

The Dynamic Capabilities of Digital Transformation for Improving Product Customization and Innovation

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Abstract:

Digital transformation has driven the dynamic growth of firms over the last two decades. Currently, it is now being implemented by many firms including small and medium sized enterprises. This quantitative study explores the effects of digital transformation with reference to digital marketing and innovation, which are said to enhance the performance of firms in the automotive parts industry. The 280 usable subjects from total number of 1,800 SMEs listed in Thai auto-parts manufacturers association were participated in this study. The questionnaires were developed from reviewing the literature and supported by experts' suggestion. There are two mediators in the research framework as customization and innovation, then, Structural Equation Model is a statistical used for testing the hypotheses. The results indicate digital transformation exerts a significant effect on both digital marketing and innovation. As well, the indirect effect of digital transformation on firms' performance is evident through digital marketing and innovation. These results support that auto-part firms should applied digital transformation appropriately with digital marketing and innovation. Those functions contribute to firm performance.

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I. Introduction

Increasingly, digital transformation is being implemented in many kinds of businesses over a large range of industries. It is very evident that using digital technology has created value for firms compared to those which do not operate with digital or related technologies (Saengchai & Jermstittiparsert, 2019; Syazali, Putra, Rinaldi, Utami, Widayanti, Umam, & Jermstittiparsert, 2019). It is now deemed a strategic imperative to use digital technologies in all aspects of management and production (Hess, Matt, Benlian, & Wiesböck, 2016; Singh & Hess, 2017). However, we are still in the early stages of investigating this phenomenon, since the digital transformation is very much an ongoing one with rapid changes being a part of the process. Only a few empirical studies concentrate on how digital transformation has a direct and indirect effect on marketing function. These days, marketing

activities are an integral aspect of digital marketing and innovation. Various organizations - both business and non-profit ones - use digital technology such as mobile devices, social media application, software, and data analytics as their common tools for monitoring business marketing activities. Compared to older marketing tools such as the traditional mass media and communication systems, digital technology can support marketing functions in terms of efficiency, cost reduction, enhanced customer experiences, and flexible management. The marketing is a function along the supply chain. It is the most fundamental activity of business firms ranging in size from giant to small businesses where responsibility for customers is a core value. In addition, customers now strive for more personalized values, which requires innovation for specific products and specifically business customers. A crucial challenge for management is

to balance the exploitation of resources with the dynamics of digital technology and employees' skills or expertise in responding to external situations such as customer experiences and expectations.

To explore the links between the factors mention above, we found that the dynamic capabilities concept is one of the most interesting topics to investigate, particularly in terms of how firms operate and respond to rapid changes in both marketing and technology (Di Stefano, Peteraf, & Verona, 2014). Thailand's automotive industry is an important aspect of its economy as it drives the economic growth of the country. Foreign direct investment by automobile firms is very pronounced in Thailand and has been so for more than three decades. This has resulted in automotive firms which supply materials and other services to the industry's manufacturers. Suppliers who are small and medium enterprises (SMEs) have to develop themselves to meet the requirements of their clients, these generally being multi-national enterprises. We consider here the level of development of innovation among these firms.

Digital transformation and digital marketing are relatively new concepts in Thailand. In the automotive firms' context, the following research questions (RQ) are posited: (RQ1): Does the digital transformation affect digital marketing? (RQ2) ; Does digital transformation affect innovation? (RQ3); Does digital marketing affect innovation? (RQ4), Do digital transformation and digital marketing affect firms' performance? (RQ5) ; and Does digital marketing have an indirect effect on firms' performance through digital marketing and innovation? This study investigates the link between digital transformation, digital marketing, and innovation and especially how these all influence automotive part firms' performance. We focus our interest on the non-financial aspects of firms' performance.

II. Theoretical Overview and Prior Studies

This study examines automotive firms that are SMEs in Thailand's automotive industry. This section explains the definition of SMEs in Thailand, digital transformation, digital marketing, and innovation.

Small and Medium Enterprises (SMEs):-

The term SMEs in this study is defined according to the Office of Small and Medium Enterprise Promotion (OSMEP) in Thailand. The term is used in the sense that a SME firm has less than 200 employees and capital between 30-200 million Thai baht.

