

The Effect of Foreign Ownership and Capital on Digital Transformation and Innovation in Automotive Business Performance

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Digital transformation is now being applied to many aspects of organisations' operations, ranging from multi-national companies to small and medium enterprises. The differences in firms' characteristics will have a direct and important impact on the nature of digital transformation and innovation. This empirical study aims to discover the effects of small and medium automotive enterprises' characteristics, referring to their Thailand-based operations. Their adoption of digital transformation innovation will also be examined, along with how such factors influence their business performance. These firms supply materials to many automobile manufacturing firms in Thailand, and both digital transformation and firms' innovation play key mediating roles. The Structural Equation Modelling statistical approach was implemented to generate empirical data from multivariable factors. Findings indicate that the amount of capital owned by small and medium enterprises directly affects their digital transformation and innovation. This in turn wields an important impact on non-financial performance of firms.

Key words: *Digital transformation, Firm performance, Innovation.*



Introduction

The automotive industry plays a crucial role in the Thai economy in terms of growth and development of technology, marking Thailand as the ‘Detroit of Asia’. Many automobile makers from Asia, Europe and the United States have invested in Thailand for a long period of time. Those firms require support from the local automotive industry with operations and other facets of the value chain process. Automotive part firms, which are generally small and medium enterprises (SMEs), have operated in Thailand for over three decades. These firms have supported multi-national enterprises which have invested large amounts of money into Thailand for the manufacture and assembly of completed knock down (CKD) in Thailand. This process involves the shipment of automobile parts for certain vehicles from the manufacturing plant to plants in other countries where assembly takes place.

In the past decade, some automotive SMEs have successfully developed the requirements demanded by their business partners, which are mainly foreign automotive multi-national enterprises. The SMEs’ operations have the support of foreign firms, who invest directly in Thailand, and local firms requiring materials and services. However, the continuously dynamic nature of business and the overall economic environment affect the SMEs’ business plans and growth, as has been discussed from various viewpoints. New automobile models are made with advanced technological features that are vastly different from those constructed ten years ago. Moreover, innovations are now being created not only by automobile producers, but also by their suppliers. Automotive suppliers may need to participate in an innovation program to appropriately fulfil clientele needs. Moreover, they must develop digital technology operations to improve efficiency and must utilise critical computer-related communications and data analysis strategies. Automotive SMEs function according to different demographic factors, however, and such modernisation and implementation of digital operations differentiates their performances. Most notably, certain firms have the ability to create innovations that support the requirements of foreign firms working in the competitive automotive industry in Thailand. The question thus stands: how and why do differences in firms’ ownership types and capital affect innovation ability?

Digital transformation in many industries relates to the interaction among people and operational processes through the use of software for various business operations and procedures. The manufacturing firms that apply digital transformation strategies to their operations can be determined based on their use of software as a form of digitisation along their supply chain (Thongrawd, Mee-ngoan, & Jermisittiparsert, 2019; Jermisittiparsert, Sutdewan, & Sriyakul, 2019). This process assists in creating intensively digital networked companies (Borangui, Trentesaux, Thomas, Leitão, & Barata, 2019). It is very evident that strategies surrounding the formulation and implementation of these digital endeavours has become an important success factor across the industry cluster (Chanias, Myers, & Hess,



2019). Methods of development and application of these strategies is still open to debate throughout many firms, leading this study to question whether certain SME characteristics relating to digital transformation behaviour may impact on business performance. Moreover, SMEs with effective digital transformation programs will in turn have updated and modernised information available when management teams must make decisions. The information will support management awareness surrounding the need for innovation in their business practices and objectives.

Firms' requisites to be innovative is now part of national policy in Thailand. The government's policy has strongly determined the need to change from a labour intensive to a technologically innovative nation (Sae-Lim & Jermisittiparsert, 2019). Effective innovation remains difficult to achieve, however, as the creation of products or goods and services is a complex and time-consuming process (Greve & Salaff, 2001; Rizova, 2006; Sutduean, Harakan, & Jermisittiparsert, 2019). Recent studies indicate that financial constraints and information asymmetries affect SMEs' innovative functions and capacities (Barbaroux, 2014). This study considers innovation with specific reference to product and process innovation. Most theories of innovation explain it as a starting point (Audretsch & Thurik, 2001). This study examines the effect of SME characteristics that may impact digital transformation and innovation of small and medium auto-part enterprises. These characteristics are determined according to type of owner and amount of capital of those SMEs. Results will aim to promote innovation and overall improvement in automotive business performance.

