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RESEARCH REPORT

THE BUSINESS PERFORMANCE OF DIGITAL BUSINESS

TRANSFORMATION ON SMALL ENTERPRISES IN THAILAND

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Acknowledgement

ABSTRACT

The purpose of this research is to study whether digital business transformation significantly affects SMEs to increase the business performance including the financial perspective, customer/marketing perspective, internal process perspective, and learning and growth perspective. The research design is designed as a quantitative research. Structural equation modeling (SEM) is used to analyze the survey responses. Using SME is to specify, test, and modify the measurement model. The results of measurement model analysis and path model analysis are presented in this chapter. The data set of 500 samples are collected and summarized as shown in this chapter. The results of the EFA show that cross loading items are eliminated and other measurement items are consistent with the construct validity. The results of the CFA show that the sample data are a favorable fit to the measurement model. Hence, the structural model was reasonably acceptable. The results of structural path analysis indicate that two hypotheses are statistically significant and positive.

Keywords :   Digital Business, Transformation, Small and Medium Enterprises, Business,
                 Performance

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Chapter 1

Introduction

Over the last few years, the revolution of the Internet communication has been changing from static to dynamic platforms. It has fundamentally shifted from websites' owner-driven to user-driven technologies such as webboards, forums, blogs, social networks, and video-sharing platforms. The movement of these platforms allows individuals and organizations to overcome geographical and time constraints, which in turn allows consumers and businesses to connect around the world at any time. With rapid changes in the Internet, these online activities are now performed via a new form of communication technology known as Web 2.0 or social media. Furthermore, the world currently is surrounded by information. However, information technology today is a rapidly changing area. Therefore, a business that is able to choose the right successful system implementation can make significant improvement. Furthermore, the Internet is empowering people in a new and different way to create and share their ideas, giving rise to new content, entrepreneurs and markets. In order to achieve a competitive advantage, businesses have to develop and integrate the infrastructure of electronic petition used and required in various departments for using and applying them into working process. The digital economy rises to a number of new business models recently from traditional business to modern advances in technological involvement that have made it possible to conduct many types of business at outstanding greater scale and over longer distances than was previously. The digital economy allows the rapid development of new business models; it can also quickly cause existing businesses to become obsolete.

Since the change of technologies and widespread diffusion of the digital economy, it led to innovation in business models, which in turn allows consumers and businesses to connect around the world any time (Harris & Rae, 2009). The growing of the DE in the business field has heightened demand for new big data being used for business intelligence. The digital economy provides business an ability of the transformational effects of new way to use the data as in the fields

of information and communication. It gives rise to certain form of new business models, which is important to the business to adapt in the new environments.

The digitalization of a growing number of new business opportunities, including new types of products and services goods is huge access to crowd-sourced. The economic in many local markets are quickly disappearing and giving huge advantages to the best product, service or process in the market. Competition in markets is typically based on innovation rather than price, resulting in high opportunities in the market; with serving quickly being displaced by more successful innovators. The increasing of the digital economy has an impact which is the need of having some physical establishment in a country where business is done. However, operating in the digital economy which is based on electronic services as final products means that they do not any longer need physical establishment in the foreign countries where they are active. Therefore, businesses are operating digital business models as their ultimate effect that they essentially run their business over the internet which essentially is a borderless world.

Even though the importance of data on the Internet is rapidly growing, some parts of the population are still excluded from media literacy in the digital environment. Thus, it might affect businesses in facing a crisis of a shortage of employees with digital skills (Digital Agenda in the Europe 2020 strategy, 2015). It is crucial to focus on digital economy since the world of business is smaller than ever before and in competitive environment, businesses must constantly explore new technologies, innovations, and services in order to respond to evolving markets, technology and economic conditions. Moreover, the growths of the technology, especially the digital economy and the revolution of business processes have transformed a new interest in the digital business development and business strategy.

In 2016, The Thai government established the country's strategy "Thailand 4.0" as a new economic model aimed at pulling Thailand out of the middle-income trap, and developing it as a high-income country. It is envisioned to change the country's traditional farming to smart farming, traditional SMEs to smart enterprises, and traditional services to high-value services (Languepin, 2016). Furthermore, Thai government officially established The Digital Economy and Society Ministry in September 2016, replacing the Information and Communication Technology (ICT)

Ministry. The new ministry takes responsibilities to plan, promote, develop and implement activities related to a digital society and economy in order to have efficient and comprehensive development and usage of information and communication technology in all sectors. Additionally, Thai government has established the Ministry of Digital Economy to offer citizens and businesses the opportunity to complete a vast array of related transactions through many channels; i.e., Electronic-Procurement (e-Procurement), Electronic-Auction (e-Auction), and Electronic-Taxation system (e-Taxation). Generally, Thailand 4.0 is based on value-based economy, integrated by digital technology and innovation. It becomes crucial for the new economy era. Digital technologies are used to transform business operations in order to improve effectiveness, efficiency, productivity, and service delivery (Easley and Kleinberg, 2010).

One of the crucial objjctives of Thailand 4.0 model is to help Thai industries in every sectors such as agriculture, SMEs, and services, to adapt to global competitive pressures by increasing the technological base through the development and integration of enabling innovation, and digital technologies. For example, agriculture sector will reconfigure its advantage in which its cost no longer exists. They need to adapt some part of innovation and technology into their production process by the support of biotechnology and argitech, also called "smart farming." Meaning that farmers should no longer be the poorest segment of the population. They should or might become entrepreneurs instead of being subjected to the vagaries of changing weather and the dictates of merchants and middlemen (Yoon, 2016). Moreover, the increasing recognition of the role of innovation and digital technology, which enables the interactions among partnership such as consumers, and suppliers as an important co-value creation has derived the implications of these interactions in numerous settings, including online activities. Thailand 4.0 also is considered the backbone of the digital economy. Digital economy is growing rapidly and frequently features comments about brands and products. Moreover, consumers increasingly rely on and are interested in collaborations (Cheong & Morrison, 2008). New business models have emerged demonstrating common features – mobility, use of data to generate value and network effects.

In this chapter, background of the problem and statement of the problem are discussed in the first section. Then, purposes of the proposed study and research questions are

presented. Finally, research hypotheses, significance of the study, definition of terms, and limitations of the study are discussed.

Background for This Research and Statement of the Problem

Since the emergence of the digital technology in the late 20th century, innovation, and digital technology among individuals and organizations of all sizes has changed dramatically. The digital technology has revolutionized the way of doing business, allowing individuals and organizations to overcome the new business model (Simmons, Palmer, & Truong, 2013). Globalization and integrated development of the new industrial economy model considerably increases the startup business possibilities. Digital technology today provides mobile access and analytic power, which satisfy the needs of providing trade and management of enterprises on a national and continental scale (Garifova, 2014).

In order to achieve a competitive advantage, businesses have to develop and integrate the innovation and applying them into business process and business model. The digital and innovation rise to a number of new business models recently from traditional business to modern business in technological and innovative involvement that have made it possible to conduct many types of business at outstanding greater scale and over longer distances. The digital and innovation allows the rapid development of new business models; it can also quickly cause existing businesses to become obsolete. Furthermore, to encourage digital and innovation in various economic activities, the objective of which is to create equilibrium between the environment and society. Therefore, Thai government has established the policy in order to pull itself out of the middle-income trap and deal effectively with disparities and the imbalance between the environment and society, called Thailand 4.0 (Kyozuka, 2016). The policy also seeks to promote creativity, innovation, and the application of technology in various economic activities, the objective of which is to create equilibrium between the environment and society. Therefore, the research objectives are 1) to study the awareness of Thai SMEs regarding Thailand 4.0 economic policy; 2) to explore the readiness of Thai SMEs regarding Thailand 4.0 economic policy; and 3) to explore the perceived of Thailand 4.0 economic model to the businesses (Estopace, 2016).

Digitization forms are both threatening, but also providing an opportunity to transform business; and can make entire business models redundant (Leipzig, Gamp, Manz, Schöttle, Ohlhausen, Oosthuizen, Palm, & Leipzig, 2017). Digitization provides a lot of tractions and completely changed customer behavior and expectations. Therefore, businesses need to reinvent of business in order to create and participate with their customers. Obviously, customers currently no longer only expect businesses to respond to their expressed demands, but implicitly expect companies to anticipate and create their future demands. Furthermore, seeking for new business model that contribute to competitive advantage in the market and thus raise the level of innovation. Innovation today is synonymous with progress and modernity in every area (Witkowski, 2017). According to Schumpeter (1960), innovations are related to developing a new product or introducing products with new properties to the market, and carrying out a new organization of economic processes. Additionally, Drucker (1992) said that "innovation is the specific tool of entrepreneurs, by means of which the changes make them an opportunity to take up a new business or the provision of new services."

Considering a vital ingredient for creating businesses' competitiveness advantages, SMEs need to pay attention to the development of business opportunities to compete and survive the industry in the long run. Typically, digital technology provides with a strategic competitive advantage in the business arena. Although most companies have realized the need to digitize, changes in the business environment cause more uncertainty in SMEs than in large businesses. The response to environmental changes is different in SMEs than in larger businesses. For instance, the firms' resources and strategic formulations limit SMEs because they are required to have information about the business, market, consumer behavior, and industry to develop business strategies. Most of SMEs seem to have some common characteristics. They may have begun with just one idea or one product and expand their product offering from that point onward. The SME owners tend to focus on technical expertise with limited business skills and experience. Either success or failure tends to rely on the owners' business connections and their managerial styles (Boonpattarakan, 2010). Moreover, the adoption of digital technology by SMEs is generally slower than larger organization because SMEs tend to have simple organizational structure and lack financial resources (Chau, 1994; Glynn &

Koenig, 1995; Montazemi, 1988). Therefore, these challenges can occur during all four phases of the digital transformation, including insufficient IT structures, lack of technical skills, inadequate business processes and high implementation risks and costs (McAffee, Ferraris, Bonnet, Calmejane, and Westerman, 2011).

Consequently, the problems and challenges faced on the road to becoming digital and analyses a new approach for SMEs to initialize their digital transformation. The threats for the SMEs in the business environment is the increasing competition in a dynamic environment where traditional boundaries are shifting. For example, telecommunications companies or land line telecom has been replaced by voice over internet protocol (VoIP) (Yovanof, and Hazapis, 2008), and many social messaging applications such as WhatApps, Line, and WeChat. Therefore, SME business owners or executives must consider about their business transforming to the digital era, crafting strategy for the purpose of achieving sustainable innovation in the face of the reshaping of the industry and the market. One of the main purposes of this research is to seek the answer on how companies can overcome these obstacles and become digital. Moreover, to study whether the digital business transformation significantly affect SMEs to perform a better business performance based on balance scorecard model including financial perspective, customer/marketing perspective, internal process perspective, and organizational learning and growth perspective (Kaplan and Norton, 1993).

Objectives

The objectives of the research are:

1. To examine the level of digitalization of Thai small and medium enterprises.
2. To examine whether digital business transformation significantly affect business performance.
3. To explore the advantages and disadvantages of digital business transformation as a source of competitive advantage to create business performance.

Research Questions

This research specifically focus on studying technology acceptance, diffusion of innovation, and organizational change management occurring in digital technology. Therefore, the research questions are:

1. To what extent are small and medium enterprises ready for digital business transformation?

2. Whether or not the perceived usefulness of digital technology influences the innovation of digital business transformation of the Thai small and medium enterprises?

3. Whether or not the perceived ease of transformation process influences the innovation of digital business transform ation of the Thai small and medium enterprises?

4. Whether or not the digital readiness influence the innovation of digital business transformation of the Thai small and medium enterprises?

5. Whether or not the digital business transformation is associated with business performance?

Hypotheses

1. Hypothesis 1: Perceived of technology acceptance is positively associated with the digital business transformation of the Thai small and medium enterprises.

2. Hypothesis 2: digital readiness is positively associated with the digital business transformation of the Thai small and medium enterprises.

3. Hypothesis 3: Digital business transformation is positively associated with the business performance of the Thai small and medium enterprises.

Research Framework

The framework proposes that digital business transformation will have an impact on business performance. The practice is conceptualized as a four-dimensional construct. The four dimensions are technology acceptance model (TAM), digital readiness, digital business transformation, and business performance. Figure 1 presents the research framework developed in this research.
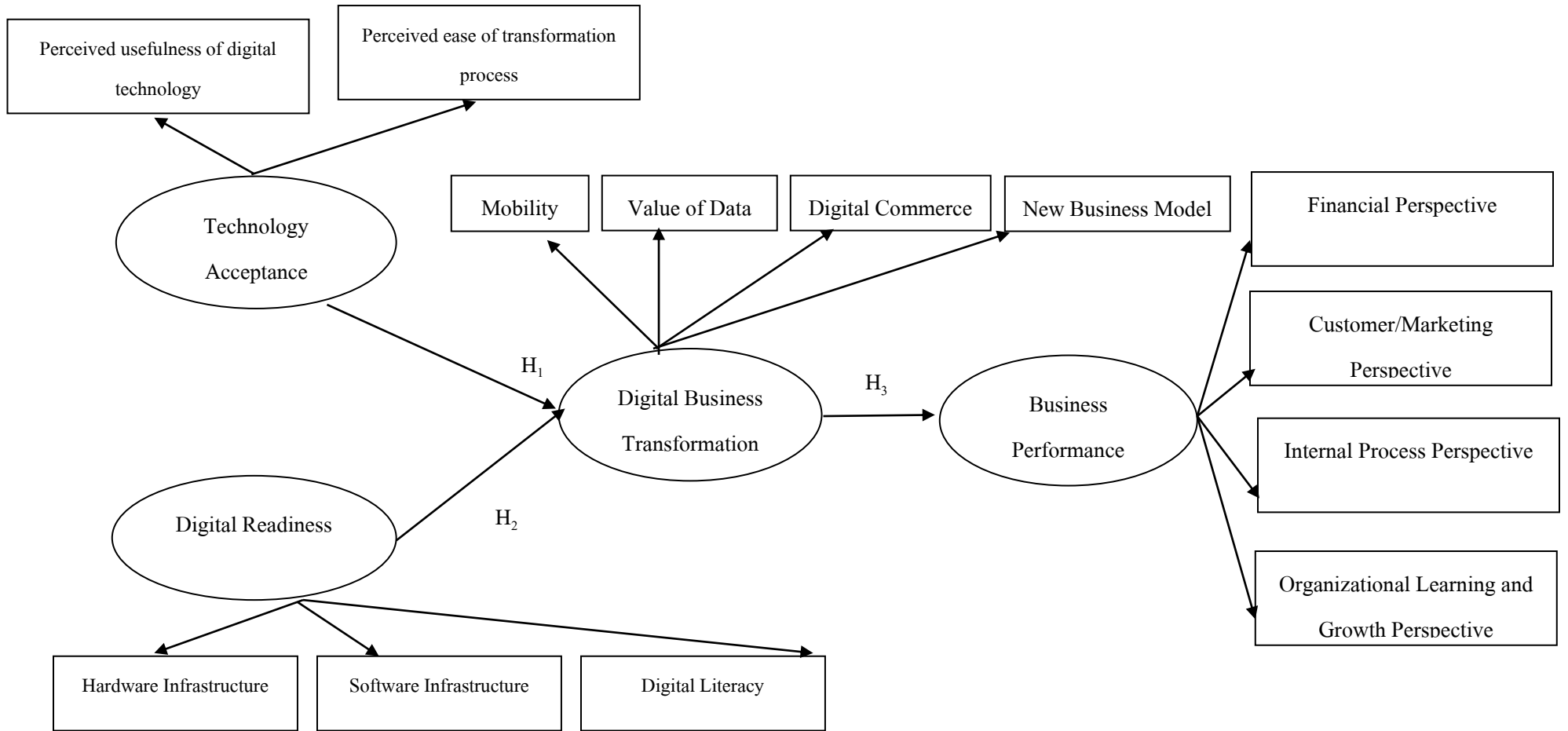
Figure 1 : Research Framework

Scope of Research

Small and medium enterprises (SMEs) are dominant form of business in all countriess worldwide. They exert a strong influence on the economy of all countries, particularly in today's fast-changing and increasingly competitive global market (Aharoni, 1994; Drilhon & Estime, 1993). The definition of small and medium enterprises (SMEs) varies because the diversity of small business is subject to criticism. A small business in Thailand, according to the Bureau of Industrial Promotion Policy and Planning, is defined as any business that has fixed assets of less than 20 million Baht or any company with fewer than 50 employees, while a medium business is a business with fixed assets of between 20 and 100 million Bath or any business with employees between 50 and 200 (Norlaphoompipat, 2008). Moreover, the small and medium business as divided according to three main categories: production sector are 1) agriculture processing, manufacturing and mining; 2) trading sector including wholesale and retail, and 3) service sector (The Office of Small and Medium Enterprises Promotion, 2012).

