (FP), the construct has three items with fit indices results as follows: CFI, TLI, and NFI are 0.968, 0.904, and 0.965 accordingly. This indicates that the model accurately represents the data. All indices show that the model fit is satisfactory, and all elements may be employed in Structural Equation Modelling (SEM) path analysis.

In summary from the second validity test for DR (Digital Resiliency) that separate by technology was a lot more improve for model fit compared to combine technology earlier the summary of Goodness fit indices is present in Table 7.

Table 7 Goodness of Fit (Incremental fit indices) Summary by Construct

ITEMS	CFI	TLI	NFI
TL (Transformation Leadership)	0.982	0.963	0.968
Separate 3 Technology Test			
DR (Digital Resiliency) – Collaboration Technology	0.957	0.929	0.924
DR (Digital Resiliency) – CyberSecurity Technology	0.939	0.941	0.938
DR (Digital Resiliency) – Cloud -Managed Technology	0.931	0.994	0.929
TC (Technological Competence)	0.901	0.908	0.905
FP (Firm Performance)	0.968	0.904	0.965

Refer to: CFI> 0.90 (Marsh, Hau, & Wen, 2004), TLI/NFI > 0.90 (Bentler and Bonnet, 1980)

Structural Equation Modelling (SEM) Analysis

Structural Equation Modelling (SEM) was used to do the inferential analysis for this study. The model fit was tested, and path analysis was performed using a few analysis tools. SEM is a good way to test a model or the internal relationship between various constructs with complicated relationships. The model's goodness of fit, SEM results, and hypothesis testing are all discussed in this section.

Goodness of fit of the model

The goodness of fit of the model will be evaluated using the criteria specified in Chapter 3 in the same way as the construct model fit test. For this study, we will leverage the Incremental fit index as a reference to the level of acceptance of CFI> 0.90 (Marsh, Hau, & Wen, 2004), and TLI/NFI > 0.90 (Bentler and Bonnet, 1980) for testing individual constructs and the overall model fit. The Comparative Fit Index (CFI) (adapted from the Normed Fit Index (NFI)) (Bentler & Bonett, 1980). If CFI is more than 0.90, the model matches the empirical data. If CFI is

between 0.90-0.95, the model is reasonably compatible with empirical evidence (Diamantopoulos et al., 2000; Kaplan, 2008). If CFI is more than 0.95, the model is reasonably compatible with actual data (Diamantopoulos et al., 2000; Kaplan, 2008; Schumacker & Lomax, 2004). Table 8 will present the findings and result of the model fits based on the level of acceptance (Incremental fit indices) for the research model to be accepted.

The model with fit indices results as follows: CFI, TLI, and NFI are 0.992, 0.914, and 0.902 accordingly. This indicates that the model accurately represents the data. All indices show that the model fit is satisfactory, and all elements may be employed in Structural Equation Modelling (SEM) path analysis base on the acceptance of Incremental fit indicators.

And for other goodness fit index measurement result as follows: P-Value (Chi-Square), RMIN/DF, RMSEA, RMA and GFI are 0.72, 2.415, 0.055, 0.360 and 0.772 that most result show that the model is fit and all elements may be employed in Structural Equation Modelling (SEM) path analysis for next process step of analysis.

Table 8 Goodness of fit of the model

ITEMS	P-Value	CMIN/DF	RMSEA	RMA	GFI	CFI	TLI	NFI
Overall Model Fit	0.72	2.415	0.055	0.360	0.772	0.992	0.914	0.902

Refer to Incremental fit indices we will focus on CFI> 0.90 (Marsh, Hau, & Wen, 2004), TLI/NFI > 0.90 (Bentler and Bonnet, 1980)

SEM Outcome (Proposed Model)

The fit indices were tested, and the proposed model had an adequate fit to the data. The final analysis is the path analysis which tests and quantifies the relationship between each variable in the research by analyzing the regression weights and standardized regression weights.

For this study, we are working on structural equation modeling (SEM) using an analytical tool for quantitative data analysis. Before evaluating the whole CFA model, each of the measurement models (CFA). And we are looking for a highest validity and reliability of the measurement models, then we do 2-time validity testing result between combine DR (Digital Resiliency) 3 technology together (Including Collaboration technology, CyberSecurity technology and Cloud-Managed technology together 10 items), refer to validity test result of combine DR (Digital Resiliency) and compare with separate DR (Digital Resiliency) testing, Collaboration technology (4 items), CyberSecurity technology (4 items), and Cloud-managed technology (2 items). All validity test result is present in Table 9.