Theoretical Overview and Prior Studies

Small and Medium Enterprises (SMEs)

The subjects of this study are automotive firms that provide materials and services to other businesses operating in the Thailand automotive industry. The terminology in this analysis refers to definitions from the Office of Small and Medium Enterprise Promotion (OSMEP). Table 1 below summarises the relevant information.

Table 1: Definition of SMEs.

Type of Enterprises	Small Enterprises		Medium Enterprises	
	Number of Employees (Persons)	Amount of Land, Buildings, and Equipment (Million Baht)	Number of Employees (Person)	Amount of Land, Buildings, and Equipment (Million Baht)
Manufacturing	Less than 50	Less than 50	50-200	50-200
Services	Less than 50	Less than 50	50-200	50-200
Wholesale	Less than 25	Less than 50	25-50	50-100
Retail	Less than 15	Less than 30	15-30	30-60

Source: www.smebank.co.th

Digital Transformation

SMEs are beginning to invest in digital technology to positively change how they formerly operated. This type of advanced technology requires specifically skilled employees to conduct business procedures and other operations. The development of digital technology is now familiar to younger generations of employees who can apply their individual expertise and training to essential skills like online marketing. Digital transformation is greatly influencing production activities and the creation of sustainable structures available to firms (Oertwig, Gering, Thomas Knothe, & Rimmelspacher, 2019). The term ‘transformation’ refers to the extent of strategic change realignment in the way firms function and operate (Balogun & Johnson, 2005). Businesses operate in accordance with the needs of various stakeholders, both internal and external, to achieve their goals. The term ‘digital transformation’ can thus be explained as a system of fundamental dynamic activities in which enterprises reinvent themselves to substantially change their relationships with customers, suppliers and employees. They do this by applying digital technology into their processes and procedures.

From a wider perspective, digital transformation is a process that can reconstruct entire economies and societies (Unruh & Kiron, 2017). Digital tools like social media can support firms’ interactions with customers, while IT system can assist with delivering products, goods and services more effectively and efficiently (Bouwman, Nikou, & de Reuver, 2019). The initial concept of transformation in enterprise operations marks a radical change and is crucial to achieving success both within and across organisational boundaries. Business success within the digital world also leads to enhanced customer experiences and increases the value of an organisation within increasingly complex and challenging environments (Purchase, Parry, Valerdi, Nightingale, & Mills, 2011). Some aspects of digital transformation, such as big data, are relevant to the management of SMEs’ marketing strategies in their customer

relationships programs and data-driven revenues. The need to incorporate new technologies is now a core principle of SME business models (Loebbecke & Picot, 2015). Consequently, digital transformation is thought to result in sustainable business performance as it will lead to highly valued products, goods and services (Rouse, 2005).

Digital transformation is currently helping SMEs to create value in their operations (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013; Lucas Jr, Agarwal, Clemons, El Sawy, & Weber, 2013). SMEs should apply digital information systems that enable stable value chains and customer needs where the enterprise architecture forms an ‘ecosystem’ and context-sensitive value creation (Goerzig & Bauernhansl, 2018). Furthermore, SMEs can generate higher efficiency through digital transformation in their operations, allowing them to better compete with other multi-national companies. SMEs have particular characteristics that may influence the digital transformation process where specific support tools are required (Goerzig & Bauernhansl, 2018), meaning that firms must also improve their employees’ skills so that the necessary digital functions can be executed. Management demands a clear, profitable outcome from investing in the digital transformation process (Bernaert, Poels, Snoeck, & De Backer, 2014), although many SMEs have limited financial resources for investing in new technologies. SMEs in Thailand are generally firms which operate with process- and non-process-based operations. This study therefore investigates digital transformations that may impact on innovation and firm performance.

Innovation of the SMEs

SMEs operate through dependence on customer needs; these are businesses that seek complementary, innovative activities and outcomes regarding their products. Conversely, SMEs have limited resources with which to respond to business and client requirements. Due to the time-consuming and complex nature of required activities, managing innovation within an organisation poses many difficulties (Greve & Salaff, 2001; Haseeb, Hussain, Ślusarczyk, & Jermsittiparsert, 2019; Matear, Osborne, Garrett, & Gray, 2002). Two essential factors that affect innovation results include the ability to be innovative and the organisational cultures that influence employees’ behaviours when conducting new product or process development schemes (Bratianu & Orzea, 2010; Cohen & Levinthal, 1990; Rivera-Vazquez, Ortiz-Fournier, & Rogelio Flores, 2009; Wang, 2008). Cultures will differ from business to business and with varying characteristics, which may impact on the fundamental dynamic capabilities for improving innovation (Limaj, Bernroider, & Choudrie, 2016; Roberts, Galluch, Dinger, & Grover, 2012).