Typically, most SMEs have similar characteristics. SMEs have simple organizational structures and highly centralized structures (Lees & Lees, 1987). Although they are limited by constraints on financial resources, human resources and management perspectives (Gable, 1991; Lees & Lees, 1987; Montazemi, 1988), SMEs exert a strong influence on the economy of all countries, particularly in the fast-changing and increasingly competitive global market (Aharoni, 1994; Drilhon & Estime, 1993).

Thai SMEs have a significant effect on the economic development. They are considered to be the largest provider of employment. Thai SMEs are increasingly seen as creators of new jobs. Additionally, SMEs contribute their share in output and value added in Thailand's industrial sector (Huang, 2003). According to the Office of SMEs Promotion (2012), Thai SMEs accounted for 2,739,142 (98.46%) of all establishments in all sizes of businesses (2,781,945). Larger businesses comprised a very small percentage of all business enterprise in Thailand. The majority of the SMEs in Thailand have started out as family businesses, while some may not survive in the industry. Boonpattarakan (2012) indicated that the survival rate of SMEs in the first year was higher than 95%, while these in the second year and third year had decreased with the survival rate of lower than 90%.

Most SME owners run the business under their own vision and managerial styles and tend to be bounded by their skills and experiences. Success or failure as mention earlier tend to rely on the owners' business connections and their managerial styles. Therefore, this study will emphasize on SME owners who pay attention to the development of business capabilities especially through digital business transformation to compete and improve their business performance.

Operational Definition

Decision maker: this study defines decision maker as business founders, top managers, leaders or anyone who have a right to make a decision to transform the business to digital business. Therefore, this study focuses on middle level and top level executives.

Digital business transformation : an organizational change that arises from the tremendous develspopment and application of digital technology in business.

Digital business: digital business is executed by leveraging digital resources to create differential value, leading to destructive innovations which change the competitive environment as a result of the emergence of new dynamically developing companies.

Small and Medium Enterprises (SMEs): any business that has the fixed asset of less than 100 million Baht and numbers of employees with fewer than 200 employees.

Business performance: measure and monitor progress in four perspectives, including financial, customer/marketing, internal process, and organizational learning and growth perspectives.

Limitations of the Study

This research study focuses only on small and medium businesses, generalized to specific sampling in the areas of Bangkok. Furthermore, the results may not be generalized to larger businesses. Furthermore, the sampling technique used in this study is the convenience sampling instead of random sampling; hence, there is no guarantee that the behaviors of these people represent the behavior of the population. Therefore, the bias of participants in the study may be presented since some participants who are already involved or have technology literacy may have a positive attitude toward the digital business transformation, and more likely to respond to the questionnaires. On the

other hands, participants who have a bias against the digital technology might not pay close attention to each question of the questionnaire that may affect the validity and reliability of the study.

Benefits of Research

This study attempts to investigation into this area will provide an empirical approach for investigating this phenomenon, while creating knowledge that will contribute to a deeper understanding of the business transformation. Furthermore, it may provide a framework for corporate strategic planners with meaningful technological considerations to integrate into their business strategies for new business model. It will provide an understanding on the level of digitalization of Thai SMEs, allowing the data for benchmarking and progress to be measured over time. Moreover, it will contain data from many diverse firms, aiding in pioneering an understanding of how digital business transformation might impact relationship of business performance. Lastly, the finding may provide an insight into the areas that businesses may require extra support to improve their adoption and exploitation for digital economy as the Thailand 4.0 policy.

Chapter 2

Literature Review

The purpose of this research study is to study the business performance of digital business transformation on small and medium enterprises in Thailand. To develop a solid theoretical research framework, this chapter presents the related literature as follows: Firstly, to introduce digital economy, and Thailand 4.0 policy. Secondly' technology acceptance model known as TAM (Davis, 1989) is presented. Thirdly' digital readiness, and digital business transformation are described. Forthly' the balanced scorecard is explained as the performance measurement.

Digital Economy

Digital economy has been addressed to be a significant method to transform a new way of doing business. Digital economy is generally defined as being the use of digital technologies to transform business operations in order to improve effectiveness, efficiency, productivity, and service delivery (Easley and Kleinberg, 2010). Thai government has established the DE policy to offer citizens and businesses the opportunity to complete a vast array of related transactions through many channels; i.e., Electronic-Procurement (e-Procurement), Electronic-Auction (e-Auction), and Electronic-Taxation system (e-Taxation).

Typically, the digital economy involves five parts, including hardware infrastructure, software infrastructure, service infrastructure, promotion and innovation, and society and knowledge (Boonnoon, 2014). Hardware infrastructure refers to information-technology infrastructure that is used to support a digital economy such as high speed broadband Internet, and digital gateways. Software infrastructure refers to online channels, online transactions such as verification systems to identify individuals online and cyber-security in order to boost up e-Commerce transactions. Service infrastructure would create a platform to support the private sector, while the promotion and innovation part is the developing the digital skills of entrepreneurs to improve their productivity and workflow process efficiency through the supply chain, which will utilize digital tools and go along

with banking system, services and manufacturing. Society and knowledge refers to the universal access ability, which allows people various online channels with an affordable price. The integration of activities at various levels generates the value that make specific business models profitable (Boonnoon, 2014).

The increasing recognition of the role of digital economy, which enables the interactions among consumers, and suppliers as an important co-value creation has derived the implications of these interactions in numerous settings, including online activities. Digital economy is growing rapidly and frequently features comments about brands and products. Moreover, consumers increasingly rely on and are interested in collaborations (Cheong & Morrison, 2008). New business models have emerged demonstrating common features – mobility, use of data to generate value and network effects.

An extension of Web 2.0, online technologies and mobile device capability, digital economy fills a basic desire for interaction and decision support. Digital economy specifically helps businesses mitigate the isolation inherent to most online data analysis activities. Furthermore, it is an online community-based e-commerce platform that brings together products from a vast array of stores into one digital platform. The types of business expand to several varieties of e-commerce, app stores, online advertising, cloud computing, participative networked platforms, high speed trading, and online payment services.

Web 2.0, though, represents some of the best ways in which Internet is different from other forms of technological communication. The key features of Web 2.0 are interactive with users rather than the creation of static Web pages, decentralized forms of authority and control, and the use of material for dissemination through hyperlinking rather than a sole emphasis on content creation (Briggs, 2007). It can be user-driven, such as information-seeking on the Web, or producer-driven, such as an online news site or a TV news broadcast. Information technologies, then, are used to create a medium for information exchange, but they are not the exchange itself. For the Web 2.0 have been adopted and widely used in order to improve communication and relationship with employees, employers, customers and suppliers.

Web 2.0 and social media is referred to in this research as synonymous because "the interaction that occurs is social" (Borges, 2009, P.38).

Thailand 4.0 Policy

In order to achieve a competitive advantage, businesses have to develop and integrate the innovation and applying them into business process a business model. The digital and innovation rises to a number of new business models recently from traditional business to modern advances in technological and innovative involvement that have made it possible to conduct many types of business at outstanding greater scale and over longer distances than was previously. The digital and innovation allows the rapid development of new business models; they can also quickly cause existing businesses to become obsolete. Furthermore, to encourage digital and innovation in various economic activities, the objective of which is to create equilibrium between the environment and society. Therefore, Thai government has established the policy in order to pull itself out of the middle-income trap and deal effectively with disparities and the imbalance between the environment and society, called Thailand 4.0. The policy also seeks to promote creativity, innovation, and the application of technology in various economic activities, the objective of which is to create equilibrium between the environment and society.

Since the change of technologies and widespread diffusion of the digital economy, it led to innovation in business models, which in turn allows consumers and businesses to connect around the world any time (Harris & Rae, 2009). The digital economy provides business an ability of the transformational effects of new way to use the data as in the fields of information and communication. It gives rise to certain form of new business models, which is important to the business to adapt in the new environments. Thailand attempts transforming the nation through creativity and innovation, also known as Thailand 4.0. Thailand 4.0 is a new economic policy to develop Thailand into a valued-based economy or digital-based economy. However, Thailand is confronting many challenges, such as a labor shortage and an aging society. Thai labor is still lagging behind in terms of manufacturing technology. New businesses in Thailand still lack the ability to find new sources of investment. Therefore, Thailand is attempting to change the country from traditional

farming to smart farming, traditional business to digital business, and traditional services to high-value services. It is envisioned to change the country's traditional farming to smart farming, traditional SMEs to smart enterprises, and traditional services to high-value services.

The Revolutions of Thailand's Economic Model

Competition in the business is typically based on innovation rather than price, resulting in high opportunities in the market; with serving quickly being displaced by more successful innovators. The increasing of the digital technology and innovation have impacts which are the need of having some infrastructure and policy establishment in a country where business is done.

In 2016, The Thai government established the country's strategy "Thailand 4.0" as a new economic model aimed at pulling Thailand out of the middle-income trap, and developing it as a high-income country. It is envisioned to change the country's traditional farming to smart farming, traditional SMEs to smart enterprises, and traditional services to high-value services (Languepin, 2016). Furthermore, Thai government officially established the Digital Economy and Society Ministry in September 2016, replacing the Information and Communication Technology (ICT) Ministry. The new ministry takes responsibilities to plan, promote, develop and implement activities related to a digital society and economy in order to have efficient and comprehensive development and usage of information and communication technology in all sectors. Additionally, Thai government has established the Ministry of Digital Economy to offer citizens and businesses the opportunity to complete a vast array of related transactions through many channels; i.e., Electronic-Procurement (e-Procurement), Electronic-Auction (e-Auction), and Electronic-Taxation system (e-Taxation). Generally, Thailand 4.0 is based on value-based economy, integrated by digital technology and innovation. It becomes crucial for the new economy era. Digital technologies are used to transform business operations in order to improve effectiveness, efficiency, productivity, and service delivery (Easley and Kleinberg, 2010).

Thailand is similar to other countries that the public and private sectors in Thailand are most likely important revolution. For example, South Korea, Singapore, Taiwan all went through the same first three steps of economic development and global integration. They were developing

from traditional export to labor-intensive, from light manufacturers to capital-intensive, from national heavy manufacturers to value-base innovation (Shafer, 2016). However, the workforce is an essential element. It could be an efficient means of helping Thailand through the transition period, since the Thai entrepreneurs and workforces need to understand the structure and the basis of the revolution to the new economic model.

Thailand 1.0 was based on traditional agriculture, before transitioning to the light industry. It's emphasis was placed on the agricultural sector. Thailand 2.0, which focused on light industries and helped upgrade the country's economy from the low-income to middle-income status. Thailand 3.0, which emphasized heavy industries for continued economic growth. Thailand 4.0 is a new economic model to develop Thailand into a valued-based economy. It is envisioned to change the country's traditional farming to smart farming, traditional SMEs to smart enterprises, and traditional services to high-value services.

The Importance of Thailand 4.0 Model

During this period, Thailand has become stuck in the middle-income trap and faces disparities and imbalanced development. Hence, one of the purposes of the new economic model (Thailand 4.0) is to pull itself out of the middle-income trap and deal effectively with disparities and the imbalance between the environment and society. According to Ariyapruchya (2016), the World Bank economist believes that Thailand should be able to achieve long-term annual economic growth of 4-5 percent through the Thailand 4.0 model.

Furthermore, the developing must be sustainable growth and development, in order to achieve economic growth and sustainable development without destroying the environment (Royal Thai Government, 2016). Therefore, Thailand 4.0 is mainly focused on at least three major changes, which are 1) change production of "commodities" into "innovative products; 2) transform industry-driven activities into those driven by technology, creativity and innovation; and 3) shift from the focus on making products, to providing services (Yoon, 2016).

One of the crucial cgereteristies of Thailand 4.0 model is to help Thai industries in every sector such as agriculture, SMEs, and services, to adapt to global competitive pressures by

increasing the technological base through the development and integration of enabling innovation, and digital technologies. For example, agriculture sector will reconfigure their advantage, which is cost is no longer existed. They need to adapt some part of innovation and technology into their production process by the support of biotechnology and agritech also called "smart farming."

Meaning that farmers should no longer be the poorest segment of the population. They should or might become entrepreneurs instead of being subjected to the vagaries of changing weather and the dictates of merchants and middlemen (Yoon, 2016). Moreover, the increasing recognition of the role of innovation and digital technology, which enable the interactions among partnership such as consumers, and suppliers as an important co-value creation has derived the implications of these interactions in numerous settings, including online activities. Thailand 4.0 also is considered the backbone of the digital economy. Digital economy is growing rapidly and frequently features comments about brands and products. Moreover, consumers increasingly rely on and are interested in collaborations (Cheong & Morrison, 2008). New business models have emerged demonstrating common features – mobility, use of data to generate value and network effects.

Elements of Thailand 4.0

Typically, the Thailand 4.0 comprised with three elements, including knowledge based economy, inclusive society, and sustainable growth and development (Royal Thai Government, 2016). These three elements will initiate to develop manpower, strengthen society, sustain economic growth, ensure a more equitable distribution of wealth and opportunities, and enhance the quality and accessibility of public services.

Knowledge based economy

In order to enhance the country's standing to become a high income country, the country faces many challenges such as knowledge, research and development, science and technology, creative thinking, and innovation. Thai government plans to increase its research and development investment to 1 percent of gross domestic product, while investing in digital infrastructure (The Nation, 2016).

Inclusive society

In the second element, Thailand will move toward an inclusive society with equitable access to the fruits of prosperity and development. Moreover, the government places high importance on the freedom, equality and well-being of people, as well as inclusive and equitable access to basic services (Chan-O-Cha, 2016).

Sustainable growth and development

The third element focuses on sustainable growth and development, in order to achieve economic growth and sustainable development without destroying the environment. Thailand 4.0 model employs technology and innovation as driving forces for sustainable economic development in the agricultural and industrial sectors, among others (Chan-O-Cha, 2016).

Technology Acceptance Model (TAM)

There are many technology acceptance models that are used to identify factors influencing the innovation adoption such as theory of reasoned action and theory of planned behavior. Fishbein's and Ajzen's (1975) introduce theory of reasoned action (TRA), it is a widely validated intention model for predicting and explaining behavior and extended by including another construct called perceived behavioral control, in their theory of planned behavior (TPB). Later, the theories are used often and proven successful in predicting and explaining behavior across business areas (Agrarwal and Prasad, 1997; Moore and Benbasat; 1996; Tayloy and Todd; 1995).

Recently, there have been a number of studies that provided theoretical frameworks for research in the acceptance of innovation. Another foundation of the model development relating to technology acceptance is introduced by Davis (1989) known as the Technology Acceptance Model (TAM). The theory has been widely applied and examined the determinants of computer usage behavior. Davis (1989) finds that intention to use a word processing system can precisely predict later use of the system. Meanwhile, perceived ease of use shows a significant effect on intention to use while attitude partially mediated the effects of beliefs on intention. Moreover, many studies test and successfully apply TAM to predict technology usage specific to Web site (Lin & Lu, 2000), spreadsheets (Mathieson, 1991), electronic mail (Straub, 1995), and database management systems

(Szajana, 1994). The model is used to predict and explain human behavior, the structural linkages within a sequence of beliefs, attitudes, intentions, and behaviors.

The strength of TAM is focused on several areas: specific focus on information systems usage, theoretical foundation on social psychology, and the reliability of its constructs (Mathieson, 1991). Furthermore, the importance of TAM research focuses on the fact that its findings are validated by significant information systems research and considered well suited for modeling technology usage acceptance.

Based on the theory, there are two important points of departure that explain and predict user acceptance of technology, including the beliefs in ease of use (EOU) and perceived usefulness (PU) (Davis, 1989). Ease of use is a degree to which the user expects a technology to be free of physical and mental efforts (Davis, 1989). Perceived usefulness is a degree to which an individual believes that a particular system will increase the individual user's job performance (Fishbein and Ajzen, 1975). The importance of EOU and PU as major determinants of innovation usage has been theoretically supported and empirically validated by many studies. Taylor and Todd (1995) study the effect of computer usage in a computer resource center. They adapt EOU and PU as fundamental element of perception to study 430 experienced and 356 inexperienced business school students focusing on computer usage and they find that perceived usefulness had a significantly greater correlation with usage behavior than does ease of use.

However, Mathieson, Peacock and Chin (2001) argue that TAM is limited in its explanation in some situations. In a manner similar to an impulse purchase in marketing, TAM cannot explain the user's decision to use technology for no apparent reason or rationale. Moreover, the model does not explain the variance associated with several situations, such as lack of time, resources and expertise, which would preclude the use of technology, as well as, TAM does not consider the influence of social pressure (Mathieson et al., 2001). However, the overall is supportive evidence found for determinants of technology acceptance.