From this 2-time validity testing, we can get the better result from **separate**

process step of DR (Digital resiliency). The overall structural model was found to be statistically valid and reliable. Composite Reliability (CR) and AVE (Average Variance Extracted) value from both transformation leadership and resiliency is much more improve to the level of acceptance.

Table 9 Second Validity and Reliability Test (CR & AVE Value)- Separate DR

Variable	Cronbach's Alpha	CR	AVE	Firm Performance	Collab	TL	TC	Cyber Security	Cloud-Managed
(FP) Firm Performance	0.716	0.755	0.534	**0.731**					
Collaboration Technology	0.856	0.800	0.572	0.122	**0.756**				
(TL) Transformation Leadership	0.623	0.646	0.390	0.206	0.232	**0.624**			
(TC) Technological Competence	0.720	0.756	0.519	0.273	0.356	0.343	**0.721**		
Cyber Security Technology	0.856	0.817	0.598	0.269	0.677	0.262	0.344	**0.773**	
Cloud-Managed Technology	0.763	0.769	0.626	0.317	0.631	0.576	0.457	0.770	**0.791**

From Separate DR validity test, we found that Cronbach's Alpha from Transformation leadership is still below 0.7, Convergent Validity: the AVE for Digital resiliency is improve and above 0.5 for all 3 technology, CR and Cronbach's Alpha between range of 0.60 - 0.70 (Ghozali, 2014) is acceptable. With this study we can leverage, all indices show that the model fit, satisfactory, and all elements may be employed in Structural Equation Modelling (SEM) final path analysis as present in the following figure.

Table 10 Summary of coefficients within the model

Factor			Coefficient	P-Value
Technological Competence	→	Transformation Leadership	.232	***
Transformation Leadership	→	Cloud-Managed Technology	.903	***
Technological Competence	→	Cloud-Managed Technology	.383	***
Transformation Leadership	→	CyberSecurity Technology	-.598	***
Technological Competence	→	CyberSecurity Technology	.172	.033
Cloud-Managed Technology	→	CyberSecurity Technology	1.043	***
Transformation Leadership	→	Collaboration Technology	.218	.062
Technological Competence	→	Collaboration Technology	.150	.053
CyberSecurity Technology	→	Collaboration Technology	.600	***
Collaboration Technology	→	Firm Performance	-.071	.016
CyberSecurity Technology	→	Firm Performance	.075	.069
Cloud-Managed Technology	→	Firm Performance	.090	.116
Technological Competence	→	Firm Performance	.106	.005
Transformation Leadership	→	Firm Performance	.030	.676

** P Value <0.05 ** P Value <0.01 ***P Value <0.001*

For this study we also have additional testing about the possibility of mediator role and mediator role from DR (Digital Resiliency) by Technology included Collaboration, CyberSecurity and Cloud-managed as a mediator role between Transformation leadership to Firm performance and Technological competence to Firm performance and the testing result has shown in following table below included the result of testing moderator role by Technological competence, between relationship of Transformation leadership and Firm performance.

Mediators are frequently called intermediary variables because they often reflect the mechanism through which an effect happens. They define the how or why of a (usually well-established) link between two other variables. An indirect effect is another term for this. For this study transformation leadership can increase level of SMEs firm performance, but this benefit is mediated by the Technological competence. However, the mediation package method is an important and flexible and statistically powerful approach for this study.

Digital resiliency (including Collaboration, CyberSecuirty, and Cloud-managed technology) playing as the **mediator** role between transformation leadership to Firm performance

Table 11 Digital resiliency as **mediator** role between Transformation leadership to Firm Performance

Variable	Direct Effect w/o mediate on Firm Performance	Direct Effect with mediate on Firm Performance	Indirect Effect on Firm Performance	LCI	UCI	Outcome
Digital resiliency (Collaboration technology)	0.103**	0.077	0.026	0.007	0.048	Full mediate
Digital resiliency (CynerSecurity technology)	0.103**	0.040	0.063	0.033	0.096	Full mediate
Digital resiliency (Cloud-managed technology)	0.103**	-0.016	0.119	0.081	0.159	Full mediate

** P-Value <0.05 ** P-Value <0.01 *** P-Value <0.001*

Leveraging the SEM outcome and **Figure 10** Final path model with standardized coefficients and refer to the relationship between transformation leadership to firm performance path, the result show that this not performed together with coefficient is 0.03, and "Not Accepted" outcome from the hypothesis test. Then we continue doing more analysis with the mediate test, the result by each technology test as follows.