Digital Transformation:-

Digital transformation combines several innovations such as technologies, structures, practices, values, cultures, and how modern organizations function online in virtually all their procedures (Hinings, Gegenhuber, & Greenwood, 2018). The use of digital technology can improve operations through the development of a modern and new business model (Fitzgerald, Kruschwitz, Bonnet, & Welch, 2014). It is a form of radical change that influences virtually all structures, values, and practices (Pache & Santos, 2013; (Boxenbaum & Jonsson, 2017). Digital transformation is about advanced technology that requires updated and specific skills for certain processes. Continuous improvements make digital technology very essential for both individuals and organizations. Currently, digital transformation is playing a crucial role in business development with implications for production procedures and firms' structure (Oertwig, Gering, Thomas Knothe, & Rimmelspacher, 2019).

To understand this in more detail, we have to clearly define the relevant terminology. Currently, the innovations based on digital innovation have been extended to many areas of business operations. Innovation and in particular

digital innovation from an institutional perspective, then, is how digital technology enables firms to be more efficient (Hinings et al., 2018). According to the transformation-related terminology, strategic change refers to realigning firms' operational processes (Balogun & Johnson, 2005). Stakeholders - both internal and external - participate in firms' operations because they also have goals they need to achieve. Therefore, the definition of digital transformation can be summarized as firms reinventing their relationships with stakeholders such as suppliers, customers, and employees. From the macro perspective, digital transformation can be defined as a process of restructuring economies and in fact the overall system and society in which people live and work (Unruh & Kiron, 2017). Digital tools consist not only of social media which help communicate and interact with customers, but also support firms to deliver goods and services to their customers efficiently and effectively (Bouwman, Nikou, & de Reuver, 2019).

Alternatively, digital transformation is linked to the continuous development of technology such as 'Internet of things', cyber-physical systems, and others where disruptive change is now part-and-parcel of the industry landscape (Müller & Hopf, 2017). A new technology can help firms improve their processes and remove obsolete technology from the society and for business enterprises, the transformation to digital systems creates radical changes by connecting to the external environment to bring value and profitability to the company (Purchase, Parry, Valerdi, Nightingale, & Mills, 2011). Digital technology such as cloud computing and big data can help SMEs be much more efficient, economical and enjoy low operation costs (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013; Lucas Jr, Agarwal, Clemons, El Sawy, & Weber, 2013).

The change to digital technology will create value for firms' products and

goods/services and subsequently generate sustainable business performance (Rouse, 2005). Digital tools like big data are powerful for marketing in creating better customer relationships which will leader to better sustainability of business practices. Based on the above argument, the digital transformation sets the framework for new business models so that SMEs can make the most of new technologies (Loebbecke & Picot, 2015). SMEs in this study operate in the automotive industry and they occupy one part of the value chain in Thailand. These firms need to function well as vendors for the country's automobile producers and create well-linked and prompt outputs and information. SMEs can design their own digital transformation strategy so that they operate well when communicating with their partners (Goerzig & Bauernhansl, 2018). Management groups in charge of SMEs have to consider what they want from their investment in the digital transformation process (Bernaert, Poels, Snoeck, & De Backer, 2014).

The development of digital technology has provided existing opportunities for business firms to conduct their marketing strategies better. The revolution in digital communication which allows business firms to market themselves effectively emerged from the internet and various kinds of social networking known as Twitter, Facebook, Instagram and others. Marketers commonly utilize those tools for their digital marketing activities (Levy & Birkner, 2011). The rapid and widespread adoption of digital marketing has contributed to SMEs but also multi-national corporations doing better business than before. There has now been a transformation in communication channels so that now nearly every industry can be identified as a sub-branch of traditional marketing and uses modern digital channels for the placement of products (Royle & Laing, 2014). Social networks and media platforms normally interact between businesses

and individual customers. Digital marketing is just one example of business to business (B2B) activities that responds to the customization of products and goods and services. More decisions are made based on data-driven extrapolations and statistical heuristics (Valos, Ewing, & Powell, 2010). The marketer can respond accurately by using data mining techniques (Oliveira, Santos, Aguiar, & Sousa, 2014). In reality, multi-national firms are expanding their operations globally; those firms need to engage in digital communications with their suppliers that are based in many countries. Then, the digital transformation can be determined effect to innovation of firms. In addition, the rapid information from digital transformation process can support any firms to customize their product appropriately to the need of customers.