Within the SME context, firms must adapt to their industry or business environment and function dynamically while coping with internal and external stakeholders’ demands (Ates & Bititci, 2011; Westrenius & Barnes, 2015). Some studies state that serious financial

constraints and information asymmetries explain why SMEs are now developing innovation programs (Barbaroux, 2014). Existing research focuses on the tension between organisational performance and how firms can achieve positive long-term performance, though this is not yet fully understood (O'Reilly 3rd & Tushman, 2004; Zi-Lin & Wong, 2004). This gap in the existing research motivated the current study to examine how SMEs build strategic innovation mechanisms based on the balance between absorptive capacities and organisational culture (Limaj & Bernroider, 2019). Some digital networks can act as tools for better innovation, meaning that interacting with customers creates new markets and new products (Ioanid, Deselnicu, & Militaru, 2018). SMEs in Thailand generally respond to those customers who are business firms or individuals. SMEs in the automotive business have almost all operated along the automobile manufacturing industry supply chain, trade built from foreign investment which starts from the assembly line and ends with the finished product. Business-to-business operations require customised innovations specific to each company while also on business-to-client basis. This possible effect of innovation on firm performance is thus investigated in the present study.

Research Design and Methods

To explore how the factors in the framework are linked, the quantitative approach was applied to investigate the SMEs working in the automotive industry. The sample consisted of 300 respondents in senior executive positions within their firms. The Structural Equation Modelling (SEM) analysis was used to validate measurements and test hypotheses. The methodology, including the statistical process of verifying test results, is explained below.

Demographics

The sample for this study comprised small and medium firms in the automotive parts industry. The majority of respondents were limited companies, wherein Thai business owners less than 50 Million Baht in capital.

Table 1: Firm Demographics

	Sizes	Percentage
Business Owner		
Thai	237	79.0
Foreigner	63	21.0
Capital (Million Baht)		
< 50	180	60
51-100	52	17.3
101-150	29	9.7
151-200	39	13.0

Total	300	100
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Measurement

Measurement models for digital transformation, innovation and firm performance with five scales were tested through SEM. The survey uses 14 items and the composite measures are described in Table 2. This table presents the mean and standard deviation for the composite measure of digital transformation, innovation and firm performance.

Table 2: Mean, Percentage and Standard Deviation of Digital Transformation

Digital transformation	<input type="checkbox"/>	S.D.
DT1 You adjusted your production system by using software in creating products and making your business from competitors	5.58	1.12
DT2 Your organisation adjusts its production system so that it is linked to innovation and software	5.40	1.18
DT3 Your organisation can increase its gross sales based on information from internet	5.13	1.33
Total	5.37	1.21
Innovation	<input type="checkbox"/>	S.D.
IN1 Your organisation has applied technology to increase workplace efficiency	5.47	1.21
IN2 Your organisation devotes enough time to creating productivity	5.43	1.22
IN3 Your organisation provides feedback on working with partners and suppliers when planning production requirements	5.39	1.22
IN4 Your organisation evaluates and develops management processes for more effective and efficient production processes	5.41	1.26
Total	5.42	1.22
Firm performance	<input type="checkbox"/>	S.D.
FP1 Your organisation can achieve goals in operational targets	5.48	1.15
FP2 Your organisation has stable financial or funding sources	5.44	1.14
FP3 Your organisation is continuously profitable	5.24	1.33
FP4 Your organisation continuously reduces production costs	5.10	1.22
FP5 Your organisation continuously increases gross sales	5.33	1.16
Total	5.31	1.22

Reliability Testing

This study applied Cronbach's Alpha to overall items, specifically to investigate the variables. The results documented in Table 3 indicate that Cronbach's Alpha is between 0.789 and 0.926, signifying that they have reliability.

Table 3: Reliability Statistics

Variable	Cronbach's Alpha
Digital Transformation	0.789
Innovation	0.941
Firm Performance	0.926

Multi-Collinearity Testing

To ensure that the model will complete the requirements of the SEM that is based on regression analysis, the existence of multi-collinearity between independent variables should be tested. The tolerance and variance inflation factor (VIF) are measurements for testing. The tolerance should be more than 0.1, while VIF should be less than 10 ($VIF = 1 / \text{tolerance}$). Findings in Table 4 below suggest that all tested variables have tolerance and VIF between the required ranges, meaning that no multi-collinearity was found.