Digital resiliency (Collaboration technology) test, the result of this testing with all the valid value of Direct Effect w/o mediate on Firm Performance, Direct Effect with mediate on Firm Performance, Indirect Effect on Firm Performance, LCI, UCI and Outcome: 0.103*, 0.077, 0.026, 0.007, 0.048, and Full mediate. With this result can explain the fact that transformation leadership without mediator will not make any impact to firm performance, the mediate test result show "Full mediate" this technology can help digitize SMEs firm performance by leverage Collaboration technology platform for example web, video conference will help both internal between leadership and employees, business to customer, supplier, and partner with this can lead to firm performance improvement for both financial (revenue growth & profitability) and non-financial (product/ process innovation).

Digital resiliency (CyberSecurity technology) test, the result of this testing with all the valid value of Direct Effect w/o mediate on Firm Performance, Direct Effect with mediate on Firm Performance, Indirect Effect on Firm Performance, LCI, UCI and Outcome: 0.103*, 0.040 0.06, 0.033, 0.096, and Full mediate. With this result can explain the fact that transformation leadership without mediator will not make any impact to firm performance, the mediate test result show "Full mediate" this technology can help digitize SMEs firm performance by leverage CyberSecurity technology platform for protect firm from cyber-crime, malware attack, and improve internal and external security for every process from working outside while we are in the pandemic situation. This can lead to firm performance improvement

for both financial (revenue growth & profitability) and non-financial (product/ process innovation). Additional benefit for firm with CyberSecurity technology can bring in more customer confidential and trust when they have a business process with us. They can confident that all of their information is well protection and safe.

Digital resiliency (Cloud-managed technology) test, the result of this testing with all the valid value of Direct Effect w/o mediate on Firm Performance, Direct Effect with mediate on Firm Performance, Indirect Effect on Firm Performance, LCI, UCI and Outcome: 0.103*, -0.016, 0.119, 0.081, 0.159, and Full mediate. With this result can explain the fact that transformation leadership without mediator will not make any impact to firm performance, the mediate test result show "Full mediate" this technology can help digitize SMEs firm performance by leveraging Cloud-managed technology for provide all efficiency visibility end to end for overall IT network in SMEs business. Simply package for all cloud platform and help SMEs to start with small investment and put more investment when the business grown up later. Cloud technology will help more flexibility of firm investment, productivities, and smarter process while you are in the virtual office and external security for every process from working outside while we are in the pandemic situation. This can lead to firm performance improvement for both financial (revenue growth & profitability) and non-financial (product/ process innovation). The additional benefit for SMEs firm with Cloud-managed technology can save a lot of IT workforce, pay as you grow, will definitely lead to better firm performance, and efficiency.

Table 12 Digital resilience as **mediator** role between Technological competence to Firm Performance

Variable	Direct Effect w/o mediate on Firm Performance	Direct Effect with mediate on Firm Performance	Indirect Effect on Firm Performance	LCI	UCI	Outcome
Digital resiliency (Collaboration technology)	0.339***	0.334***	0.005	-0.030	0.364	Partial
Digital resiliency (CynerSecurity technology)	0.339***	0.260***	0.079	0.046	0.115	Partial
Digital resiliency (Cloud-managed technology)	0.339***	0.268***	0.071	0.038	0.106	Partial

** P-Value <0.05 ** P-Value <0.01 *** P-Value <0.001*

Leveraging the SEM outcome and **Figure 10** Final path model with standardized coefficients and refer to the relationship between technological

competent to firm performance path, the result show that this construct very well performed together with coefficient is 0.106***, and "Accepted" outcome from the hypothesis test. We do interesting and continue doing more analysis with the mediate test, the result by each technology test as follows

Digital resiliency (Collaboration technology) test, the result of this testing with all the valid value of Direct Effect w/o mediate on Firm Performance, Direct Effect with mediate on Firm Performance, Indirect Effect on Firm Performance, LCI, UCI and Outcome: 0.339***, 0.334***, 0.005, -0.030, 0.364, and Partial mediate. c for both financial (revenue growth & profitability) and non-financial (product/ process innovation).