Product customization:-

Customization of the product refers to offering products or goods/ services that are tailored to individual customers' needs (Fels, Falk, & Schmitt, 2017). Customizing of B2B products requires the collaboration and shared knowledge of employees (Madhavaram & Hunt, 2017). Both parties need to engage in complex projects regarding the detailed requirements of products that need to be marketed and sold effectively. Digital technology has a moderating impact on several aspects of the relationship between buyers and suppliers such as knowledge, social, and task complexity (Boyd & Koles, 2019). The development of cloud computing-based data influences the requirement-centered and knowledge-diversified nature of customized B2B products (Jinghua, 2009). Moreover, big data analytics can facilitate B2B product innovation (H. Zhang & Xiao, 2019). This supports the sales function where the interface between suppliers and customer organizations is vital and must be ongoing in a trusted way (La Rocca, Moscatelli, Perna, & Snehota, 2016). As

well, the continuous development of big data has necessitated the design of products for customers' needs (S. Zhang, Xu, Gou, & Tan, 2017).

The firms in Thailand's automotive industry need to have innovation programs for their specific customers given those parts and materials will differ. Diffusion of digital technologies in the manufacturing industry offers new opportunities for firms to create innovative products so that they can remain competitive and unique in the marketplace (Abrell, Pihlajamaa, Kanto, vom Brocke, & Uebernickel, 2016). Firms can provide integrated solutions for their products and services by examining what the customers value, based on an assessment from the suppliers' perspective (Keränen & Jalkala, 2013). To achieve a good customizing strategy, those firms have to identify specific groups of customers. However, only rarely have studies looked into the outcomes of customization and innovation. This study addresses this gap by examining both digital transformation and customization in terms of their effect on innovation and firm performance.

Innovation in the SMEs:-

Innovation is considered to be a key element in achieving sustainable operations (Maier, Keppler, & Maier, 2014). Innovation capability refers to the potential to create innovation and add market value to the firm (Hogan, Soutar, McColl-Kennedy, & Sweeney, 2011; Laforet, 2011). SMEs operate along the value chain of the B2B context and in particular automobile producers have to develop innovative customer requirements and response strategies. However, the management of SMEs using traditional operational methods may not be able to compete with firms applying digital technologies. Innovation in the manufacturing firms can be classified as product and process innovation, which both remain complex and time-consuming processes (Greve & Salaff, 2001; Matar, Osborne, Garrett, & Gray, 2002). Moreover,

firms need to integrate knowledge from various disciplines to create successful product innovation (Howells, James, & Malik, 2003). Manufacturing innovation is closely linked to organizational culture where employees behaviors' will influence product and process development (Bratianu & Orzea, 2010; Cohen & Levinthal, 1990; Rivera-Vazquez, Ortiz-Fournier, & Rogelio Flores, 2009; C. L. Wang, 2008).

Culture is recognized by researchers as a key to understanding the relationship between firms' dynamic vision or processes and ability to innovate (Limaj, Bernroider, & Choudrie, 2016; Roberts, Galluch, Dinger, & Grover, 2012). SMEs have to adapt their innovation strategies to the internal and external environments (Ates & Bititci, 2011; Westrenius & Barnes, 2015). The major factor is the requirement of how internal knowledge and capabilities can lead to a better understanding of external knowledge. Unfortunately, Thai SMEs' financial limitations and information asymmetries are a barrier for to innovation (Barbaroux, 2014). Digital technology will help SMEs acquire the external information concerning customers more effectively. They have to create dynamic capabilities for using limited resources. Dynamic capability refers to firms' ability to reconfigure their resources appropriately to their competencies and industrial context (Teece, Peteraf, & Leih, 2016). Some SMEs have better products or goods/services but may not have not enough resources such as manufacturing facilities, marketing skills, and distribution capacities to make innovation

profitable (Sağ, Sezen, & Güzel, 2016). They have to create an innovation mechanism based on limited capacities in their organizational culture (Limaj & Bernroider, 2019). Information technology which is one aspect of digital technology highlights the importance of firms having innovation capabilities (Ortiz de Guinea & Raymond, 2020).