Table 4: Collinearity Statistics Testing compared with DT1

Variable	Collinearity Statistics	
	Tolerance	VIF
DT2	.457	2.186
DT3	.446	2.243
IN1	.196	5.115
IN2	.190	5.268
IN3	.247	4.049
IN4	.249	4.023
FM1	.315	3.180
FM2	.287	3.484
FM3	.253	3.957
FM4	.289	3.460
FM5	.292	3.424

Construct Validity

To ensure the efficacy of the instrument, both the construct validity and the discriminant validity were tested. Convergent validity was measured by the value of confirmatory factor

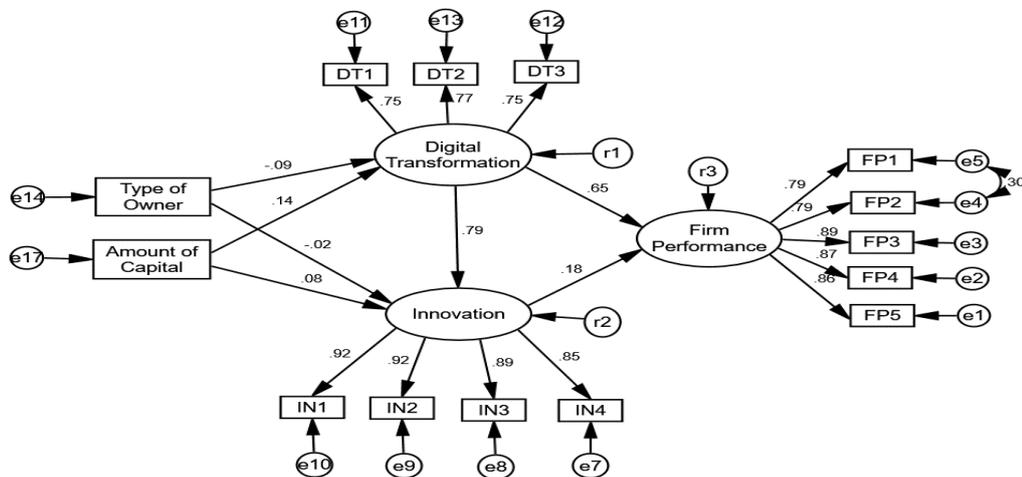
analysis (CFA) that their factor loading should be greater than 0.6. Results found average variance extracted (AVE) were above .5 for all variables. Moreover, discriminant validity was tested by examining the correlation between constructs while the correlations between observed variables should be less than 0.85. The results of AVE are presented in Table 5 below.

Table 5: Factor Loading, Critical Ratio, R^2 , Composite Reliability, Average Variance Extracted of Digital Transformation, Innovation and Firms' Performance

Variable	Factor Loading	R^2	Composite Reliability	Average Variance Extracted
Digital Transformation			.797	.568
DT1	.74	.55		
DT2	.77	.59		
DT3	.75	.56		
Innovation			.942	.802
IN1	.92	.84		
IN2	.92	.65		
IN3	.89	.79		
IN4	.85	.71		
Firms' Performance			.928	.720
FP1	.81	.65		
FP2	.82	.67		
FP3	.89	.78		
FP4	.86	.74		
FP5	.86	.74		

Statistical Modelling

Figure 1. Statistical Model



CMIN=200.155 df=67 p-value=.000 CMIN/DF=2.987
GFI=.919 AGFI=.874 NFI=.938 CFI=.957 RMSEA=.082 RMR=.054

Table 6: Assessing the model fit indicators

Chi-square/Degree of freedom (CMIN/df)	2.98
Goodness-of-Fit Index (GFI)	.919
Adjusted Goodness-of-Fit Index (AGFI)	.874
The Root Means Square Error of Approximation (RMSEA)	.082
Normed Fit Index (NFI)	.938
Comparative Fit Index (CFI)	.957

Results show that capital has a significant effect on digital transformation ($\beta=.14$ with p-value $<.05$), and that digital transformation also has a significant effect on both innovation ($\beta=.79$ with p-value $<.001$) and firm performance ($\beta=0.65$ with p-value $<.001$). Furthermore, innovation yields a significant effect on firm performance ($\beta=0.18$ with p-value $<.05$).

Table 7: Standardised direct and indirect effects

	Direct Effect			Indirect Effect			Total Effect		
	DT	IN	FP	DT	IN	FP	DT	IN	FP
Type of Owner	-.09	-.02			-.08	-.07	-.09	-.1	-.07
Capital	.14	.08			.11	.12	.14	.19	.12
Digital Transformation		.79	.65			.15		.79	.80
Innovation			.18						.18

According to Table 7 above, capital has an indirect effect on innovation and firm performance with $\beta=.11$ and $\beta=.12$.