Digital resiliency (CyberSecurity technology) test, the result of this testing with all the valid value of Direct Effect w/o mediate on Firm Performance, Direct Effect with mediate on Firm Performance, Indirect Effect on Firm Performance, LCI, UCI and Outcome: 0.339***, 0.260***, 0.079 0.046 0.115, and Partial mediate. With this result can explain the fact that technological competence without mediator is already well performed and make an impact to firm performance, the mediate test result show "Partial mediate" means that technological competence have direct impact to firm performance itself, and we can have the path by adding CyberSecurity technology as an mediator also can bring in impact to SMEs firm performance. Technology competence is the level of SMEs firm capability on digital technology. Leverage CyberSecurity technology platform for protect firm from cyber-crime, malware attack, and improve internal and external security for every process from working outside while we are in the pandemic situation. This can lead to firm performance improvement for both financial (revenue growth & profitability) and non-financial (product/ process innovation). Additional benefit for firm with CyberSecurity technology can bring in more customer confidential and trust when they have a business process with us. They can confident that all of their information is well protection and safe. The firm can keep this as differentiation when compare to other SMEs firm business.

Digital resiliency (Cloud-managed technology) test, the result of this testing with all the valid value of Direct Effect w/o mediate on Firm Performance, Direct Effect with mediate on Firm Performance, Indirect Effect on Firm Performance, LCI, UCI and Outcome: 0.339***, 0.268***, 0.071, 0.038, 0.106, and Partial mediate. With this result can explain the fact that transformation leadership without mediator will not make any impact to firm performance Cloud technology will help more flexibility of firm investment, productivities, and smarter process while you are working outside of the physical office and external security for every process from working outside while we are in the pandemic situation. This can lead to firm performance improvement for both financial (revenue growth & profitability) and non-financial (product/ process innovation. The additional benefit for SMEs firm with Cloud-managed technology can save a lot of IT workforce, and also build up a good capability IT champion on the office, pay as you grow, and will definitely lead to better firm performance.

Moderator, the influence of a third variable, Z, on the relationship between variables X and Y can likewise be tested using moderation analysis. Moderation examines when or under what conditions an effect occurs rather than proving a causal link between these other factors. The character of a connection can be strengthened, weakened, or reversed through moderators.

Technological competence playing as the **moderator** role between transformation leadership to Firm performance.

Table 13 Technological Competence as moderator role between Transformation leadership to Firm Performance

Variable	Coefficient & P-Value w/o Moderator	Coefficient & P-Value with Moderator	Outcome
Technological competence	-0.009	-0.068	Not Applicable

**P-Value <0.05 **P-Value <0.01 ***P-Value <0.001*

Table 14 Coefficients values for all variable included moderator test result

	Variable Names	Unstandardized Regression Coefficients
Independent Variable	Transformation leadership	-0.009
Moderator	Technological competence	0.301
Dependent Variable	Firm Performance	-0.068

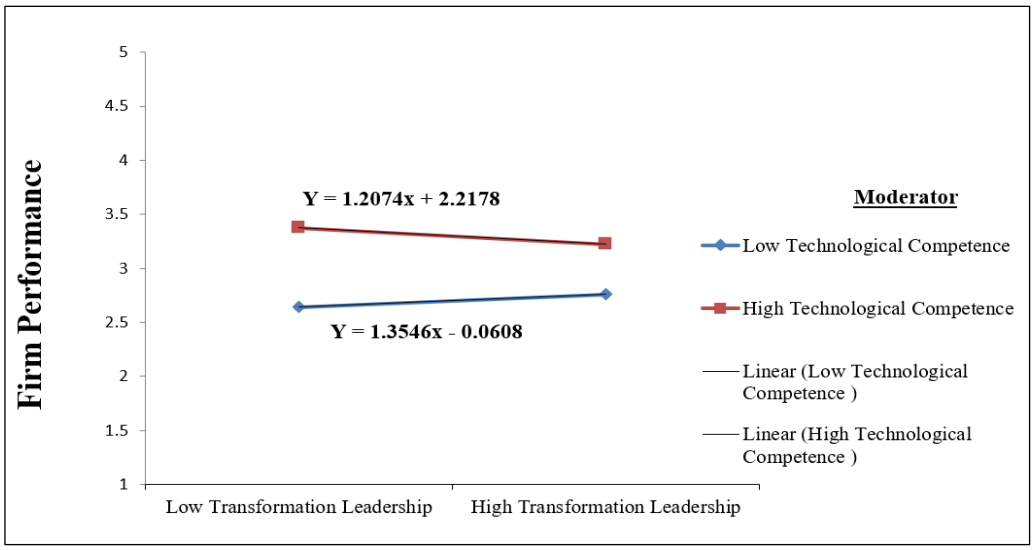

Figure 9 Moderator test result

Leveraging the SEM outcome and **Figure 10** Final path model with standardized coefficients and refer to the relationship between transformation leadership to firm performance path, the result show that this not performed together with coefficient is 0.03, and "Not Accepted" outcome from the hypothesis test. Then we continue doing more analysis with the moderator test, the result of Technological competence as a moderator is "Not Applicable" the value of Coefficient & P-Value w/o Moderator, and Coefficient & P-Value with Moderator are -0.009, and -0.068. And we less different from the lower linear equation (Y=1.3546X-0.0608) and the higher linear equation (Y=1.2074X+2.2178). In conclusion, technological competence do not adding any power on the relationship between transformation leadership to firm performance, leadership with or without technological competence is not make any change or impact to Thailand SMEs firm performance in this study.