III. Research design

Data collection and sample:-

To test the proposed hypotheses, Thai SMEs operating in the automotive parts manufacturing industry have been classified by the Office of Small and Medium Enterprise Promotion (OSMEP). The total number of 1,800 companies (Thai Auto-Parts Manufacturers Association: TAPMA 2018). The participants are management representatives and they numbered 280. The questionnaires were developed based on a review of the literature with the questions linked to the recognized variables.

IV. Analysis

Demographics

The subjects of this study are SMEs operating in the automotive parts industry. The majority of respondents are: limited company, Thai business owner, having less than 50 employees, firm capital is less than 50 Million Baht, and firm year where they have operated for more than 15 years.

Table 1 Firm Demographics

	Sizes	Percentage
Business Type		
Public Company	14	5.0
Limited Company	220	78.6
Limited Partnership	46	16.4
Business Owner		
Thai	222	79.3
Foreigner	58	21.0
Employee Size		
<50	163	58.2
50-100	61	21.8
101-150	40	14.3
151-200	16	5.7
Capital (Million Baht)		
< 50	166	59.3
51-100	47	16.8
101-150	28	10.0
151-200	39	13.9
Firm years		
< 5	24	8.6
5-10	74	26.4
10-15	81	28.9
>15	101	36.1
Total	280	100

Measurement

According to the mediators introduced into our model, and for testing the interaction effect, Structural Equation Modeling is used to analyze

the complex data gathered for this study. Digital transformation is the independent variable, the two mediators are customization and innovation, and the dependent variable is firm performance.

Table 2 Mean, Percentage and Standard Deviation of Digital transformation

Digital transformation	$\bar{X}$	S.D.
DT1 You adjusted your production system by using software to create products that ensure your company differs from the competitor	5.41	1.31
DT2 Your organization adjusts its production system so that it is innovative and linked to upgrades in software	5.15	1.31
DT3 Your organization can increase gross sales putting information on the internet	5.35	1.18
Total	5.30	1.26
Customization	$\bar{X}$	S.D.
CM1 You focus on specific groups of customers	5.51	1.36
CM2 Your organization has experience in producing goods and services for	5.57	1.15

specific

groups of customers

CM3 You can predict customers' needs in the future and they will continue to purchase goods from you well into the future 5.54 1.09

CM4 You can identify clearly the target group of customers to whom you your products 5.55 1.10

Total 5.54 1.17
 $\bar{X}$ S.D.

Innovation

IN1 Your organization has applied technology to reduce working process for increasing work efficiency 5.46 1.23

IN2 Your organization devotes enough time to improve productivity 5.44 1.25

IN3 Your organization provides feedback to your partners and suppliers which improves the production plan 5.38 1.24

IN4 Your organization evaluates and develops management processes to lead to better production and process efficiency 5.38 1.27

Total 5.41 1.24
 $\bar{X}$ S.D.

Firm performance

FP1 Your organization can achieve its operational targets 5.45 1.15

FP2 Your organization has a secure source of funds 5.44 1.25

FP3 Your organization can keep making profits 5.26 1.33

FP4 Your organization has continuously reduced production costs 5.11 1.22

FP5 Your organization is continually increasing its gross sales 5.33 1.18

Total 5.31 1.22

Reliability Testing

This study applied Cronbach's alpha to all the items, specifically to investigate the variables. Results summarized in Table 4.5 [Tables 4 and 5?; clarify this] indicate Cronbach's alpha between 0.798 and 0.945, indicating that they have reliability.

Table 3 Reliability Statistics

Variable	Cronbach's Alpha
Customization	0.921
Digital Transformation	0.798
Innovation	0.945
Firm Performance	0.930

Multi-collinearity Testing

The issue of multi-collinearity was tested to meet the requirements of the Structural Equation Model based on the regression analysis. Results for tolerance and variance inflation factor (VIF) are measured in the test, and these should be more than 0.1, and VIF should be less than 10 ($VIF = 1 / \text{tolerance}$). It is found that the variables exhibit tolerance and VIF between the desired ranges and it can be stated here that no multi-collinearity was found.