Results

The data indicates that ownership type does not affect digital transformation or innovation in Thai SMEs. Conversely, the amount of capital has an impact on both digital transformation and innovation. Digital transformation is considered in three dimensions. First, the firms used software to create value and differentiated products and this is in fact the most important factor ($\bar{X}= 5.58$, S.D. 1.12). Second, the firms adjust their production system to support innovation by linking it to digital software ($\bar{X}= 5.40$, S.D. 1.18). Lastly, the firms applied internet marketing data to increase their sales ($\bar{X}= 5.13$, S.D. 1.33). In considering innovation, there are four dimensions applied to obtain results. Firms first have applied technology to reduce or change their operating processes so that they are more efficient ($\bar{X}= 5.47$, S.D. 1.21). Secondly, the firms devote appropriate time to creating productivity ($\bar{X}= 5.43$, S.D. 1.22). Third, information sharing between firms and partners is achieved through innovation ($\bar{X}= 5.39$, S.D. 1.22). Finally, firms have evaluated and improved their operation management systems in order to implement more efficient production processes ($\bar{X}= 5.41$, S.D. 1.26). Further, the results of two mediators such as digital transformation and innovation impart a significant effect on firm performance measured in terms of non-financial performance. Non-financial firm performance was measured according to five factors: 1) attempts to achieve operational goals or targets ($\bar{X}= 5.48$, S.D. 1.15) 2) strong sources of financing or funds ($\bar{X}= 5.44$, S.D. 1.14); 3) ability to continuously increase profits ($\bar{X}= 5.24$, S.D. 1.33); 4) ability continuously reduce production costs ($\bar{X}= 5.10$, S.D. 1.22), and 5) ability to continuously increase gross sales ($\bar{X}= 5.33$, S.D. 1.16).

Discussion

Small and medium automotive enterprises were examined in this quantitative study to discover whether specific demographic factors influence digital transformation and innovation practices of these SMEs. Digital transformation and innovation were the two mediators tested to assess their impact on the non-financial performance of firms. These findings have crucial implications for Thai SMEs regarding capital management to support non-financial performance via digital transformation and innovation. The major contribution of this study is the investigation of SMEs' important demographic aspects wherein ownership type and amount of capital can affect levels of digital transformation and innovation and subsequent business performance. Results consider all ownership types in terms of Thai owners and foreign owners for both digital transformation and innovation. It is evident that

Thai SMEs developed their operations over a long period of time in managing business transactions with multi-national automobile producers from foreign countries. They then responded to the requirements of these companies, especially in starting innovation practices for suppliers. Conversely, the amount of capital was found to affect innovation practices of those SMEs.

SME capital was found to have a positive relationship with amount of digital transformation and innovation. Higher capital produced more digital transformation which subsequently increased innovation levels, a scenario which affects business performance. This finding is congruent with prior studies that found digital transformation influences firms' innovation and performance (Ferreira, Fernandes, & Ferreira, 2019; Nambisan, Wright, & Feldman, 2019). Automotive suppliers are firms that aim for competitive advantage through focusing on their amount of capital. Owners or shareholders should understand that capital amount has an indirect effect on firm performance. Digital transformation of the manufacturing process leads to a more efficient process in operation management and manufacturing. Furthermore, the information generated from digital transformation supports better coordination with partners and suppliers for updating and improving productions plans in manufacturing systems. SMEs can therefore invest in software for all operations where the critical outcome is value creation based on innovative techniques and strategies. Consequently, investment in software will lead to reduced production costs, continued sales growth and rising profits.

For a theoretical contribution, the study of digital transformation in relation to innovation and firm performance is still in its infancy. Results of this study support the link between digital transformation, innovation and firm performance. They also substantiate the concept that digital transformation is an ongoing reality for improving businesses' strategic plans, replacing older and obsolete business models, and can lead to enhanced collaboration between partners and overall superior business performance (Kiel, Arnold, Collisi, & Voigt, 2016).

Limitations and Future Research

This study examines firms' performances by measuring non-financial performance. To generalise results, users should be aware that differences in financial performances may occur at any point in the process. Moreover, firms wishing to implement digital transformation programs should note that digital transformation requires SMEs' management to rethink and adjust their business model beforehand, and should determine where and when digital processes should be initiated (Bouwman et al., 2019). Management should also revise their strategies and consider all organisational requirements before the transformation program commences. Further studies are required to support these theories, and researchers may consider financial performance and longitudinal studies for more precise results. Moreover,



specific types of innovation in terms of products or goods and services should be considered for comparative analysis.

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