Digital Readiness

In the digital economic climate, most businesses try to maximize return on investments on multiple levels. Due to their versatility, digital technologies may be an important factor in reducing costs and at the same time increasing the value offered by information and communication technologies. Although most companies have realized the need to digitize, various challenges are inhibiting them from starting or benefitting from digital transformation, especially for the SMEs. Basically, the major barriers for SMEs are related to insufficient IT structures, lack of technical skills, inadequate business processes and high implementation risks and costs (Leipzig, Gamp, Manz, Schöttle, Ohlhausen, Oosthuizen, Palm, and Leipzig, 2017). Generally speaking, The efficiency, whereby ventures can utilize digital business through highly scalable infrastructures. Thus, the digital decade has seen businesses taking advantage of lower price/performance levels of computing (hardware and software) as well as global connectivity through standard protocols such as the Internet, mobile web, and application to adapt their business infrastructure to the new digital era. Therefore, digital transformation challenging for traditional businesses require hardware infrastructure, software infrastructure, and digital literacy (Boonnoon, 2014; Bharadwaj, El Sawy, Pavlou, and Venkatraman, 2013; Eshet-Alkalai, 2004; Huerta and Almazan, 2007; Mutch, 1997; Wanda and Stian, 2015; and Ziphorah, 2014).

Hardware Infrastructure

Hardware infrastructure refers to information-technology infrastructure that is used to support a digital economy such as high speed broadband Internet, and digital gateways. The business must involve an infrastructure that supports business innovation through agility. Integrated infrastructure are combinations of server, storage and network infrastructure, sold with management software that facilitates the provisioning and management of the combined unit (Moore, 2016). A majority of integrated hardware infrastructure replace existing infrastructure. This is great for cost and consolidation of IT and efficiency metrics. However, when implementing this as part of a digital business initiative digital businesses must look at how the potential savings of those costs. For example, to operate a private cloud, determine which deployment environment best suits a particular

workload, what management tools to use and which cloud providers and partners are best equipped to assist.

Software Infrastructure

Software infrastructure refers to online channels, online transactions such as verification systems to identify individuals online and cyber-security in order to boost up business transactions. The infrastructure would create a platform to support the private sector, while the promotion and innovation part is the developing the digital skills of entrepreneurs to improve their productivity and workflow process efficiency through the supply chain, which will utilize digital tools and go along with banking system, services and manufacturing. The universal access ability allows business various online channels with an affordable price. The integration of activities at various levels generates the value that make specific business models profitable. In the near future, almost every business will have software development expertise at its core (Bourne, 2016).

Digital Literacy

Digital literacy has been among the most popular expressions featuring in the curricula of the last few years (Dani, 2013; Jukes, McCain & Crockett, 2010). The information literacy concept has been adapted to include ICT. The American Library Association defines information literacy as the ability to recognize when information is needed and to be able to locate, evaluate, and use it effectively (Mutch, 1997). Digital literacy is information literacy in a digital environment. Digital literacy refers to the technical, cognitive, and sociological skills that people need to perform efficiently in a digital environment (Eshet-Alkalai, 2004). It seems reasonable to assume that, due to the lack of digital literacy, it might also lack the skills required to transform business to the digital business efficiently in a digital environment. According to Huerta and Almazan (2007), the digital literacy is based on five skills, including photovisual, reproduction, branching, information, and socioemotional.

Photovisual skill

The photovisual skill refers to the ability to use graphical user interfaces. This skill also includes the user's ability to understand information delivered through different sensory channels. This skill is specific to the digital environment; it describes the ability to use computer and digital devices.

Reproduction skill

The reproduction skill refers to the ability to synthesize and analyze the information gathered to create an original piece of work. The analytical skill is used to examine the big data, gathered from online and offline sources, by reproducing and manipulating preexisting digital text, visuals, and audio pieces.

Branching skill

The branching skill refers to the ability to navigate in a nonlinear environment to find the desired information. This skill is specific to the digital environment through knowledge domains, such as in the Internet and other hyper- media environments.

Information skill

The information skill refers to the ability to assess the quality of the information retrieved. The reproduction and information skills are not unique to the digital environment but they are increasingly relevant to this environment because of the great deal of information available. The skill is to consume information critically and sort out false and biased information.

Socioemotional skill

The socioemotional skill refers to the ability to interact with other people on the Internet. A user with socioemotional ability must be familiar with the rules of interaction on the Internet, being able to communicate effectively in online communication platforms such as discussion groups and chatrooms. The socioemotional skill reflects the fact that ICT access is not only used as a means for gathering information**.**

Therefore, to transform business to the digital business, the digital literacy is described in literature as the ability to employ a wide range of cognitive and emotional skills in using digital technologies. It is

one of the crucial factors that business need to pay close attention, and prepare for the readiness of digital business transformation.

In sum, digital readiness needs the resources around digital business strategy, viewed relatively broadly. Digital readiness and its capabilities are the digital infrastructure consists of institutions, practices, and protocols that together organize and deliver the increasing power of digital technology to business and society (Deloitte, 2009). Thus, to be ready in the Infrastructure to enable the digital business providers is to control and optimize the flow of big data between businesses and their customers and partners.

Digital Business Transformation

In a digitally business environments, businesses operate in business ecosystems, integrating the alliances, partnerships, and competitors. Furthermore, the use of digital platforms enables firms to break traditional industry boundaries and to operate in new business model through the digital resources (D'Adherio 2001; Klein and Rai 2009; Rai et al. 2012; and Saraf et al. 2007).

To identify the main factors motivating and influencing the digital business transformation in the business, they should understand the concept, benefits, and challenges of the digital business, its' impact on business performance and future perspective. Especially, the idea of seeing a business model as a system, made up of subsystems each with inputs, transformation processes and outputs. Inputs, transformation processes, and outputs involve the acquisition and consumption of resources such as money, labor, materials, equipment, buildings, land, administration and management. How value chain activities are carried out determines costs and affects profits.

Van, et al (2014) pointed out that the direct impact that technology investment had on growth and having the indirect impact on both information technology and commerce in term of competitive advantage. The vast progress in digitalizing processes, allowing businesses in transmitting information to decentralize many functions in distant locations based on their advantages. Therefore, digital technologies increase competitive advantage for the economy; this is likely to be global in scale, given that geographical barriers are becoming increasingly irrelevant. Therefore, the businesses

that are embracing the digital business trend to craft their transformation stages are required to focus and develop the key business transformations as a digital transformation strategy, which are mobility, value of data, social commerce effect, and new business model (Harvard Business Review Analytic Services, 2015).

1. Mobility - mobile is enabling new business scenarios (Harvard Business Review Analytic Services, 2015). The development of a core contributor to value creation and economic growth for companies in the digital economy. Businesses are increasingly able to carry on commercial activities remotely while traveling across borders, removing geographically from both the locations in which the operations are carried out and the locations in which their suppliers or customers are located. Furthermore, Harvard Business Review Analytic Services (2015) found that putting mobile functionality in the hands of employees is now a key requirement to increase productivity.

2. Value of Data – there is a report showing that there are over 2.5 Exabyte's (billions of gigabytes) of data every day (OECD, 2013). The big data effect is a crucial part on the value of the data-driven marketing economy and the revenues generated for the economy. Big data is helping companies innovate (Harvard Business Review Analytic Services, 2015). The business uses the big data to obtain and analyze data, and big data in particular, is increasingly well documented by market observers. Additionally, leading companies are not only integrating more data into their analyses, but they are using the results to develop new products and services (Harvard Business Review Analytic Services, 2015).

3. Digital Commerce - social shopping allows people to browse through product specifically for them that are filled with products posted or made popular by other users. Social channels are transforming core business processes (Harvard Business Review Analytic Services, 2015). Social media is becoming a core aspect of modern digital marketing strategies, and they see potential for it to radically transform the marketing function. This helps to confirm and increase their purchase decisions. It is more likely to have friendly collaborative buying experience. When shopping information or an experience is communicated to one's friends and acquaintances, the comments or opinions made by these significant others influence the consumer's consumption related self-confidence (Gordon, 2007).

4. New Business Models – data input and resources such as customer information, and customers' online behavior allows businesses to gain an asset in business models where the different sides of the market can be created then dynamically adapted based on evolving technology, the latest expression of consumer demand, and a firm's position on the market, resulting in innovative new business models, products, and services (Harvard Business Review Analytic Services, 2015). Uber, for example, uses power of tech innovation to create a new way calling a taxi.

Therefore, the digital business transformation is the process involving the design of products and services, interoperability with other complementary business platforms, and deployment as products and services by taking advantage of digital resources. Many firms are beginning to see the power of digital resources to create new digital technology capabilities and craft new strategies around new products and services (Rai et al. 2012; Ray et al. 2005; Sambamurthy et al. 2003).

Digital Business Transformation Benefits

Typically, digital technology can provide so many of the necessary benefits for businesses to seek a better business opportunity. Digital technology is highly accessible and relatively easy and efficient to implement. With the right strategy, digital technology can be utilized to achieve corporate advantage. Digital technology and the expectations of digitally savvy customers are having a profound impact on all aspects of business including the products and services companies offer, their business models, and even core operations and processes. Digital transformation is becoming a cultural norm as more digitally advanced companies seek new levels of competitive advantage (Harvard Business Review Analytic Services, 2014).

1. Cost - generally, the adoption of technology, providing decline in price and increase in performance, has contributed to the development of new activities in businesses. Furthermore, these technologies have expanded market reach and lowered costs, and have enabled the development of new products and services (OECD, 2014). Furthermore, many technologies are embraced to boost efficiency and cut the business costs. Harvard Business Review Analytic Services (2015) found that digital makes business flexible and cost effective. Many businesses expect cost-effective, innovative forms of information processing for enhanced insight and decision making.

2. Business Value - along with the value, the business can use the data to improve products and services. Digitally maturing companies are in a position to recognize the benefits from collaboration (Kane *et al.,* 2015). The value of the ability to obtain and analyze data, and big data in digital economy environment is increasingly well documented by market researchers. Such data business can use it to analyze variability in performance and understand their consumers' behaviors, and to segment their market target in order to customize their products and service categories, to use as a supportive decision making with the automated algorithms (OECD, 2014).

3. Service - services are an important feature of many businesses in the digital economy. Digital business platforms create a new service offering that integrates social and mobile data with analytics to provide real time business intelligence (Kane *et al.,* 2015). New digital trends in service such as cloud computing, mobile web service, social media, eco-system, co-creation, and so forth, are thoroughly changing the way of doing business from traditional business models to digital business models (service innovation). For example, UBER, a car (taxi) ride service, uses mapping data and the global positioning system (GPS) to capitalize on drivers and customers to connect them to share the ride. This sample can be applied to other businesses since the important for digital economy is to build the platform or model rather than to build a product (McKenna, 2015).

Therefore, digital business strategy is to formulate and execute by leveraging digital resources to create differential value, thereby elevating the performance implications of business strategy beyond efficiency and productivity metrics to those that drive competitive advantage and strategic differentiation. Additionally, digital business transformation is the result of blending the power of technology with a rapidly adaptable culture that understands not only what technology can do for its business.

Business Performance

Once the business is transformed to digital business, it is expected to achieve better results, which is to compared to be traditional performance. Possibly one of the most well-known models for strategic planning and management, is the Balanced Scorecard. The Balanced Scorecard (BSC) is used to provide management with a quick, but thorough overview of the company's

performance on a strategic level (Kaplan, and Norton 1993). The BSC was developed by Robert Kaplan and David Norton in 1992 as an alternative to traditional performance measurement approaches that focus solely on financial indicators and are based purely on a business's performance. It is used as a strategic planning and management system, integrating business activities based on the vision and strategy of the businesses, to make effective internal and external communication processes and to monitor and improve organization performance against the overall strategic goals, providing sufficient feedback about both internal processes and external business outcomes to endlessly modify strategic performances.

The Balanced Scorecard considers the following perspectives, including financial perspective, customer / marketing perspective, internal business processes perspective, learning and growth perspective. The BSC is not only considering the financial results which are important, but also those factors which actually drive businesses towards future success as well (Evans, 2002). The benefit of managing with a combination and balancing of financial and non-financial information is that the use of leading, non-financial indicators facilitates proactive control and the ability to take preventive action (De Waal, 2013). The BSC is not only combining of important indicators of performance evaluation, but it is also consistent application providing a modern way of management, since it aligns the business activities with the business processes of company's value creation.

The Balanced Scorecard Perspectives

1. Financial perspective

The most obvious reasons for digital technology explosion in organizations are its abilities to reduce cost. Business performance refers to how well an organization achieves its outcomes-based sale performance as well as its financial goals, including return on investment (ROI), market share, profit margin on sales, the growth of ROI, the growth of sales, the growth of market share, and overall competitive position. Lambert (2010) suggests that for each relationship, the impact on financial performance of the businesses involved is the ultimate measure of success. Beside the revenue stream, there is a cost consideration regarding to financial perspective. Oliver (1989) suggests that transaction costs typically refer to the transaction expenses and the accompanied hidden

costs of shopping during the transaction process, including costs in bargaining, breach of contract and signing of contract.

Therefore, financial perspective represents the long- term goal of the organizations that provides superior returns based on the capital invested in the unit. Financial Measures, have been the traditional method of analyzing organizational success and involve such elements as profitability, sales growth, and revenue per sales visit. Although the BSC stresses the need to incorporate additional measures to determine success, the need for financial measures is still an extremely strong element to determine success (Niven, 2002).

2. Customer / marketing perspective

Choosing measures for the customer perspective of the BSC depends on the type of customers desired and the value that the organization provides to them. The purpose of the customer perspective is to focus on the target customers. This will allow organizations to create strategies consistent with the type of customers they want to attract (Bose and Thomas, 2007).

The concept of customer and marketing consideration is to keep customer satisfaction. Additionally, it has been a point of investigation and some recent researches. Rossomme (2003) claims that satisfaction is an important tool in assessing the health of customer relationships and asserts that is the concept of customer satisfaction. Yang & Peterson (2004) suggest businesses to offer the products or services truly needed by customers and come up with considerable higher value and higher satisfaction.

Lim, Ling, Lee, and Benbasat (2006) find that satisfied customer endorsement by similar peers is found to increase customers' trusting beliefs about the business's product and service. This positively influenced customers' attitudes toward the business and their willingness to buy products from the business, which ultimately lead to actual buying behaviors.

Therefore, employees should have the ability to resolve problems quickly, efficiently and at the heart of customer service process, dealing with customer complaints, provide good customer service and information.

3. Internal business processes perspective

The internal process perspective focuses on all the activities and key processes required in order for the company to excel at providing the value expected by the customers, leading indicators where management intervention is possible to affect customer and financial outcomes.

Digital technology typically provides the ability for collaboration at increased communication speeds. This empowers employees to share and receive ideas on improved business effectiveness. Also, we could say that the human resource function has also been transformed by digital technology, which is related to internal business processes perspective.

On the other hand, it entails the procedures that an organization must develop and master to be successful. Many organizations will concentrate on such elements as order processing, delivery, manufacturing, and product development as examples.

The focal point of this perspective is related to the customer perspective because to keep customers satisfied, an organization will need to focus on the components of the organization important to them. If target customers are dissatisfied when delivery is late, an organization must concentrate on the internal process of developing a more efficient delivery system or refining the system currently used (Levy, 1998).

To accomplish this, managers are undertaking a rigorous internal analysis not only assessing the internal processes of the organization, but also being able to manage the business risk. Risk is defined as models of economic utility, which risk involves uncertainty and financial. Risk is the combination of an outcome (assigned a utility value) and the probability that this outcome will occur (Cooper, 2008), while crisis is explained as a threat to the organization. Risk management involves assessing potential threats and finding the best solutions to avoid those threats, while crisis management involves dealing with threats prior, during, and after they have occurred (Wikipedia, 2013).

4. Learning and growth perspective

Learning and growth is the area probably least measured by most companies and yet it holds the key to future sustainable success (Narayanamma, and Lalitha, 2016). Learning and growth perspective focuses on the intangible assets of an organization, mainly on the internal skills and capabilities of the employees that are required to support the value creating internal processes.

This perspective is the backbone to a successful scorecard because it involves employee skills and information systems. Learning and Growth can include such issues as employee satisfaction, alignment of employee skills with jobs, number of employee suggestions implemented, and hours of employee training. Depending on the actual employee skills and desired employee skills, some organizations change job descriptions, relocate employees to other departments, and/or implement incentive programs designed to motivate employees to provide suggestions, receive education or training, and/or gain tenure through continued employment.