Table 4 Collinearity Statistics Testing compared with CM1

Variable	Collinearity Statistics	
	Tolerance	VIF
CM2	.332	3.015
CM2	.253	3.950

Variable	Collinearity Statistics	
	Tolerance	VIF
CM3	.257	3.884
DT1	.396	2.525
DT2	.384	2.604
DT3	.390	2.565
IN1	.176	5.697
IN2	.157	6.372
IN3	.231	4.334
IN4	.197	5.083
FP1	.287	3.487
FP2	.262	3.824
FP3	.243	4.109
FP4	.267	3.744
FP5	.272	3.670

Construct Validity

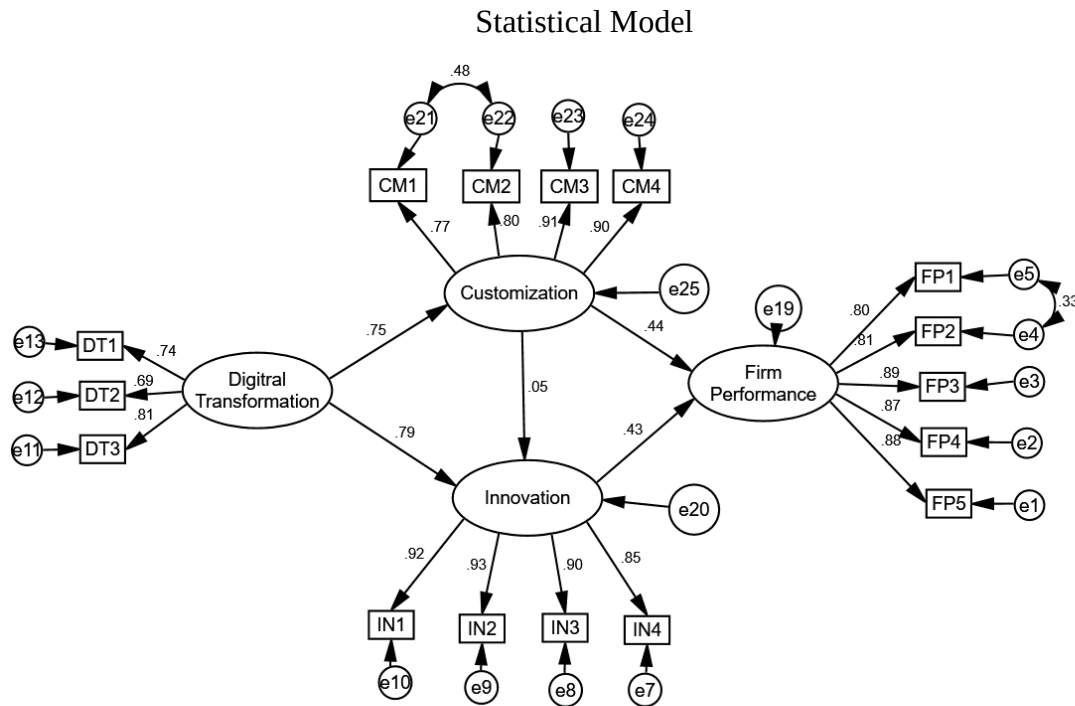
The questionnaire was also tested to assess construct validity and discriminant validity. Convergent validity was measured using the value of confirmatory factor analysis (CFA), and the outcome of factor loading should be greater than 0.6. It emerged here that average variance extracted (AVE) of all variables were above .5. Moreover, the discriminant validity was tested by examining the correlation between constructs and the correlation between observed variables should be less than 0.85. The results of AVE are presented in the following tables.

Table 5 Factor Loading, Critical Ratio, R^2 , Composite Reliability, Average Variance Extracted of Customization

Variable	Factor Loading	R^2	Composite Reliability	Average Variance Extracted
CM1	.83	.69	.83	.56
CM2	.86	.73		
CM3	.88	.78		
CM4	.88	.77		
Digital Transformation				
DT1	.75	.57	.801	.573
DT2	.75	.56		
DT3	.77	.60		
Innovation				
IN1	.92	.84	.942	.765
IN2	.93	.87		
IN3	.90	.81		
IN4	.86	.74		
Firm performance				
FP1	.87	.76	.919	.694
FP2	.86	.75		
FP3	.88	.78		
FP4	.83	.69		
FP5	.82	.68		

Table 6 Correlation Matrix for Variables

Variable Name	CM	DT	IN	FP
Customization (CM)	1			
Digital Transformation (DT)	.74	1		
Innovation (IN)	.64	.82	1	
Firm Performance (FP)	.67	.85	.71	1