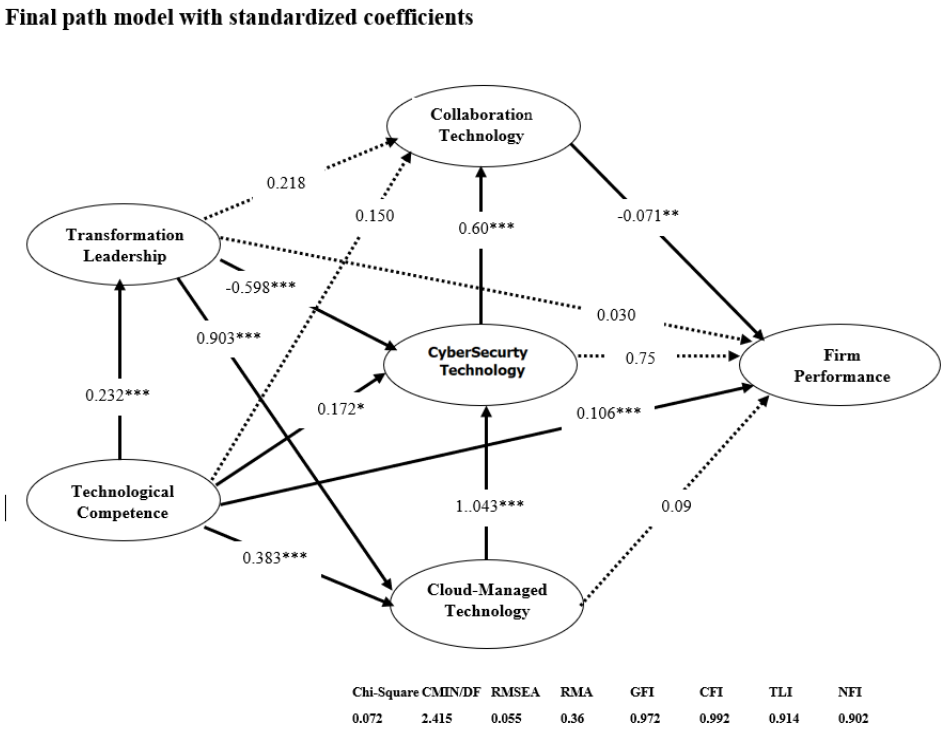

Figure 10 Final path model with standardized coefficients

Hypothesis testing

The statistical with significant coefficients vary from -0.598 (Transformation leadership to cybersecurity technology) to 1.043 (cloud-managed technology to cybersecurity technology). The important pathways include technological competence to transformation leadership, transformation leadership to cloud-managed technology, technological competence to cloud-managed technology, technological competence to cybersecurity technology, cybersecurity technology to collaboration technology, collaboration technology to firm performance, and technological competence to firm performance.

The non-significant paths are from transformation leadership to collaboration technology, technological competence to collaboration technology, cybersecurity to collaboration technology, cybersecurity technology to firm performance, cloud-managed technology to firm performance, and transformation leadership to firm performance.

There are 21 hypotheses in this research of which the results are summarized in below table; H1-H4, are about testing the relationship between transformation leadership to firm performance and firm's digital resiliency (with 3 technologies separately) on collaboration technology, cybersecurity technology, and cloud-managed technology. For both H3 (Transformation leadership has significantly positive related to Firm's digital resiliency (CyberSecurity technology) and H4 (Transformation leadership has significantly positive related to Firm's digital resiliency (Cloud-managed technology) are accepted. H5-H9 are about testing the relationship between technological competence to firm performance and firm's digital resiliency (with 3 technologies separately). The accepted hypothesis are H5 (Technological competence has significantly positive related to Firm performance), H7 [Technological competence has significantly positive related to Firm's digital resiliency (CyberSecurity technology)], H8 [Technological competence has significantly positive related to Firm's digital resiliency (Cloud-Managed technology)], and H9 [Technological competence has significantly positive related to Transformation leadership]. H10-H14 between digital resiliency in a different of technology testing referring to collaboration, cybersecurity and cloud-manage to firm performance, and between technology itself. The accepted hypothesis are H12[Firm's digital resiliency (Collaboration technology) has significantly positive related to Firm performance], H13 [Firm's digital resiliency (CyberSecurity technology) has significantly positive related Collaboration technology], and H14 [Firm's digital resiliency (Cloud-Managed technology) has significantly positive related to CyberSecurity technology]. For this study we also testing mediator role (H15-20), and moderator role (H21). The accepted hypothesis are all of them, H15[The relationship between Transformation leadership to Firm performance will