In this research, the learning and growth objectives describe how the employee, technology, and organizational climate combine to support strategy, leading indicators for improvements in the internal processes, customer and financial perspectives.

Summary

The literature review begin with the digital economy, followed by Thailand 4.0 policy. The theoretical framework focuses on technology acceptance model known as TAM (Davis, 1989). The approach proposes that two particular beliefs : perceived usefulness (PU) and perceived ease of use (EOU) influencing an individual's attitude toward a technology that possibly influences this individual's intention and behavior to use the technology. Additionally, this chapter presents digital readiness, and digital business transformation, which many find that it is very important to the business, especially in business transformation. Furthermore, this chapter presents the significant business performance, including financial perspective, customer/marketing perspective, internal process perspective, and learning and growth perspective.

Chapter 3

Research Methodology

This chapter discusses the methodology used to study the business performance of digital business transformation on small and medium enterprises in Thailand. The purpose of this chapter is to describe the details of the research methodology, including research questions, research design, hypotheses, population, sampling, instrumentation, and data collection techniques, validity and reliability and questionnaire.

Research Questions

This study attempts to examine the business performance of digital business transformation on small and medium enterprises in Thailand.   The literatures are reviewed to facilitate the development of the research questions. This study emphasizes three main research questions.

6. To what extent are small and medium enterprises ready for digital business transformation?

7. Whether or not the perceived usefulness of digital technology influences the intention of digital business transformation of the Thai small and medium enterprises?

8. Whether or not the perceived ease of transformation process influences the intention of digital business transform ation of the Thai small and medium enterprises?

9. Whether or not the digital readiness influence the intention of digital business transformation of the Thai small and medium enterprises?

10. Whether or not the digital business transformation associated with business performance?

Type of Research

The researcher will conduct both quantitative and qualitative research to examine Thai SMEs perceptions towards digital businesses transformation.

Quantitative Research

The research design is drawn from quantitative research methodology, which was designed to use in this study. This quantitative research is used to explore the business performance of digital business transformation on small and medium enterprises in Thailand. Furthermore, in order to answer the research questions and research hypotheses, the survey approach is used to gather the data in this study. This design is appropriate because it allows the researcher to gather the data from a large sample size in a cost-effective manner (Chatterjee & Machler, 1997; Gall et al., 1995).

Qualitative Research

An in-depth interview instrument is used as a qualitative research methodology in order to extend the information. Some of the participants are interviewed after they finished the survey. During the interview session, the participants are asked to respond to standardized open-ended questions; the participants are asked the same questions in the same order.

Research Hypotheses

4. Hypothesis 1: Perceived of technology acceptance is positively associated with the digital business transformation of the Thai small and medium enterprises.
5. Hypothesis 2: digital readiness is positively associated with the digital business transformation of the Thai small and medium enterprises.
6. Hypothesis 3: Digital business transformation is positively associated with the business performance of the Thai small and medium enterprises.

Selection of Subjects

Every researcher intends to conduct researches that cover the whole population in order to provide the accurate results; however, for reasons of size, time, cost, or accessibility, the researcher cannot conduct research in its entirety. Hence, this research study is conducted based on a sample representative of the target population. The sample of this study consisted of 500 SMEs; the

participants in this study are voluntary and anonymity. A completely self-administered survey will be taken, and the survey will be done at business seminars attended by small business men and women. These seminars are regularly scheduled by the Office of Small and Medium Enterprises Promotion of Thailand.

Population and Sampling

According to Small and Medium Enterprises Promotion (2015), it shows that the number of known enterprises in Thailand totaled 2,723,932 enterprises, indicated as manufacturers for 534,634, wholesalers and retailers for 1,164,605 and service for 1,044,106. The researcher uses Yamane's formula to calculate sample size for 5% precision levels where confidence level is 95%, resulting in a sample size of 500 respondents. Furthermore, the researcher attempts to use structural equation modeling (SEM) to analyze the data, which requires a large sample technique. According to Hair, Anderson, Tatham and Black (1998), the sample size required is somewhat dependent on model complexity, the estimation method used, and the distributional characteristics of observed variables. The sample size should be at least 20 times of the observed variables. Therefore, the minimum of sample size is 260 respondents, which is derived from 13 variables multiplied by 20 times. However, SEM usually requires the sample size at least 200 respondents. Therefore, the usable number of respondents is 500 according to Yamane's formula, which is more than the minimum of sample size.

The sampling technique used in this study is a convenient sampling to ensure that each individual of the population has the same probability of being chosen (Best & Kahn, 1998). In this study, the target population of this study is the SMEs located in Bangkok and perimeter in Thailand. The participants in this study are voluntary and anonymous. The survey is expected to be responded by top management level because they are most likely to be the one who involves in business planning, and makes the final decisions about implementation in the business.

Instrumentation

A survey approach is used because a survey provides a basis for generalization of the results to the whole population. Survey also allows researchers to collect of large amounts of data

from different groups of people and in a relatively limited of time. Since survey is a flexible tool, survey research easily explores of a wide range of topics requiring different types of data, including demographic, attitudinal, behavioral, and so forth, comparing, and measuring across factors. Therefore, a survey as a data collection instrument is used to gather the data in this study because the intention is to sample for 500 participants who work in small and medium businesses in Bangkok, Thailand in a cost-effective manner.

Moreover, an in-depth interview instrument is used as a qualitative research methodology in order to extend the information. Some of the participants are interviewed after they finished the survey. During the interview session, the participants are asked to respond to standardized open-ended questions; the participants are asked the same questions in the same order.

The questionnaire is divided into six sections. The first section contains questions designed to gather demographic information and business information about the respondents such as gender, age, education, marital status, position title, business industry.

The second section is designed to investigate the expectations of digital business transformation. The third, fourth, fifth, and sixth sections are developed to measure the following variables: perceived usefulness of digital technology, perceived ease of transformation process, the level of readiness of hardware infrastructure, the level of readiness of software infrastructure, the level of digital literacy, mobility, value of data, digital commerce, new business model, performance in financial perspective, performance in customer/marketing perspective, performance in internal process perspective, and performance in learning and growth perspective.

Responses in these sections are based on 5-point scale: 1 means "strongly disagree"; 2 means "disagree"; 3 means "neutral"; 4 means "agree"; and 5 means "strongly agree".

Table 1 Questionnaire Items Used to Measure Key Variables and Their Sources in the Literatures

Constructs / Dimensions	Items	Source of measure
Perceived usefulness of digital technology	- Using digital technology to create ongoing and meaningful conversations with their customers - Using digital technology to response the customers more quickly - Using digital technology to encourages customers to stay loyal - Using digital technology to develop a business opportunity - Using digital technology to increase a business performance	Davis (1989), Salisbury et al. (2001)
Perceived ease of transformation process	- Easy to plan the digital business strategy - Easy to become skillful at implementing digital business strategy - Easy to acknowledge the employees to understand the transformation process - Easy to create a new business model on digital platform - Easy to offer valuable ecosystem to the business stakeholders	Davis (1989), Salisbury et al. (2001)

Constructs / Dimensions	Items	Source of measure
Digital Readiness – Hardware Infrastructure	- Having high speed broadband Internet, and digital gateways - Having server, storage and network infrastructure - Having private cloud system - Providing employees the standardize hardware for working such as desktop and laptop Providing employees the mobile devices for working remotely	Leipzig, Gamp, Manz, Schöttle, Ohlhausen, Oosthuizen, Palm, and Leipzig (2017), Bourne (2016)
Digital Readiness – Software Infrastructure	- Providing up to date software, needed for employees to work - Having security software and updated patch - Using enterprise software to keep recording and tracking data - Using business intelligence software - Having real time analytics software and alert	Leipzig, Gamp, Manz, Schöttle, Ohlhausen, Oosthuizen, Palm, and Leipzig (2017), Boonnoon (2014), Bourne (2016).
Digital Readiness – Digital Literacy	- Communicating, exchanging, and sharing information by using digital technology - Appropriate using digital technology suit to work - Having the data analysis tools and skills - Understanding and knowing how to protect and secure your technology devices Feel comfortable using technology device for personal and work	Leipzig, Gamp, Manz, Schöttle, Ohlhausen, Oosthuizen, Palm, and Leipzig (2017), Boonnoon (2014), Eshet-Alkalai (2004

Constructs / Dimensions	Items	Source of measure
Digital Readiness – Digital Literacy	- Communicating, exchanging, and sharing information by using digital technology - Appropriate using digital technology suit to work - Having the data analysis tools and skills - Understanding and knowing how to protect and secure your technology devices Feel comfortable using technology device for personal and work	Leipzig, Gamp, Manz, Schöttle, Ohlhausen, Oosthuizen, Palm, and Leipzig (2017), Boonnoon (2014), Eshet-Alkalai (2004
Digital Business Transformation – Mobility	- Allowing workers have an ability to work outside the office - Having virtual private network (VPN) to access the company's data and information - Allowing the business to real time monitor	Van, et al (2014), Harvard Business Review Analytic Services (2015)
Digital Business Transformation – Value of Data	- Having software to integrate traditional data sources and new big data - Leveraging the business opportunities in big data - Having an ability to evaluate new analytic algorithms	Van, et al (2014), Harvard Business Review Analytic Services (2015)
Digital Business Transformation – Digital Commerce	- Having online selling and payment system - Having online marketing budget separated from traditional marketing budget - Having digital business strategies	Van, et al (2014), Harvard Business Review Analytic Services (2015)

Constructs / Dimensions	Items	Source of measure
Digital Business Transformation – New Business Model	- Having new business platform - Using ecosystem to collaborate the business and their partners - Focusing on building an application to serve the customers	Van, et al (2014), Harvard Business Review Analytic Services (2015)
Business performance – Financial Perspective	- Increase the growth of sales - Increase revenue - Increase return on investment - Reduce operational costs - Reduce business costs	Kaplan, and Norton (1993), Niven (2002)
Business performance – Customer / Marketing Perspective	- Better understand of customer perception of the business's product/service - The overall of customers' satisfaction - To retain existing customers - Increase the growth of market share - To improve insights about target market	Kaplan, and Norton (1993), Bose and Thomas, (2007)
Business performance – Internal Process Perspective	- To manage customers' complaints - To quickly escalate and resolve the issue - To facilitate strategic decision making and enhances efficiency - To share and pursue CSR initiatives to resolve business crisis - To improve the service process	Kaplan, and Norton (1993), Cooper (2008)

Constructs / Dimensions	Items	Source of measure
Business performance – Learning and Growth Perspective	- To gain the brand loyalty and trust - To enhance the brand image - To shape the business's reputation - To establish expertise and credentials - To build communities around the brand and access to new market	Kaplan, and Norton (1993), Narayanamma, and Lalitha (2016)

Procedures and Data Collection

By studying the previous research and reviewing the literatures, carried out to faciltiate in the development of the research questions and the hypotheses. Additionally, related literatures assist the researcher in developing and designing instruments, developing the questionnaire, structuring the questionnaire, and to conduct an effective research (Figure 2).
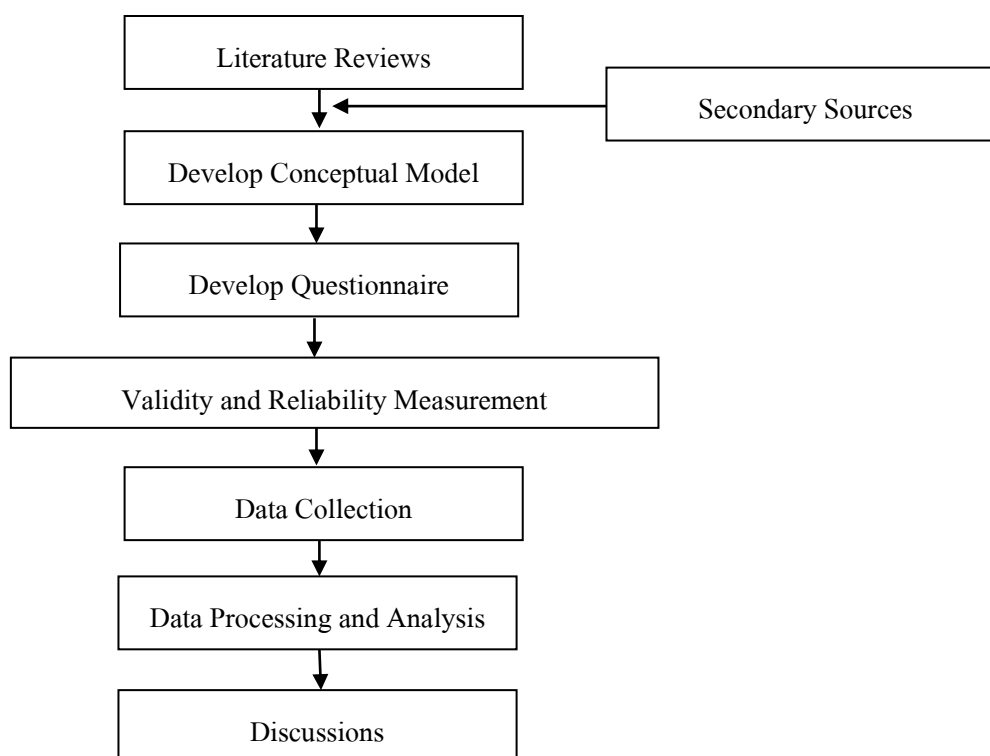
Figure 2. Procedures and data collection.

Development of the Questionnaire

The questionnaire is designed to gather the information involving the business performance of digital business transformation on small and medium enterprises in Thailand. The questionnaire questions are adapted from previously validated instruments of similar field of study. Content validity or expert validity is used to measure the content of the questionnaire samples whether or not an appropriate professional consensus exists.

Therefore, the questionnaire is reviewed by experts in the area. Further, the previous research and recommendations and comments from research committees and faculty of business administration members from academic professionals are incorporated as modifications to the survey instrument to establish the content validity of the research.

The questionnaire for this study includes a five point Likert scale, multiple choice items, and rank-order assessment. Items on the survey are scored on a five-point Likert scale. The scale ranges from one through five, with a response of one meaning strongly disagree, two meaning disagree, three meaning neutral, four meaning agree, and five meaning strongly agree.

The questionnaire has five parts with a total of 75 items. Part A in the questionnaire uses multiple-response items, involving the information about the participants' business background, business industry, and numbers of employees, approximate company's revenue. This section of the survey is used to provide the demographics of the types of organizations and their numbers of employees, but it is also used to indicate the validity of the respondents to ensure that they are in the SME industry according to the definition used in this study.

Part B in the questionnaire is designed to investigate the expectations of digital business transformation. The items in this part included rank-order items.

Part C in the questionnaire is a five point Likert scale, representing a range from strongly disagree to strongly agree, and from never to always. This part is designed to investigate the perceived usefulness of digital technology, and the perceived ease of transformation process to the digital business.

Part D in the questionnaire is a five point Likert scale, representing a range from strongly disagree to strongly agree, and from never to always. This part is designed to investigate the

digital readiness of the business, including hardware infrastructure, software infrastructure, and digital literacy.

Part E in the questionnaire is a five point Likert scale, representing a range from strongly disagree to strongly agree, and from never to always. This part is designed to investigate the digital business transformation, including mobility, value of data, digital commerce, and new business model.

Part F in the questionnaire is a five point Likert scale, representing a range from strongly disagree to strongly agree, and from never to always. This part is designed to investigate thebusiness performance, including financial perspective, customer / marketing perspective, internal process perspective, and learning and growth perspective.

Validity and Reliability

The measuring instruments used must be valid and reliable. Thus, the validated instruments are guided from reviewing prior studies, and theoretical frameworks. Some of the variables are adapted from previously used scales. Furthermore, the questionnaire questions are adapted from previously validated instruments of similar field of study.

The English version of the questionnaire needs to be translated into the Thai language. The pilot testing is done on both the English and Thai versions of the questionnaire. The translation is conducted by a qualified lecturer of the faculty of liberal arts. The review in the area of the research is to validate the reliability and validity of the research. Once the English version of the questionnaire is created and sent to a lecturer in the Faculty of Liberal Arts for review, the English version of the questionnaire needs to be translated into the Thai language. The questionnaire is reviewed involved in the area of the research in order to validate the research. Additionally, the feedback from the respondents is used to correct any misinterpretation.

Furthermore, in terms of content validity or expert validity, the previous research and recommendations from five faculty members as academic professionals, including one research mentor are incorporated as modifications to the survey instrument to establish the validity of the research. The questionnaire is tested by experts in the area of the research in order to validate the

reliability and validity of the research. The experts review the survey instrument to maximize the construct validity, face validity, and content validity. Along with the responses from the respondents, the feedback about the clarity of the questions, instructions, and the length of the questionnaire are used as a way to improve the constructs and content validity.