CMIN=247.974 df=88 p-value=.000 CMIN/DF=2.818
GFI=.904 AGFI=.852 NFI=.943 CFI=.962 RMSEA=.081 RMR=.055

Figure 4.2 [do you mean: Figure 1?] Statistical Model

Table 7 Assessing the model fit indicators

Chi-square/Degree of freedom (CMIN/df)	2.81
Goodness-of-Fit Index (GFI)	.904
Adjusted Goodness-of-Fit Index (AGFI)	.852
The Root Means Square Error of Approximation (RMSEA)	.081
Normed Fit index (NFI)	.943
Comparative Fit Index (CFI)	.962

Table 8 Hypothesis Testing

			Estimate	S.E.	C.R.	p-value
Customization	<---	Digital Transformation	.75	.064	10.613	***
Innovation	<---	Digital Transformation	.79	.107	8.289	***
Innovation	<---	Customization	.05	.099	0.607	.544
Firm Performance	<---	Customization	.44	.073	7.266	***
Firm Performance	<---	Innovation	.43	.056	7.422	***

*** p-value < .001

Regarding the findings, it is clear that digital transformation yields a significant effect on customization ($\beta = .75$ with p-value < .001 and innovation ($\beta = .79$ with p-value < .001). Customization exerts a significant effect on firm

performance ($\beta = .44$ with p-value < .001). Lastly, innovation has a significant effect on firm performance ($\beta = .43$ with p-value < .001). Moreover, digital transformation has an indirect effect on firm performance ($\beta = .688$).

Table 9 Standardized Direct and Indirect Effects

	Direct Effect			Indirect Effect			Total Effect		
	DM	IN	FM	DM	IN	FM	DM	IN	FM
Digital Transformation	.752	.794		.036	.688		.752	.830	.688
Customization		.049	.441			.021		.049	.462
Innovation			.430						.430

V. Discussion

Implications for practice:-

This study contributes to the link between digital transformation so that customization and innovation greatly assist the automotive parts and accessories SMEs in Thailand. We observe that digital transformation affects firms' product customization and innovation practices. Moreover, we set out to confirm that product customization will affect firms' innovation strategies. Consequently, for summarizing the indirect effect of digital transformation on firms' performance through customization and innovation, it is evident that digital transformation does contribute to creating product differentiation and production system management. Our results indicate that digital transformation has a significant effect on product customization and innovation. Firms that implement digital transformation through software will improve their product customization processes. We considered product customization from the firm perspective and how it influences specific customer groups who want products and goods/ services customized according to their preferences.

Digital transformation helps firms to communicate more effectively with their partners

in terms of information sharing which enhances what customers want or need. Information from digital sources supports firms to predict customers' needs precisely and encourages them to keep purchasing goods and products from them well into the future. In terms of process innovation, we investigate the SMEs that applied technology to reduce the costs of workplace processes, make them more efficient and work better with their partners and suppliers. This finding synchronizes with the knowledge that business or industry partners have along the value chain, which should lead to process innovation (Aliasghar, Rose, & Chetty, 2019). It also supports the notion that better performing firms are those that share capabilities and this drives innovation and higher profits (Aliasghar, Rose, & Chetty, 2018). Customization also affects the process of innovation. Thailand's automotive firms all along the supply chain have to create a system of mass customization for their clients, these being the automobile manufacturers. Mass customization means developing customized products on a large scale that satisfy customers' specific requirements at a reasonable price utilizing a particular production process (Z. Wang, Zhang, Sun, & Zhu, 2016). In this way digital transformation supports firms in understanding

what customers want or need because they can manufacture and/or deliver specific products.

Implications for theory:-

The findings of this study imply there is a close link between digital transformation, product customization, innovation and firm performance. First, the results reveal that digital transformation has a significantly positive affect on product customization and innovation. Second, digital transformation is the important factor in marketing operations in when attempting to create an efficient customization strategy. Third, the outcomes of innovation are a greater manufacturing efficiency, more attention to innovation and the speed with which production can be done, all due to the speed of digital transformation.

Limitation and future research:-

This study applied non-financial performance indicators in measuring Thai SMEs' performance. Users of our findings have to be aware that the results here could be very different from financial results. Scholars who conduct studies in the future can focus on financial measurement factors that may extend the results from this study, in a Thai and/or non-Thai context where comparisons can be made.

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