mediate by Firm's digital resiliency (Collaboration technology)], H16[The relationship between Transformation leadership to Firm performance will mediate by Firm's digital resiliency (CyberSecurity technology)], H17[The relationship between Transformation leadership to Firm performance will mediate by Firm's digital resiliency (Cloud-managed technology)], H18[The relationship between Technological competence to Firm performance will mediate by Firm's digital resiliency (Collaboration technology)], H19[The relationship between Technological competence to Firm performance will mediate by Firm's digital resiliency (CyberSecurity technology)] and H20[The relationship between Technological competence to Firm performance will mediate by Firm's digital resiliency (Cloud-managed technology)].

Those with the outcome "Not Accept" are H1 (Transformation leadership to Firm performance), H2 [Transformation leadership has significantly positive related to Firm's digital resiliency (Collaboration technology)], H6[Technological competence has significantly positive related to Firm's digital resiliency (Collaboration technology)], H10[Firm's digital resiliency (CyberSecurity technology) has significantly positive related to Firm performance], H11[Firm's digital resiliency (Cloud-Managed technology) has significantly positive related to Firm performance], and H21 [The relationship between Transformation leadership to Firm performance will moderate by Technological competence]

Table 15 Hypothesis testing and outcome

Hypothesis	Statement	Outcome
H1	Transformation leadership has significantly positive related to Firm performance	Not Accepted
H2	Transformation leadership has significantly positive related to Firm's digital resiliency (Collaboration technology)	Not Accepted
H3	Transformation leadership has significantly positive related to Firm's digital resiliency (CyberSecurity technology)	Accepted
H4	Transformation leadership has significantly positive related to Firm's digital resiliency (Cloud-managed technology)	Accepted
H5	Technological competence has significantly positive related to Firm performance	Accepted
H6	Technological competence has significantly positive related to Firm's digital resiliency (Collaboration technology)	Not Accepted
H7	Technological competence has significantly positive related to Firm's digital resiliency (CyberSecurity technology)	Accepted
H8	Technological competence has significantly positive related to Firm's digital resiliency (Cloud-Managed technology)	Accepted
H9	Technological competence has significantly positive related to Transformation leadership	Accepted
H10	Firm's digital resiliency (CyberSecurity technology) has significantly positive related to Firm performance	Not Accepted
H11	Firm's digital resiliency (Cloud-Managed technology) has significantly positive related to Firm performance	Not Accepted
H12	Firm's digital resiliency (Collaboration technology) has significantly positive related to Firm performance	Accepted
H13	Firm's digital resiliency (CyberSecurity technology) has significantly positive related Collaboration technology	Accepted
H14	Firm's digital resiliency (Cloud-Managed technology) has significantly positive related to CyberSecurity technology	Accepted
H15	The relationship between Transformation leadership to Firm performance will **mediate** by Firm's digital resiliency (Collaboration technology)	Accepted (Full Mediate)
H16	The relationship between Transformation leadership to Firm performance will **mediate** by Firm's digital resiliency (CyberSecurity technology)	Accepted (Full Mediate)
H17	The relationship between Transformation leadership to Firm performance will **mediate** by Firm's digital resiliency (Cloud-managed technology)	Accepted (Full Mediate)
H18	The relationship between Technological competence to Firm performance will **mediate** by Firm's digital resiliency (Collaboration technology)	Accepted (Partial Mediate)
H19	The relationship between Technological competence to Firm performance will **mediate** by Firm's digital resiliency (CyberSecurity technology)	Accepted (Partial Mediate)
H20	The relationship between Technological competence to Firm performance will **mediate** by Firm's digital resiliency (Cloud-managed technology)	Accepted (Partial Mediate)
H21	The relationship between Transformation leadership to Firm performance will **moderate** by Technological competence	Not Applicable

Conclusion and discussion

The objective of this study was to examine the relationship between technological competence, leadership transformation, and the performance of SMEs and to discover how SMEs in Thailand may overcome critical constraints and enhance their success by embracing digital technology to improve their operations and boost the degree of sustainability in their businesses.