To establish the reliability of standardized tests, Cronbach's alpha coefficient is used to analyze all the scores on individual items. All variables of this study are tested by computing the Cronbach's alpha coefficient. According to Bickman and Rog (1998), a highly reliable test will have an alpha coefficient of 0.70 or more on a scale of zero to one where a high alpha coefficient indicates high reliability.

Pilot Testing

A pilot study is used to establish the reliability and validity of the study. A pilot testing is used to measure the quality of the study (Isaac & Michael, 1995). The pilot testing is the method used in this study to validate and measure the reliability of the questionnaire (Anderson & Gerbing, 1991). The approach is taken by experts in the area of the research in order to validate the reliability and validity of the research. The pilot testing is done on the Thai version of the questionnaire. Pilot participants from SME businesses in management level review the survey instrument to maximize the construct validity, face validity and content validity. Along with the responses from the respondents, the feedback is used as a guideline to improve the questionnaire.

Data Collection

The data is collected in three ways: Firstly the questionnaires with the cover letter, which explained the purposes of the study and requested for cooperation, are provided to the top management level of small and medium businesses by the researcher visiting the samples' workplaces because of time and cost limitations. By visiting the prospective participants in their offices, the researcher expects to obtain a high return rate of responses.

Secondly, a completely self-administered survey is taken. The survey is done at business seminars attended by SME business persons. These seminars are regularly scheduled by the Office of Small and Medium Enterprises Promotion of Thailand.

Lastly, an in-depth interview is used to extend the information. The interview begins with a brief introduction and purposes of the interview. Each participant is interviewed independently. The questions are designed as an open – ended questions in order to receive respondents' comments and opinion toward business performances.

Data Processing and Analysis

The primary purpose of this study is to examine the business performance of digital business transformation on small and medium enterprises in Thailand. Consequently, the latent variables are technology acceptance model, digital readiness, digital transformation, and business performances.

The observed variables for this study are: perceived usefulness of digital technology, perceived ease of transformation process, hardware infrastructure, software infrastructure, digital literacy, financial perspective, customer/marketing perspective, internal process perspective, and learning and growth perspective.

A factor analysis is conducted using the items that measure the factor structure and initial validity. Factor analysis is useful in discovering potential latent sources of variance and covariance in observed measurements. Items with good measurement properties should exhibit high factor loadings on the latent factor of which they are indicators, and small factor loadings on the factors that are measured by differing sets of indicators. Therefore, such results provide some evidence of initial validity of measurement items (Segars and Grover, 1993).

To ensure the high quality of instrument development process, .50 is used as the cutoff score for factor loading. Items with loadings lower than .50 and items with serious cross-loadings (i.e. an item loaded very close to .50 on more than one factor) are removed. To streamline the final results, factor loadings lower than .40 is not reported. Moreover, the stability of the factors is

analyzed by measuring the ratio of respondents to items, and the Tinsley and Tinsley (1987) guideline of having a minimal ratio between 5 and 10 was followed.

Structural equation modeling is used to analyze the survey responses. It is to specify, test, and modify the measurement model. Model-data fit is evaluated based on multiple fit indexes. The Chi-square goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), and root mean square residual (RMSR) are used to evaluate the goodness of fit of the model. It measures the difference between the sample covariance and the fitted covariance. These index scores (GFI, AGFI, CFI, NFI) in the range of .80-.89 are considered as representing reasonable fit; scores of .90 or higher are considered as evidence of good fit, while RMSR values range from 0 to 1, with smaller values indicating better model; values below .05 signify good fit (Joreskog and Sorbom, 1989).

Summary of Research Methodology

This chapter discusses the research questions, research design, instruments, subjects, data collection procedures, and data processing used in this study. The research examines the business performance of digital business transformation on small and medium enterprises in Thailand. The target population is focused on top management level of SMEs in Bangkok, Thailand. The sample of this study consisted of 500 small and medium businesses obtained by convenient sampling. To collect the data, two methods are used: (a) personal contact, and (b) self-administered survey. Structural equation modeling is used to analyze the survey responses. It is to specify, test, and modify the measurement model.

Chapter 4

Research Findings

The purpose of this research is to examine the business performance of digital business transformation on small and medium enterprises in Thailand. This chapter presents the results of the study as well as a discussion of the data analysis and evaluation of the results. This chapter is divided into four sections including the descriptive statistics, factor analysis technique, and structural relationships, and the hypothesis testing. In the descriptive analysis, the respondents' characteristics are summarized and presented. Factor analysis technique is then conducted to reduce the number of items which are interrelated. The assessments of the confirmatory factor analysis and the measurement model are checked. Next, the structural relationships among constructs as proposed in the conceptual framework are determined. Finally, the hypothesis testing is conducted.

Sample Characteristics and Descriptive Statistics

The purpose of descriptive statistics is to provide a structured depiction of the characteristics of a data set. The target population of this study is SMEs in Thailand. A total of 500 usable questionnaires are obtained. Demographic questions are included as part of the survey. Respondents are asked on their gender, age, highest education, position title, types of business, number of employees, and approximate revenue. In addition, they are asked to identify their expectation of digital business transformation. The survey is done at business seminars held by Department of Business Development. These seminars were held during May to July 2017.

Table 2 shows the distribution of usable responses by gender; the respondents consist of 266 males (53.2%), and 234 females (46.8%).

Table 2 *Breakdown of Sample by Gender*

Gender	Frequency	Percentage
Male	266	53.2
Female	234	46.8
Total	**500**	**100.00**

Table 3 shows the distribution of usable responses by age; 46.6% report their age to be between 18 and 32; 23.8% report their age to be between 33 and 40; 18% report their age to be between 41 and 50; 8.6% report their age to be between 51 and 60; and 6% reports his/her age to be over 61.

Table 3 *Breakdown of Sample by Age*

Age	Frequency	Percentage
18-32	218	43.6
33-40	119	23.8
41-50	90	18.0
51-60	43	8.6
Over 60	30	6.0
Total	**500**	**100.0**

In terms of respondent's level of education, 62 (12.4%) report high school as their highest level of education. One hundred and ninety (38%) report having some college education, 162 (32.4%) indicate they have a bachelor's degrees and 86 (17.2%) reported having master's degrees or higher degrees (Table 4).

Table 4 *Breakdown of Sample by Educational Level*

Educational Level	Frequency	Percentage
High school	62	12.4
College diploma	190	38.0
Bachelor's degree	162	32.4
Master's degree or higher	86	17.2
Total	**500**	**100.0**

The majority of the respondents are married 260 (52%), 208 (41.6%) are single, 17 (3.4%) are divorced, and 15 (3%) are widowed (Table 5).

Table 5 *Breakdown of Sample by Marital Status*

Marital Status	Frequency	Percentage
Single	208	41.6
Married	260	52.0
Divorced	17	3.4
Widowed	15	3.0
Total	**500**	**100.0**

Table 6 shows the distribution of usable responses by job position; 3.2% report their position as president; 17.8% report their position as vice president; 53.8% report their position as director; and 25.2% report their position as manager.

Table 6 *Breakdown of Sample by Job Position*

Job Position	Frequency	Percentage
President	16	3.2
Vice President	89	17.8
Director	269	53.8
Manager	126	25.2
Total	**500**	**100.0**

The diversity of the 500 SMEs is indicated in Table 7 showing a distribution in four different categories regarding types of business. 29% of the SMEs sampled are in manufacturing, 12.4% of the SMEs sampled are in wholesale, 27.8% of the SMEs sampled are in retail, and 30.8% of the SMEs sampled are in service.

Table 7 *Breakdown of Sample by Business Classification*

Business Type	Frequency	Percentage
Manufacturing	145	29.0
Wholesale	62	12.4
Retail	139	27.8
Service	154	30.8
Total	**500**	**100.0**

The breakdown of the sampled SMEs by the number of employees is shown in Table 8. This section is not only used to provide the demographics of the numbers of employees, but it is also used to indicate the validity of the respondents to ensure that they are in SMEs according to the definition of SMEs used in this study. 212 (42.4%) report their employees to be between 1 and 15, 216 (43.2%) report their employees to be between 16 and 25, 36 (7.2%) report their employees to be 26-50, 26 (5.2%) report their employees to be between 51 and 100, and 10 (2%) report their employees to be over 100.

Table 8 *Breakdown of Sample by Numbers of Employees*

Numbers of Employees	Frequency	Percentage
1-15	212	42.4
16-25	216	43.2
26-50	36	7.2
51-100	26	5.2
Over 100	10	2.0
Total	**500**	**100.0**

Table 9 presents the business experience. 17.4% report that they have been running the business less than one year; 26.2% report that they have been running the business for 1-3 years; 35.8% report that they have been running the business for 4-5 years; and 20.6% report that they have been running the business for over 5 years.

Table 9 *Breakdown of Sample by Business Experience*

Business Experience	Frequency	Percentage
Less than 1 year	87	17.4
1-3 years	131	26.2
4-5 years	179	35.8
Over 5 years	103	20.6
Total	**500**	**100.0**

Table 10 presents the business revenue in a year. 44.4% report that their revenue is less than 1 million baht; 51.8% report that their revenue is between 1-10 million baht; 2.4% report that their revenue is between 10.01-20 million baht; and 0.4% report that their revenue is between 20.01-30 million baht.

Table 10 *Breakdown of Sample by Business Revenue*

Business Revenue	Frequency	Percentage
Less than 1 million	227	45.4
1-10 million baht	259	51.8
10.01-20 million baht	12	2.4
20.01-30 million baht	2	0.4
Total	**500**	**100.0**

Table 11 reveals the expectation of digital business transformation by SMEs. Generally, SMEs expect digital business transformation to provide the customer service and feedback as the top expectation. Enhance business's image, customer / marketing data insight, keep the business cost down, and enable to online business are the second, the third, the forth, and the fifth expectations of digital business transformation by SMEs.

Table 11 *Ranking of Mst Expectations of Digital Business Transformation*

Purposes	Mean	Standard deviation	Ranking
Provide the customer service and feedback	4.52	0.50	1
Enhance business's image	4.50	0.56	2
Customer / marketing data insight	4.44	0.55	3
Keep the business cost down	4.40	0.56	4
Enable to online business	4.36	0.59	5
Increase productivity and business performance	4.15	0.79	6
Knowledge sharing	4.02	0.79	7
Improve internal communication	3.94	0.82	8
Keep tracking and tracing the business data	3.93	0.83	9

Opinions of the Respondents about Digital Business Transformation

The respondents are asked to record their opinion about the digital business transformation based on the aspects of perceived usefulness of digital technology, perceived ease of digital business transformation process, , digital readiness, digital business transformation, and business performance. Respondents specify their level of agreement to a statement. These items are rated by order of agreement (1 means "strongly disagree"; 2 means "disagree"; 3 means "neutral"; 4

means "agree"; and 5 means "strongly agree"). A summary of means and standard deviations of the response are presented in Table 12 - 24.

Table 12 *Means, Standard Deviations, and Median Response with Items for the Perceived Usefulness of Digital Technology*

Perceived Usefulness of Digital Technology	Mean	SD.	Median Response
Using digital technology to create ongoing and meaningful conversations with their customers.	3.66	1.23	Agree
Using digital technology to response the customers more quickly	3.46	1.36	Agree
Using digital technology to encourages customers to stay loyal	3.50	1.35	Agree
Using digital technology to develop a business opportunity	3.27	1.34	Neutral
Using digital technology to increase a business performance	3.77	1.10	Agree
Average	**3.53**	**0.94**	**Agree**

Note. Mean Range: 1.00-1.80 = Strongly Disagree, 1.81-2.60 = Disagree, 2.61-3.40 = Neutral, 4.41-4.20 = Agree, and 4.21-5.00 = Strongly Agree

Respondents agree that Using digital technology to create ongoing and meaningful conversations with their customers. (mean = 3.66), using digital technology to response the customers more quickly (mean = 3.46), using digital technology to encourages customers to stay loyal (mean = 3.50), using digital technology to develop a business opportunity (mean = 3.27), using digital technology to increase a business performance (mean = 3.77), and the average of perceived usefulness of digital technology (mean = 3.53), which has an Agree mean response (see Table 12).

Table 13 *Means, Standard Deviations, and Median Response with Items for the Perceived Ease of Digital Business Transformation Process*

Perceived Ease of Digital Business Transformation Process	Mean	SD.	Median Response
Easy to plan the digital business strategy	3.75	0.95	Agree
Easy to become skillful at implementing digital business strategy	3.98	0.88	Agree
Easy to acknowledge the employees to understand the transformation process	3.94	0.94	Agree
Easy to create a new business model on digital platform	3.99	0.94	Agree
Easy to offer valuable ecosystem to the business stakeholders	4.04	0.90	Agree
Average	**3.94**	**0.69**	**Agree**

Note. Mean Range: 1.00-1.80 = Strongly Disagree, 1.81-2.60 = Disagree, 2.61-3.40 = Neutral, 4.41-4.20 = Agree, and 4.21-5.00 = Strongly Agree

Respondents agree that it is easy to plan the digital business strategy (mean = 3.75), it is easy to become skillful at implementing digital business strategy (mean = 3.98), it is easy to acknowledge the employees to understand the transformation process (mean = 3.94), it is easy to create a new business model on digital platform (mean = 3.99), it is easy to offer valuable ecosystem to the business stakeholders (mean = 4.04), and the average of perceived ease of digital business transformation process (mean = 3.94), which has an Agree mean response (see Table 13).

Table 14 *Means, Standard Deviations, and Median Response with Items for the Digital Readiness in Hardware Infrastructure*

Hardware Infrastructure	Mean	SD.	Median Response
Your business has high speed broadband Internet, and digital gateways	3.85	0.99	Agree
Your business has server, storage and network infrastructure	3.78	1.06	Agree
Your business has private cloud system	3.78	1.11	Agree
Your business provides employees the standardize hardware for working such as desktop and laptop	3.76	1.13	Agree
Your business provides employees the mobile devices for working remotely	3.72	1.13	Agree
Average	**3.78**	**0.86**	**Agree**

Note. Mean Range: 1.00-1.80 = Strongly Disagree, 1.81-2.60 = Disagree, 2.61-3.40 = Neutral, 4.41-4.20 = Agree, and 4.21-5.00 = Strongly Agree

Respondents agree that business has high speed broadband Internet, and digital gateways (mean = 3.85), business has server, storage and network infrastructure (mean = 3.78), business has private cloud system (mean = 3.78), business provides employees the standardize hardware for working such as desktop and laptop (mean = 3.76), business provides employees the mobile devices for working remotely (mean = 3.72), which has an Agree mean response (see Table 14).

Table 15 *Means, Standard Deviations, and Median Response with Items for Digital Readiness in Software Infrastructure*

Software Infrastructure	Mean	SD.	Median Response
Your business provides up to date software, needed for employees to work	4.15	0.85	Agree
Your business has security software and updated patch	3.92	1.03	Agree
Your business has enterprise resource planning software to keep recording and tracking data	3.85	1.02	Agree
Your business uses business intelligence software	3.84	1.01	Agree
Your business has real time analytics software and alert	3.74	1.08	Agree
Average	**3.90**	**0.74**	**Agree**

Note. Mean Range: 1.00-1.80 = Strongly Disagree, 1.81-2.60 = Disagree, 2.61-3.40 = Neutral, 4.41-4.20 = Agree, and 4.21-5.00 = Strongly Agree

Respondents agree that business provides up to date software, needed for employees to work (mean = 4.15), business has security software and updated patch (mean = 3.92), business has enterprise resource planning software to keep recording and tracking data (mean = 3.85), business uses business intelligence software (mean = 3.84), business has real time analytics software and alert (mean = 3.74), and the average (mean = 3.90), which has an Agree mean response (see Table 15).

Table 16 *Means, Standard Deviations, and Median Response with Items for Digital Readiness in Digital Literacy*

Digital Literacy	Mean	SD.	Median Response
You can communicate, exchange, and share information by using digital technology	4.14	0.83	Agree
You are appropriate using digital technology suit to work	4.12	0.89	Agree
You have the data analysis tools and skills	4.08	0.93	Agree
You understand and know how to protect and secure your technology devices	4.14	0.76	Agree
You feel comfortable using technology device for personal and work	4.14	0.79	Agree
Average	**4.12**	**0.61**	**Agree**

Note. Mean Range: 1.00-1.80 = Strongly Disagree, 1.81-2.60 = Disagree, 2.61-3.40 = Neutral, 4.41-4.20 = Agree, and 4.21-5.00 = Strongly Agree

Respondents agree that they can communicate, exchange, and share information by using digital technology (mean = 4.14), they are   appropriate using digital technology suit to work (mean = 4.12), they have the data analysis tools and skills (mean = 4.08), they understand and know how to protect and secure your technology devices (mean = 4.14), they feel comfortable using technology device for personal and work (mean = 4.14), and the average (mean = 4.12), which has an Agree mean response (see Table 16).

Table 17 *Means, Standard Deviations, and Median Response with Items for the Digital Business Transformation in the Used of Mobility*

Mobility	Mean	SD.	Median Response
Workers have an ability to work outside the office	4.07	0.89	Agree
Your business has virtual private network (VPN) to access the company's data and information	4.13	0.89	Agree
You can monitor the business operation in real time	4.11	0.80	Agree
Average	**4.13**	**0.65**	**Agree**

Note. Mean Range: 1.00-1.80 = Strongly Disagree, 1.81-2.60 = Disagree, 2.61-3.40 = Neutral, 4.41-4.20 = Agree, and 4.21-5.00 = Strongly Agree

Respondents agree that workers have an ability to work outside the office (mean = 4.07), their business has virtual private network (VPN) to access the company's data and information (mean = 4.13), they can monitor the business operation in real time (mean = 4.11), and the average (mean = 4.13), which has an Agree mean response (see Table 17).

Table 18 *Means, Standard Deviations, and Median Response with Items for the Digital Business Transformation in the Value of the Data*

Value of the Data	Mean	SD.	Median Response
Your business has software to integrate traditional data sources and new big data	4.18	0.79	Agree
You can leverage the business opportunities in big data	4.08	0.84	Agree
You have an ability to evaluate new analytic algorithms	4.32	0.80	Strongly Agree
Average	**4.19**	**0.57**	**Agree**

Note. Mean Range: 1.00-1.80 = Strongly Disagree, 1.81-2.60 = Disagree, 2.61-3.40 = Neutral, 4.41-4.20 = Agree, and 4.21-5.00 = Strongly Agree

Respondents agree that their business has software to integrate traditional data sources and new big data (mean = 4.18), they can leverage the business opportunities in big data (mean = 4.08), they have an ability to evaluate new analytic algorithms (mean = 4.32), and the average (mean = 4.19), which has an Strongly Agree mean response (see Table 18).

Table 19 *Means, Standard Deviations, and Median Response with Items for the Digital Business Transformation in Digital Commerce*

Digital Commerce	Mean	SD.	Median Response
Your business has online selling and payment system	4.38	0.69	Strongly Agree
Your business has online marketing budget separated from traditional marketing budget	4.39	0.64	Strongly Agree
You have digital business strategies for the business	4.23	0.94	Strongly Agree
Average	**4.02**	**0.79**	**Agree**

Note. Mean Range: 1.00-1.80 = Strongly Disagree, 1.81-2.60 = Disagree, 2.61-3.40 = Neutral, 4.41-4.20 = Agree, and 4.21-5.00 = Strongly Agree

Respondents agree that their business has online selling and payment system (mean = 4.38), their business has online marketing budget separated from traditional marketing budget (mean = 4.39), they have digital business strategies for the business (mean = 4.23), and the average (mean = 4.02), which has an Agree mean response (see Table 19).

Table 20 *Means, Standard Deviations, and Median Response with Items for the Digital Business Transformation in New Business Model*

New Business Model	Mean	SD.	Median Response
Your business runs under new business platform	4.24	0.87	Strongly Agree
You are using ecosystem to collaborate the business and their partners	3.98	0.98	Agree
You are focusing on building an application to serve the customers	3.92	1.08	Agree
Average	**4.10**	**0.71**	**Agree**

Note. Mean Range: 1.00-1.80 = Strongly Disagree, 1.81-2.60 = Disagree, 2.61-3.40 = Neutral, 4.41-4.20 = Agree, and 4.21-5.00 = Strongly Agree

Respondents agree that their business runs under new business platform (mean = 4.24), they are using ecosystem to collaborate the business and their partners (mean = 3.98), they are focusing on building an application to serve the customers (mean = 3.92), and the average (mean = 4.10), which has an Agree mean response (see Table 20).

Table 21 *Means, Standard Deviations, and Median Response with Items for the Business Performance in Financial Perspective*

Business Performance (Financial Perspective)	Mean	SD.	Median Response
To increase the growth of sales	4.08	1.19	Agree
To increase revenue	4.03	1.03	Agree
To increase return on investment	4.15	0.94	Agree
To reduce operational costs	4.05	0.94	Agree
To reduce business costs	3.97	1.08	Agree
Average	**4.06**	**0.62**	**Agree**

Note. Mean Range: 1.00-1.80 = Strongly Disagree, 1.81-2.60 = Disagree, 2.61-3.40 = Neutral, 4.41-4.20 = Agree, and 4.21-5.00 = Strongly Agree

Respondents agree that digital business helps the business to increase the growth of sales (mean = 4.08), digital business increase revenue (mean = 4.03), digital business helps the business increase return on investment (mean = 4.15), digital business helps the business reduce operational costs (mean = 4.05), digital business helps the business reduce business costs (mean = 3.97), and the average (mean = 4.06), which has an Agree mean response (see Table 21).

Table 22 *Means, Standard Deviations, and Median Response with Items for the Business Performance in Customer / Marketing Perspective*

Business Performance (Customer / Marketing Perspective)	Mean	SD.	Median Response
Better understand of customer perception of the business's product/service	3.94	1.02	Agree
The overall of customers' satisfaction	3.97	1.03	Agree
To retain existing customers	4.07	1.05	Agree
To increase the growth of market share	3.97	1.11	Agree
To improve insights about target market	3.86	1.09	Agree
Average	**3.96**	**0.67**	**Agree**

Note. Mean Range: 1.00-1.80 = Strongly Disagree, 1.81-2.60 = Disagree, 2.61-3.40 = Neutral, 4.41-4.20 = Agree, and 4.21-5.00 = Strongly Agree

Respondents agree that digital business helps the business to better understand of customer perception of the business's product/service (mean = 3.94), digital business helps the business to maintain the overall of customers' satisfaction (mean = 3.97), digital business helps the business to retain existing customers (mean = 4.07), digital business helps the business to increase the growth of market share (mean = 3.97), digital business helps the business to improve insights about target market (mean = 3.86), and the average (mean = 3.96), which has an Agree mean response (see Table 22).

Table 23 *Means, Standard Deviations, and Median Response with Items for the Business Performance in Internal Process Perspective*

Business Performance (Internal Process Perspective)	Mean	SD.	Median Response
To manage customers' complaints	3.71	1.19	Agree
To quickly escalate and resolve the issue	3.70	1.18	Agree
To facilitate strategic decision making and enhances efficiency	3.97	0.97	Agree
To share and pursue CSR initiatives to resolve business crisis	3.55	1.02	Agree
To improve the service process	4.01	0.73	Agree
Average	**3.79**	**0.63**	**Agree**

Note. Mean Range: 1.00-1.80 = Strongly Disagree, 1.81-2.60 = Disagree, 2.61-3.40 = Neutral, 4.41-4.20 = Agree, and 4.21-5.00 = Strongly Agree

Respondents agree that digital business helps the business to manage customers' complaints (mean = 3.71), digital business helps the business to quickly escalate and resolve the issue (mean = 3.70), digital business helps the business to facilitate strategic decision making and enhances efficiency (mean = 3.97), digital business helps the business to share and pursue CSR initiatives to resolve business crisis (mean = 3.55), digital business helps the business to improve the service process (mean = 4.01), and the average (mean = 3.79), which has an Agree mean response (see Table 23).

Table 24 *Means, Standard Deviations, and Median Response with Items for the Business Performance in Learning and Growth Perspective*

Business Performance (Learning and Growth Perspective)	Mean	SD.	Median Response
To gain the brand loyalty and trust	3.89	0.99	Agree
To enhance the brand image	3.88	0.84	Agree
To shape the business's reputation	4.09	0.66	Agree
To establish expertise and credentials	4.13	0.74	Agree
To build communities around the brand and access to new market	4.29	0.75	Strongly Agree
Average	**4.05**	**0.45**	**Agree**

Note. Mean Range: 1.00-1.80 = Strongly Disagree, 1.81-2.60 = Disagree, 2.61-3.40 = Neutral, 4.41-4.20 = Agree, and 4.21-5.00 = Strongly Agree

Respondents agree that digital business helps the business to gain the brand loyalty and trust (mean = 3.89), digital business helps the business to enhance the brand image (mean = 3.88), digital business helps the business to shape the business's reputation (mean = 4.09), digital business helps the business to establish expertise and credentials (mean = 4.13), digital business helps the business to build communities around the brand and access to new market (mean = 4.29), and the average (mean = 4.05), which has an Agree mean response (see Table 24).

Reliability of the Measurement Scales

Before calculating the scale scores for each construct by averaging the scores for the scale items, the scales item reliability is tested to ensure that these items measure the same construct. The reliability analysis is performed for each scale using the Cronbach's Alpha. The results of the Cronbach's Alpha tests indicated that all five scales are reliable and valid for measuring the model. The overall alpha for each scale is high and indicated strong internal consistency among its items as

shown in Table 25. According to Bickman and Rog (1998), a highly reliable test will have an alpha coefficient of 0.70 or more on a scale of zero to one where a high alpha coefficient indicates high reliability. The results show that all of the overall alpha values of the factors' scales are significantly higher than 0.7. Therefore, all constructs in the conceptual framework exceed the recommended level of 0.70.

Table 25 *Summary of Scale Reliability*

Constructs	Numbers of Items	Cronbach's Alpha
Perceived usefulness of digital business transformation	5	0.79
Perceived ease of use of transformation process	5	0.81
Hardware Infrastructure	5	0.86
Software Infrastructure	5	0.80
Digital Literacy	5	0.77
Mobility	3	0.77
Value of Data	3	0.87
Digital Commerce	3	0.72
New Business Model	3	0.79
Financial Perspective	5	0.75
Customer/ Marketing Perspective	5	0.73
Internal Process Perspective	5	0.78
Organizational Learning and Growth Perspective	5	0.78

Exploratory Factor Analysis

Exploratory Factor Analysis (EFA) is a variable reduction technique, which assists the researcher in determining, and identifying the number of latent constructs underlying a set of items. EFA also allows the researcher to test that the developing scales theoretically serve to identify

a latent construct, as they conceptualized. Factor analysis and principle component analysis (PCA) are procedures of EFA. All fifty-measurement items for ten constructs (unobserved variables) in this study are extracted from the principle component analysis. A principal components factor analysis with varimax rotation is conducted to identify the dimensions of the model.

The KMO yielded a value of 0.859 and Bartlett's test of sphericity presented a Chi-square of 16679.747 (significant 0.000) with an associated level of significance smaller than 0.001. This indicated that the data are adequate for use with EFA. All standardized factor loadings are shown in Table 26 and 27.

There are five measurement items for the organizational learning and growth perspective in business performance construct (LE1 to LE5). LE2 shows the cross loading items; as a result, LE2 is eliminated as measurement items for the organizational learning and growth perspective construct.

Table 26 *Standardized Factor Loadings for All Constructs (Original)*

Item	1	2	3	4	5	6	7	8	9	10	11
PU1	.506										
PU2	.519										
PU3	.527										
PU4	.516										
PU5											
PE1	.551										
PE2	.581										
PE3	.579										
PE4	.610										
PE5	.52										

Item	1	2	3	4	5	6	7	8	9	10	11
HW1	.592										
HW2	.735										
HW3	.744										
HW4	.751										
HW5	.701										
SW1											
SW2	.660										
SW3	.713										
SW4	.712										
SW5	.678										
DL1											
DL2											
DL3											
DL4											
DL5											
MO1			.545								
MO2											
MO3											

Item	1	2	3	4	5	6	7	8	9	10	11
DA1			.509								
DA2											
DA3											
CM1											
CM2											
CM3											
MD1											
MD2							.546				
MD3							.560				
FI1							.544				
FI2							.516				
FI3											
FI4											
FI5											
CS1		.547									
CS2		.579									
CS3											
CS4											

Item	1	2	3	4	5	6	7	8	9	10	11
CS5											
PR1											
PR2											
PR3											
PR4	.660										
PR5	.722										
LE1	.819										
LE2	.824										
LE3			.521	-.507							
LE4											
LE5											

Table 27 *Standardized Factor Loadings for All Constructs (Items Deleted)*

Item	1	2	3	4	5	6	7	8	9	10	11
PU1					.734						
PU2					.760						
PU3					.746						
PU4					.665						
PU5		.568									
PE1		.503									
PE2		.695									
PE3		.743									
PE4		.706									
PE5		.721									
HW1		.624									
HW2	.746										
HW3	.772										
HW4	.787										
HW5	.764										
SW1		.540									
SW2	.554										
SW3	.616										

Item	1	2	3	4	5	6	7	8	9	10	11
SW4	.530										
SW5	.656										
DL1						.711					
DL2						.744					
DL3						.748					
DL4						.681					
DL5						.639					
MO1				.698							
MO2				.769							
MO3				.754							
DA1				.789							
DA2				.728							
DA3			.634								
CM1			.710								
CM2			.646								
CM3			.802								
MD1			.795								
MD2									.765		

Item	1	2	3	4	5	6	7	8	9	10	11
MD3									.613		
FI1									.688		
FI2									.758		
FI3									.527		
FI4							.667				
FI5							.837				
CS1							.837				
CS2							.807				
CS3							.782				
CS4								.630			
CS5								.817			
PR1								.796			
PR2								.747			
PR3											.629
PR4					.873						
PR5		.866									
LE1											
LE2	.644									.549	

Item	1	2	3	4	5	6	7	8	9	10	11
LE3						.889					
LE4				.842							
LE5			.852								

The Measurement Model and Confirmatory Factor Analysis

The measurement model is commonly applied in the social research to test the consistency of the relationship between measured variables and unmeasured variables (latent variables), which is developed from previous research. Confirmatory factor analysis (CFA) allows the determination of the overall fit of the measurement model.

Confirmatory analysis model tests the measurement assumptions, relating the indicators of the structural equation model (SEM) to the latent variables (Hoyle, 1995). Hence, the objective of using CFA for this study is to confirm that the conceptual framework is well supported by the theoretical concepts and the hypothesized assumptions, which it is used to measure if the data fit to the measurement models.
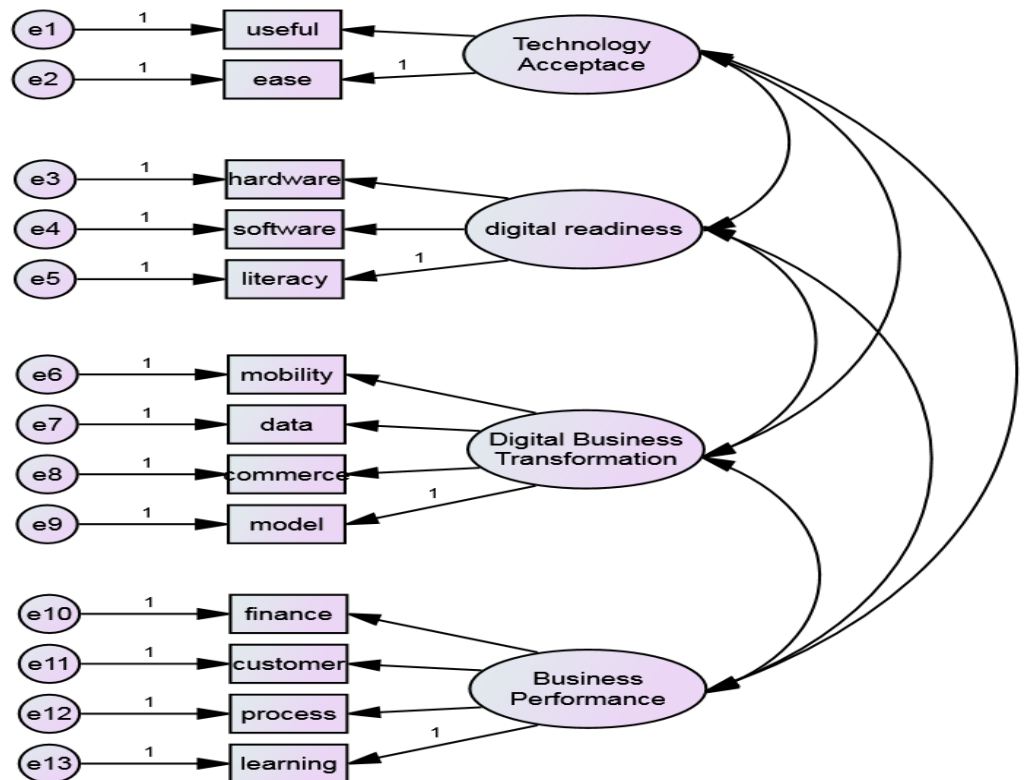