The study was created and tested a structural equation model (SEM) of the relationship between transformational leadership and technological competency, their impacts on the success of product and process innovation, and firm financial performance. The study refers to Resource-Based View, and Dynamic Capability related to this study. The resource-based view (RBV) of the firm is a starting point for investigating firms' internal resources as sources of competitive advantages, such as knowledge and capabilities (Barney, 1991; Wernerfelt, 1984). The dynamic capabilities perspective, which extends the resource-based viewpoint, emphasizes the ongoing development of capabilities that underpin firm resources (Lado and Wilson, 1994; Mowery et al., 1996; Teece et al., 1997). It is not only resources that are important, but also how managers coordinate and integrate activities within the firm in order to best utilize and improve these resources over time (Teece et al., 1997). The knowledge-based view of the firm (Grant and Baden-Fuller, 1995; Conner and Prahalad, 1996) emphasizes the firm's ability to integrate external sources of explicit and tacit knowledge, which is consistent with the evolutionary perspective of building and extending firm capabilities.

The result of this shows technological competence is positively relationship with firm performance, and also has positive relationship to transformation leadership with significantly result confirm by data analysis. By the way, for transformation leadership there is no significantly positive impact to firm performance, and the same result after adding technological competence as moderator and moderate transformation leadership to firm performance, the result still not strong enough in this case.

This research is beneficial to both SMEs business owner, manager, and related key stakeholder by provide useful key findings information. SMEs can leverage this information to digitize and building up their own business strategy. And this study also benefits to local government and SMEs associations who provide support & drive SMEs business in Thailand. Finally, this study able to develop a reliable and generalized framework about firm performance and success in SMEs context for current and future study.

The conceptual model was created and tested a structural equation model (SEM) of the relationship between constructs relationship. This research also seeks to explore how SMEs in Thailand may overcome major problems and accelerate achievement by leveraging digital technology to improve company resilience and achieve even greater levels of firm performance and success. The conceptual SEM was constructed based on current research on leadership styles, technological competency, digital resiliency, and firm performance in

SMEs. Previous research concentrated on the relationship between leadership styles and technology investment in the enterprise size of business rather than SMEs segmentation. Digital resilience is the top new technology including collaboration technology that including web, video conference platform for helping SMEs to improve engagement internal and external virtually while all SMEs in Thailand in the difficulty of the pandemic impact, CyberSecurity technology is a critical for every SMEs business that limitation or lacking of IT protection. Cyber-crime is the fastest grow up with a big total business opportunity for them to attack commercial and SMEs business segment more than ever since last 2 years. Cloud-managed technology is also important to all Thailand SMEs to start digitize their business and able to spend less from day one. All industries will need to catch up very fast to recover from the COVID-19 issue, which has impacted both locally and worldwide for more than two years.

The variable chains connecting transformation leadership to firm performance, digital resiliency to firm performance, and technological competence to firm performance are also studied in various sets of variables. Digital resiliency which included top 3 technologies None have incorporated the variables to study in the context of Thailand SMEs especially while we are facing the pandemic situation. That fastest internal capability to leverage all the competency will help SMEs to able to survive and able to manage for any crisis in the near future. The following primary research questions were derived from this argument, what are the major impact factors of the independent variable which included transformation leadership, technological competence, and digital resiliency with the top three technology which appear to influence firm performance as the dependent variable for Thailand SMEs, especially in the COVID-19 situation, is there a meaningful relationship between transformational leadership, technological competency, and digital resiliency in Thailand SME's firm performance, and is there a major influence on Thailand SMEs company performance with a difference in digital resiliency between collaboration, cybersecurity, and cloud-managed technology approach.

To fulfill the gap of knowledge in the literature, a set of 21 hypotheses involving direct and indirect linkages between components were developed and tested to answer the study questions. The conceptual model was validated using the findings of a self-administered survey completed by respondents. This study made use of non-probability sampling.

Total effect analysis reveals the importance and priority of building up the competency in a few areas for better firm performance. The biggest effect is from Technological competence to digital resilience followed by technological competence to transformation leadership. Understanding the relationships and the extent of effect between these constructs can help Thai SMEs more readiness to put all the comprehensive plans, and priorities, and implement their business strategy for growth and ambition to take advantage of new opportunities in current and future crises that may

possibly impact SMEs business in the near future.

In conclusion, the results showed that transformation leadership and digital resiliency is not significantly direct impact firm performance. By adding digital resiliency as a mediating effect to transformation leadership is also applicable to enhancing firm performance. Technological competence plays a significant role by providing a direct effect between transformation leadership, digital resiliency, and firm performance.