Figure 3 Measurement Model of the Conceptual Model

Figure 3 shows the measurement model of the conceptual framework. Fifty measurement items with ten constructs (unobserved variables) are included. The results of the model fit index are as the Table 28, and Figure 4.
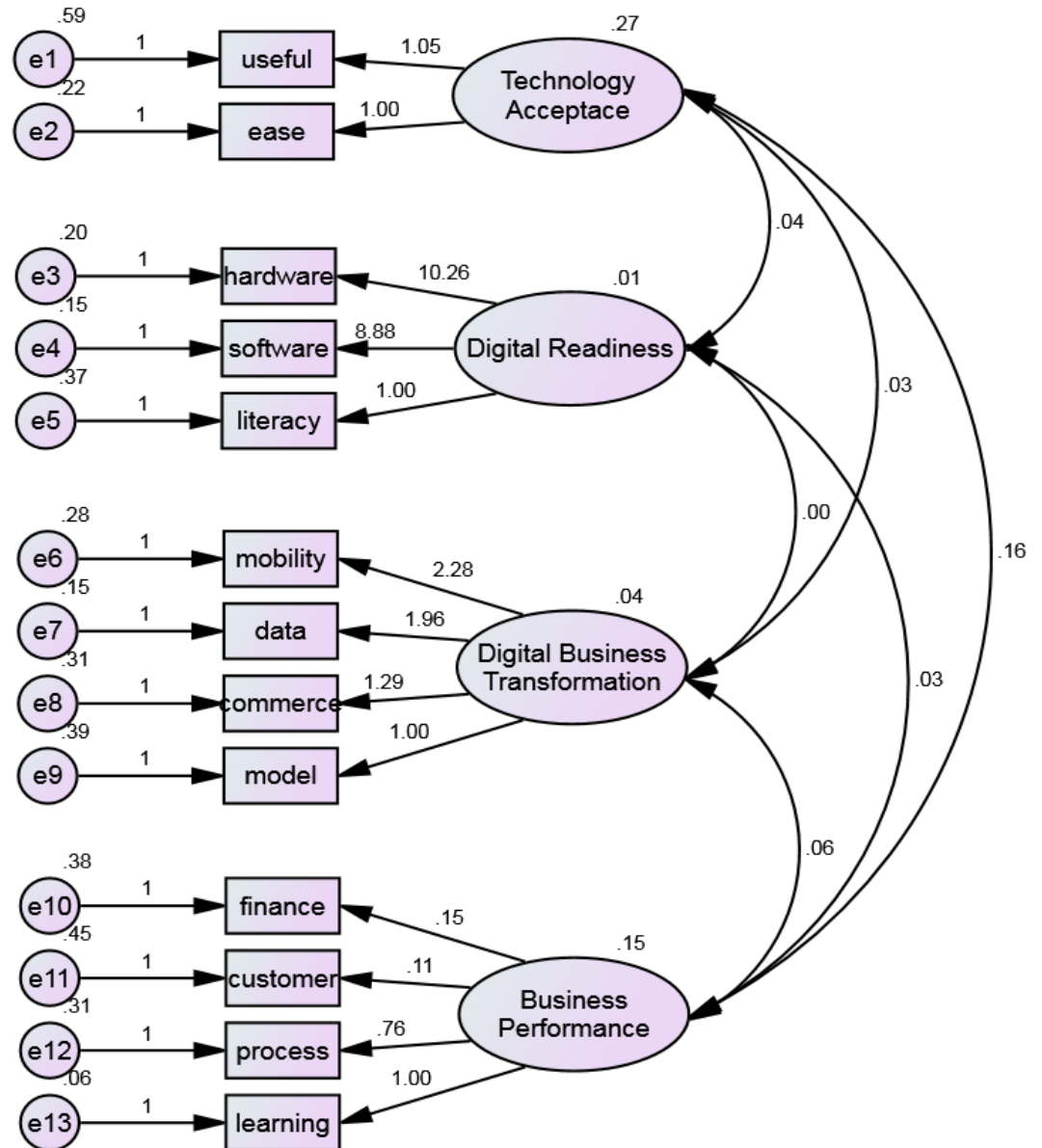

Figure 4 Results of Measurement Model of the Conceptual Model

Table 28 *The Results of Model Fit Index*

Chi-Square	P-Value	CMIN/DF	GFI	AGFI	NFI	IFI	CFI	RMSEA
790.723	0.000	13.402	0.823	0.727	0.710	0.725	0.723	0.158

To reduce the sensitivity of Chi-Square to the sample size, CMIN/DF (so called "normal chi-square") is used to be the major criterion to test the fit of the measurement model. Bollen (1989) suggests that value of CMIN/DF less than 5.0 is recommended as indicating a reasonable fit. GFI index is more than 0.90 which is slightly below the recommended level is indicated the good fit of the measurement model (GFI = 0.823). Other incremental fix indexes, including adjusted goodness-of-fit index (AGFI), normed fit index (NFI), incremental fit index (IFI), comparative fit index (CFI) suggest a marginally acceptable fit for the measurement model as it is very close to the recommended level at 0.90. For Root Mean Square Error of Approximation (RMSEA), it has been suggested that a value between 0.05 and 0.08 suggests a reasonable error of approximation, and if it exceeds 0.10, it suggests a poor fit (Bollen, 1989; Kline, 2005).

However, determination of the model's fit is complicated in this context because various goodness of fit criteria have been developed to evaluate structural equation models under different assumptions. Therefore, the fit indices in SEM do not have a statistical significance test that identifies the correct model considering the sample data.

The chi-square for the overall goodness of fit test is significant (p-value = 0.000), suggesting that the data are not well fitted by the model. However, evaluations using other criteria (CMIN/DF = 13.402, GFI = 0.823, AGFI = 0.727, NFI = 0.710, IFI = 0.725, CFI = 0.723, RMSEA = 0.158) indicate that the model fits the data is not well (Table 30). Therefore, the model is required to modify in order for the structural equation models to adjust a specific set of relationships among latent variables to improve the model fit.

A way in which fit can be improved is through the correlation of error terms. Correlating within-factor error is used to justify than across latent variable correlations. The researcher examines modification indices to get a sense for what might be causing the model to fit poorly, keeping in mind that any model modification must be theoretically justifiable.

According to Table 29, modification indices suggest that the largest improvement to the model chi-square can be achieved. These modifications reflect in the measurement model as shown in Figure 4 and Table 29.

Table 29 *Model Modification Indices*

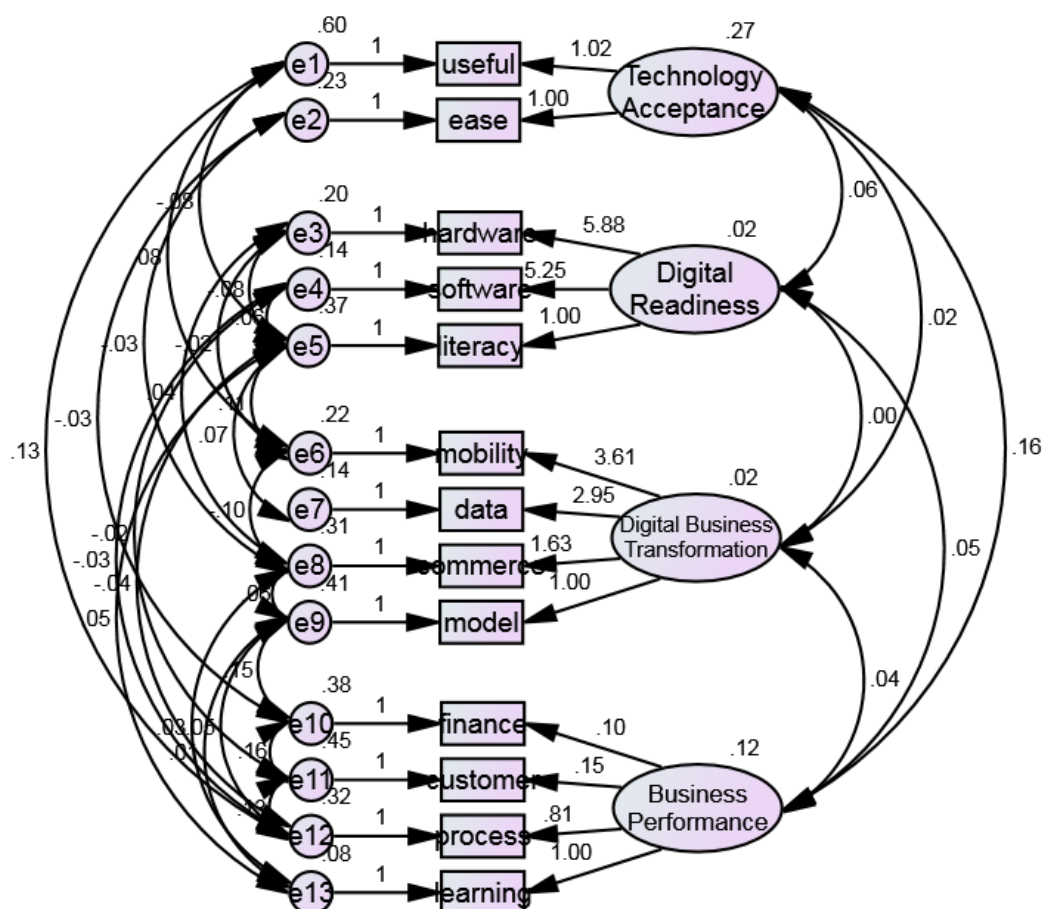|			M.I.	Par Change
e11	<-->	e10	88.760	.175
e9	<-->	e10	79.535	.156
e8	<-->	e6	70.000	-.123
e12	<-->	e11	62.441	.131
e5	<-->	e13	62.250	.049
e1	<-->	e12	35.663	.119
e8	<-->	e13	28.974	.030
e5	<-->	e3	28.005	-.071
e5	<-->	e4	17.581	-.049
e9	<-->	e8	11.712	.055
e4	<-->	e11	10.905	-.042
e9	<-->	e12	8.206	.045
e4	<-->	e12	7.607	-.029
e3	<-->	e6	4.070	-.026
e9	<-->	e13	4.067	.009
e3	<-->	e8	7.811	.030
e5	<-->	e12	4.006	-.023
e5	<-->	e6	12.204	.046
e1	<-->	e6	15.766	.073
e2	<-->	e10	7.125	-.031
e2	<-->	e8	10.546	-.039
e5	<-->	e7	10.512	.033
e1	<-->	e5	7.290	-.048

Figure 5 Results of Adjusted Measurement Model of the Conceptual Model

Table 30 *The Results of Adjusted Model Fit Index*

Chi-Square	P-Value	CMIN/DF	GFI	AGFI	NFI	IFI	CFI	RMSEA
97.398	0.000	2.705	0.971	0.927	0.964	0.977	0.977	0.058

According to Figure 5 and Table 30, the results exhibit that all the measurements have significant loadings to their corresponding construct. Overall, the model has a satisfactory fit with GFI = 0.971, AGFI = 0.927, NFI = 0.964, IFI = 0.977, CFI = 0.977, and RMSR = 0.058. Those are all very good, which is representing a reasonable model-data fit. Therefore, the model fix indexes

for the path model indicated an acceptable approximation of the proposed relationship among the constructs and the results should be interpreted meaningfully. Furthermore, the Table 31 shows the summary of the results of model fit index, including the priori model fit, and the adjusted model fit.

Table 31 *Summary of the Results of Model Fit Index*

Fit Indices	Indication of Fit	Measurement Model		Adjusted Measurement Model	
		Value	Results	Value	Results
CMIN/DF	< 2.00	13.402	Poor	2.705	Fit
P-Value	< 0.05	0.000	Fit	0.000	Fit
GFI	> 0.90	0.823	Fair	0.971	Fit
AGFI	> 0.90	0.727	Poor	0.927	Fit
NFI	> 0.90	0.710	Poor	0.964	Fit
IFI	> 0.90	0.725	Poor	0.977	Fit
CFI	> 0.90	0.723	Poor	0.977	Fit
RMSEA	< 0.08	0.158	Poor	0.058	Fit

Hypothesis Testing

The hypothesized model or the base model is as shown in Figure 6. The statements of hypotheses are as follows:

1. Perceived of technology acceptance is positively associated with the digital business transformation of the Thai small and medium enterprises.

2. Digital readiness is positively associated with the digital business transformation of the Thai small and medium enterprises.

3. Digital business transformation is positively associated with the business performance of the Thai small and medium enterprises.
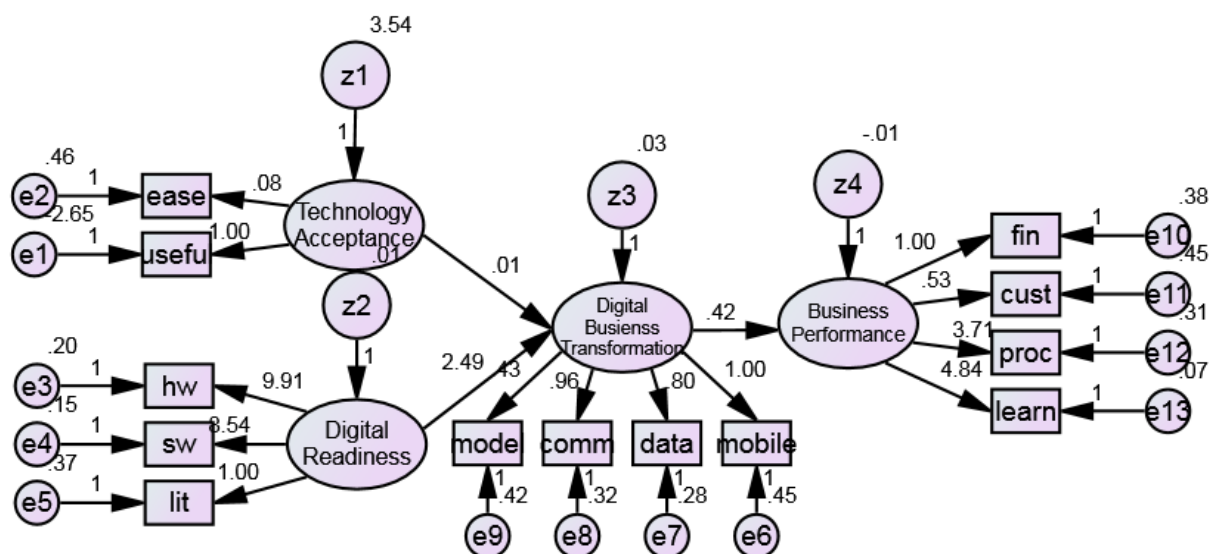
Figure 6: Structural Relation and Standardized Coefficients for the Model

Table 32 *Estimates of Regression Weights*

			Estimate	**S.E.**	**C.R.**	**P**	**Label**
Digital Business Transformation	<---	Technology Acceptance	.0.006	0.013	0.426	0.67	par_10
Digital Business Transformation	<---	Digital Readiness	2.495	1.001	2.492	0.01*	par_11
Business Performance	<---	Digital Business Transformation	0.418	0.148	2.829	0.00**	par_12

Note:　* shows p-value < 0.05 ** shows p-value < 0.01

The Paths, which are presented in Figure 6, represent the individual hypotheses. The hypotheses were tested by using SEM to analyze the structural relationship between constructs. The results of hypothesis testing are reported in terms of z-value (Critical Ratio) at the level of significance of 0.05 or lower as shown in Table 32.

The results indicate that all hypotheses are supported. All construct relationships are found to be positive. The results suggest that there is a significant relationship between digital readiness and digital business transformation ($p < 0.05$) as the direction of the relationship is positive as the study proposed (Hypothesis 2).

Hypothesis 3 is supported as the results show a significant relationship between digital business transformation and business performance ($p < 0.01$). This indicates that digital business transformation has a positive influence on the business performance in terms of financial perspective, customer/market perspective, internal process perspective, and organizational learning and growth perspective.

Among the significant relationships, the standardized coefficients are 2.495 (digital readiness to digital business transformation), and 0.418 (digital business transformation to business performance). The paths represent directly link in the proposed model. It can be concluded that effective digital business transformation will greatly lead to improve business performance.

Summary

The results of measurement model analysis and path model analysis are presented in this chapter. The data set of 500 samples are collected and summarized as shown in this chapter. The results of the EFA show that cross loading items are eliminated and other measurement items are consistent with the construct validity. The results of the CFA show that the sample data are a favorable fit to the measurement model. Hence, the structural model was reasonably accepted. The results of structural path analysis indicated that all three hypotheses are statistically significant and positive.