As a result, we argue that if Thailand's SMEs intend to improve their performance during pandemics, they should consider developing company strengths and competencies such as transformational leadership, digital resiliency, and technological competence. Thailand's SMEs must also understand the mechanisms of each capability's interactions. This study establishes an empirical model for leadership, technology, and digital resiliency capabilities for increasing Thailand SMEs' business performance during a pandemic or crisis.

Managerial implication

From this study, the following are three implications for Thailand SMEs should consider improving performance by leveraging a suitable type of leadership, and bringing in the right technology to enhance the firm's capability and readiness for current and coming new turbulence in the near future.

First, leadership and technology skills are crucial in defining a vision, aim, and strategy that helps firms to digitize and become more robust and adaptive to market changes or future crises in a changing corporate environment. Thailand's SMEs should consider re-educating both present and new management teams. Effective leadership is critical to the success of any company. A strong transformation leadership with high technological competence can create more activities, and leverage more innovative technology, to secure sustainable growth. Moreover, improved knowledge for better product brand development, more understanding of modern business management and process, and efficient marketing knowledge and information to drive and lead beneficent to the firm.

Second, improved technological expertise can help SMEs achieve greater efficiency through process improvements or product redesign, boosting their chances of earning a competitive advantage. Furthermore, a company with a high level of technical competence outperforms those with a low level of technological competence in terms of innovative success as well as financial firm performance, including revenue and growth. To be different and build up more value-added to the firm, SMEs should consider building technology capability, in the new digital economy we are not able to ignore technology for enhancing engagement with internal employees, customers, suppliers, or business partners. SMEs invest comparably little in technology. For example, in hospitality businesses i.e., Resort/Boutique Hotels the company should invest in the website, and social media channels, and join mobile application platforms to explore more business opportunities. SMEs' s customers can be anywhere in this world and e-commerce platforms also have more

than 3X growth. SMEs should grab this opportunity as fast as possible. Technology will bring in a borderless network between SMEs and customers nationwide.

And last, according to the findings of this study, Thailand's SMEs should be required to begin digitizing and developing their business strategies, and local government/SMEs groups might provide more support. Digital transformation/innovation also assists SMEs in increasing business revenue and growth, improving customer experience, differentiating, and remaining competitive, attracting, and retaining talent, and finally improving collaboration within the SME's organization in order to develop a long-term reliable and generalized framework for firm performance and success in the context of SMEs for current and future research. Technology is being used by SMEs. There have been several inquiries in the media and among the general public concerning the new or next normal. SMEs business owners or leadership in the organization together with technological competence is playing a very important role in the new normal and what we should intend to thrive in the post-covid world. The faster SMEs can adapt and evolve, the sooner they may embrace more business possibilities and achieve success.

Limitations and future research

This study has various limitations that should be considered when interpreting its findings. First, this research only focuses on the constructs identified from theory and previous study for example transformation leadership, technological competence, and firm performance by testing relationship and impact between constructs based on the conceptual model. Other constructs may exist, for example: firm business strategy and direction, firm structure, firm investment, and specific vertical. According to Leadership, this study investigated only transformational leadership as, during the pandemic situation, we are seeing more importance and priority for transformation leadership. In future research, we may consider exploring to other newest types of leadership style that should be more useful and may be suitable to the current market i.e., Strategist leadership, Innovation leadership, and Digital leadership.

Second, this study focused entirely on Thailand SMEs that have between 50 – 499 employees without specifically on any industries. Future studies could include industry to be one of the measurements, as each industry may have a different type of business focus, level of concerning on leadership, and technological and performance measurement. Examples of industries i.e., hospitality, healthcare, manufacturing, retail business, or e-commerce. Moreover, this research do not put any location tracking of SMEs. The possibility of different location/region can make a difference of impact, between Bangkok and up country.

Third, the size of the business has a wide range from 50 to 499 employees, between firm that have 50-99 employees and 400-499 is a bit bigger gap. From this study, we found that both smallest size and biggest size together 2 groups contribute the biggest portion with more than 60%.

The result of analysis for both goodness fit by construct and model fit is acceptable. For the future study, if we could specifically size the firm to be closer, we should get more accurate key findings, and recommendations.

The final limitation is the measurement of performance. The subjective scale of perceived performance that the company performs for both financial and non-financial i.e., revenue, growth, product, and process innovation. In addition, we only ask for the last 3 years that it's not a normal market situation from the impact of COVID-19 we may see lower perceived performance both financial and innovation than normal situation. In the future study, we could consider only one or two measurements and adding longer year of perceived performance.

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