Chapter 5

Conclusion, Discussion and Recommendation

This chapter presents a brief summary of the study, research findings. Further, the end result is discussed as the recommendations for future research.

Summary of Research

The purpose and overall goal of this study is to examine the business performance of digital business transformation on small and medium enterprises in Thailand. The results from this research can be used not only by academicians in further exploring and testing causal linkages in business transformation to the digital business and the business performance, but also by practitioners for guiding the implementation.

A total of 500 usable questionnaires are obtained. The results of this study show that the SMEs expect digital business transformation to provide the customer service and feedback as the top expectation,. Enhance business's image, customer / marketing data insight, keep the business cost down, and enable to conduct online business are the second, the third, the forth, and the fifth expectations of digital business transformation by SMEs.

The SMEs perceive usefulness of digital technology that it helps the business in better performance (mean = 3.53), and they agree that it is easy to plan and implement the digital business transformation process (mean = 3.94). Generally, the SMEs agree that they are ready for the infrastructure; including hardware infrastructure (mean = 3.78), software infrastructure (mean = 3.90), and digital literacy (mean = 4.12).

Furthermore, the SMEs is changing their business by getting ready and becoming mobility business (mean = 4.13). They use the data for the business planning, and view the value of the data (mean = 4.19). Additionally, the SMEs start conducting the business in the digitalization (mean = 4.02), collaborating with new business model (4.10).

Discussions and Implications

The research found out that the SMEs This research found out that the SMS realigned the importance of trow digital technology affecters their business. SMEs transformed their business model to the digitalization in order to connect with their customers and their market closer, and to distribute and enhance their businesses' image. Many researchers found the relationship between digital technology and the business performance, the digital toll and platform help the business to increase awareness of business brand (Lo, 2010; Shih, 2009; and Wise, Alhabash and Park, 2010). Many believed that digital technology provide the business an accessible medium for accessing the customer base, building relationships, establishing and branding the business' unique personality (John, 2014; and Trainor, 2012). SMEs should build a community presence or want to reach as broad a network as possible. According to the findings, SMEs is using digital technology to emerge from consumer initiatives but also businesses have started to create communities as part of brand and image management strategies. Michael (2014) agreed that there is the possibrility that live chat could wind up boosting the business profits, but there could also be a possibility that it could chase customers away.

However, the results also showed that the SMEs were concerned about to keep tracking the data and tracing their business data the least. Nevertheless, digital business platform has its own unique benefits, so that SMEs should understand how to utilize for the marketing efforts is crucial to success by focusing on the big data. According to OECD (2013) and Harvard Business Review (2015), there is over 2.5 Exabyte's (billions of gigabytes) of data daily. The big data effect is a crucial part on the value of the data‑driven marketing economy and the revenues generated for the economy. Big data is helping companies to innovate and to obtain and analyze data, and big data in particular, is increasingly well documented by market observers. Additionally, leading companies are not only integrating more data into their analyses, but they are using the results to develop new products and services (Harvard Business Review Analytic Services, 2015).

The results also reported the structural equation modeling (SEM) and hypotheses testing results on the proposed model. To summarize, three hypothesized relationships were significant at the 0.00, and 0.01 level and the final SEM displayed very good fit to the data. However,

statistical significance and model fit are not ultimate objectives of academic research. They are basically the means to achieve the end, which is better understanding of the subject under investigation and discovery of new relationships. As mentioned, the results from this research can be used not only by academicians in further exploring and testing causal linkages in the digital business transformation, but also by practitioners for guiding the digital business transformation and the evaluation of the business performance. This section will discuss the theoretical and practical implications of the test of each hypothesis.

Technology acceptance is directly related to digital business transformation. This relationship is not found to be significant (p-value = 0.426), which indicates that there is no relationship between technology acceptance and digital business transformation. Many researchers found the relationship between technology acceptance model (TAM) and the technology adoption (Chen, Xu, and Arpan, 2017; Hussein, 2017; Lin & Lu, 2000; Straub, 1995). However, Mathieson, Peacock and Chin (2001) argue that TAM is limited in its explanation in some situations. In a manner similar to an impulse purchase in marketing, TAM cannot explain the user's decision to use technology for no apparent reason or rationale. Moreover, the model does not explain the variance associated with several situations, such as lack of time, resources and expertise, which would preclude the use of technology, as well as, TAM does not consider the influence of social pressure (Mathieson et al., 2001). The results show that the SMEs enjoy and feel easy when using the technology, so that it may imply that they already embraced and integrated new technology to change the way of doing their businesses. Additionally, regarding the data about their digital readiness, it showed that they identified business objectives and goals and tried in the introduction of new technology to those specific goals. The infrastructures are at the heart of the business, leading to enhanced levels of productivity and efficiency. Furthermore, they see the potential to increase responsiveness and the customer experience through technology, as well as opportunities to enhance upselling, customer satisfaction and retention. Therefore, the result does not find any relationship between the technology acceptance and the digital business transformation.

Digital readiness is directly related to digital business transformation. The results of this study further provide the empirical support for the hypothesis justifications. The relationship is found to be significant (p-value = 0.01), which indicates that there is direct, positive relationship (2.49) between digital readiness and digital business transformation. Generally, the business needs to enable digital transformation to remain competitive and meet consumer and customer demands. However, the major barriers for SMEs are related to insufficient IT structures, lack of technical skills, inadequate business processes and high implementation risks and costs (Leipzig, Gamp, Manz, Schöttle, Ohlhausen, Oosthuizen, Palm, and Leipzig, 2017).

Generally speaking, the efficiency, whereby ventures can utilize digital business through highly scalable infrastructures. Thus, the digital decade has seen businesses taking advantage of lower price/performance levels of computing (hardware and software) as well as global connectivity through standard protocols such as the Internet, mobile web, and application to adapt their business infrastructure to the new digital era. The digital business transformation set the conditions for the IT transformation (Savulescu, 2015).

Frmanzah (2015) agrees that technology transformation must be synchronized with business demand to deliver results fast and independent from huge infrastructure changes. Additionally, Schumacher, Erol, Sihn (2016) found that the business value derived from integrating this perspective into the company's general strategy. Digital business transformation is involved in the long-term success coming from the executives' and employees' understanding the opportunities of digital that provides and grive them the tools to successfully drive initiatives forward (Ortowski, Ziotkowski, Paciorkiewicz, 2017). Jayaram, Manrai, Manrai (2015) found the relationship between a digital readiness and the strategic execution. to understand their ability to respond. Therefore, digital business transformation starts with an understanding of how the organization works now and identifying internal change as well as opportunities for a better innovation culture. Furthermore, Frmanzah (2015) suggests that a continued focus on building infrastructure should be complimented by an effort to identify those without an ability to manage, integrate, evaluate, and create information in a traditional sense and to provide them with the necessary tools to acquire ICT skills. These results support whether or not a business chooses to participate in digital literacy, including hardware

infrastructure, software infrastructure, and digital literacy. Every business should understand these basic requirements and able to use them for the business capabilities. In sum, the business has to view of how they perform against critical capabilities that emphasize digital business transformation, achieving the business's objectives.

Digital business transformation is directly related to business performance. The results of this study further provide the empirical support for the hypothesis justifications. The relationship is found to be significant (p-value = 0.00), which indicates that there is direct, positive relationship (0.42) between digital business transformation and the business performance. It can be concluded that digital business transformation is a very effective form of business in today's competing environmental and will provide competitive advantage for the business. The digital business directly improves a business's financial, customer/marketing, internal process and organizational learning and growth performances in the long run. Stoddard, Clopton, and Avila (2006) researched on sales process effectiveness incorporates understanding customers and found that the understanding customers' ability is to complete only short-term outcomes in the sale performance. As a result, the finding found that digital business transformation would increase the business performance to generate little more sales. As for the current study, seeing that digital business transformation assisted the growth and the business performance, the result of the study supported prior studies by many researchers. Arshad, Rasli, Arshad, Zain (2014); Duperein (2014); and Vargas, Estrada, Gómez (2016); which brought into being that technology infrastructure acted as a platform for digital business development especially in digital knowledge and skills practices of IT personnel in developing business platform.

Duperein (2014) pointed outs that a digital strategy impacted the learning and growth perspective in balanced scorecard model in term of human, information and organization capital, which these factors have to be leveraged by business processes. Moreover, Vargas, Estrada, Gómez (2016) found that the use of ICTs, innovation and business performance were positively correlated. It was also mentioned that the efficient use of ICTs was reflected in the level of overall performance of the businesses, including efficiency, market orientation, profitability and organizational climate. Furthermore, the use of ICTs and innovation are critical factors that improve

the performance level of companies and thus support their growth and competitiveness in the market. Arshad, Rasli, Arshad, Zain (2014) also support that technology-based SMEs has a relationship with business performance.

In conclusion, the results of this study provide evidence that SMEs, which have digital readiness, including hardware infrastructure, software infrastructure, and digital literacy tend to be more desirous of the digital business transformation. Furthermore, through the analyses, this study found that the desire for the digital business transformation underlies the increase of business performance. This association implies that SMEs should realize the appropriate digital business scheme used to increase the business performance.

Recommendations

Digital transformation is not just about embracing new technology, it is about a change in thought and organization culture. There is a need for organizations to address the change in business scenarios, dynamic business demands and innovate ways to quickly cater to these changing needs. Digital business is supposed to improved productivity and a concomitant increase in business opportunities and business performance. Therefore, the following recommendations are offered as a resulted of this study in order to increase the business opportunity and business performance that facilitate the development of business strategies.

1. Data science management (Learning and growth perspective)

In order to improve organizational capacity regrading to learning and growth perspective in business performance, the business should prepare for their employees about the digital literacy and skills. One of the purposes of digital business transformation is viewed as the value of data. Furthermore, the research results found that there was a significant relationship between digital readiness (digital literacy) and digital business transformation (value of data). As more data becomes available, the state of big data maturity also changes. Transformation of this data continues to be a challenge. Increased data volume could affect data integration and analytical capabilities, thus impacting big data maturity. Therefore, the SMEs should well prepare for their employees' skill in business data analysis. They should be able utilize a data and information, consisting of a group of

statisticians, technologists and business subject matter experts, to collectively solve problems and provide solutions. The needed ability is to determine how to transform large amounts of data into information which can be assimilated into the daily business processes in a timely manner with high quality information. Resulting in the data-driven which is far more likely to reveal proactively exactly what one is seeking and actually influence customer behavior in real-time.

2. Innovation-driven business model (Internal process perspective)

New digital products and/or digitizing existing business models that goes beyond existing business needs and foster new innovative products and service and cater to changing business needs. To emphasize on the digital economy as well as in the Thailand 4.0 policy, there is an impact of new digital business models on business products and services. As the results found that there was a significant relationship between digital readiness (hardware and software infrastructure) and digital business transformation. SMEs should apply digital tools to the infrastructure to redesign and develop a successful platform strategy and focuses on how companies can maintain a competitive advantage in the digital age. To get the biggest benefits or breakthrough performance through digital technology and business models, the SMEs must fundamentally change their business model. However, changing the company's business model does not only change how the company operates. It is the key to changing the value the company delivers.

3. Ecosystem management

Digital business is to underlie in an unprecedented convergence of people, business, and things that disrupts existing business models. In order to enable better customer experiences, SMEs should integrate IT infrastructure and operational technologies along with business processes. These elements of the business model affect how you do application development and innovation, the components of your IT infrastructure, partnering ecosystem and what technologies to be implemented. SMEs should be enable the connected digital business approach, across all functions, and a connected interaction with the ecosystem of the business can only happen if SMEs are connecting the value dots and docs well, regardless of job function.

4. Balancing human touch and digital based service

Digital technologies impact business in real life because they impact the behavior and attitudes of people across all their activities, especially, when the businesses serve their customers, collaborate and operate. SMEs should focus on a people-centric view and agile processes, whereby digital technology is used to enable people, including customers, employees, suppliers, and so forth to succeed, optimize all business functions and make their businesses more relevant and profitable. Therefore, balancing the efficiency, productivity, profit, customer experiences is the good manner for SMEs to work and collaborate.

In conclusion, there is beyond the adoption but transformation, what explains why pure player that don't have to deal with legacy structures have an advantage. However, digitizing or socializing an existing model never lead to substantial improvements.

Limitations and Recommendations for Future Research

Since this research has some limitations, the researcher would like to make some recommendations for future study as the following:

1. Future research may include business strategies and marketing strategies to provide additional validity focused on the perspectives of business performance connected to revenue generation.

2. Future research may investigate about the process of the digital business transformation.

3. Future research may investigate other consequences of digital business transformation, which is digital disruption.

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Appendices

Appendix A

Questionnaire

"The Business Performance of Digital Business Transformation on Small and Medium Enterprises in Thailand"

The purpose of the research is to examine the business performance of digital business transformation on small and medium enterprises in Thailand Your participation in this research is strictly voluntary, and you may choose not to participate without fear of penalty or any negative consequences. Individual responses will be treated confidentially. No individually identifiable information will be disclosed or published, and all results will be presented as aggregate, summary data. Once the research is completed, you may request a copy of the results of this research by writing to the researcher at:

Assistant Professor Dr.Anupong Avirutha (*aupong.av@spu.ac.th*)

Part A: Information about Yourself and Your Business

Please check (X) in the appropriate space that are true about your business

1. What is your gender?

   ( ) Male   ( ) Female

2. How old are you?

   ( ) 18 – 32   ( ) 33 – 40   ( ) 41 – 50

   ( ) 51 – 60   ( ) Over 61

3. What is your highest level of education?

   ( ) High school   ( ) College diploma

   ( ) Bachelor's degree   ( ) Master's degree or higher

4. What is your marital status?

   ( ) Single   ( ) Married

   ( ) Divorced   ( ) Widowed

5. What is your position title?

   ( ) President   ( ) Vice President

   ( ) Director   ( ) Manager

6. Your business industry is

( ) Manufacturing   ( ) Wholesale

( ) Retail   ( ) Service

7. Numbers of your employees

( ) 1 – 15   ( ) 16 – 25   ( ) 26 – 50

( ) 51 – 100   ( ) Over 100

8. Your experiences doing business

( ) Less than 1 year   ( ) 1-3 years

( ) 4-5 years   ( ) More than 5 years

9. Approximate your company's total revenue in a year

( ) < 1 million   ( ) 20.01 – 30 millions

( ) 1 – 10 millions   ( ) 30.01 – 40 millions

( ) 10.01 – 20 millions   ( ) > 40 millions

Part B: Expectation of Digital Business Transformation

Please read each of the statements below about your technology experience, and place X in the suitable box that most accurately reflects your opinion of specific statement. 1 means "Strongly disagree"; 2 means "Disagree"; 3 means "Neutral"; 4 means "Agree"; and 5 means "Strongly agree".

	Expectation of Digital Business Transformation	5	4	3	2	1
10	Enhances the business's image					
11	Provides the customer service / feedback					
12	Increases productivity and business process performance					
13	Enable to online business					
14	Improve internal communication					
15	Keep tracking and tracing the business data					
16	Knowledge sharing					
17	Customer / marketing data insight					
18	Keep the business cost down					

Part C: Perceived of Digital Business

Please read each of the statements below about your perceived of digital business, and place X in the suitable box that most accurately reflects your opinion of specific statement. 1 means "Strongly disagree"; 2 means "Disagree"; 3 means "Neutral"; 4 means "Agree"; and 5 means "Strongly agree".

	Perceived Usefulness of Digital Technology	1	2	3	4	5
19	Using digital technology to create ongoing and meaningful conversations with their customers.					
20	Using digital technology to response the customers more quickly					
21	Using digital technology to encourages customers to stay loyal					
22	Using digital technology to develop a business opportunity					
23	Using digital technology to increase a business performance					

	Perceived ease of transformation process	1	2	3	4	5
24	Easy to plan the digital business strategy					
25	Easy to become skillful at implementing digital business strategy					
26	Easy to acknowledge the employees to understand the transformation process					
27	Easy to create a new business model on digital platform					
28	Easy to offer valuable ecosystem to the business stakeholders					

Part D: Digital Readiness

Please read each of the statements below about the digital readiness of the business, and place X in the suitable box that most accurately reflects your opinion of specific statement. 1 means "Strongly disagree"; 2 means "Disagree"; 3 means "Neutral"; 4 means "Agree"; and 5 means "Strongly agree".

	Hardware Infrastructure	1	2	3	4	5
29	Your business has high speed broadband Internet, and digital gateways					
30	Your business has server, storage and network infrastructure					
31	Your business has private cloud system					
32	Your business provides employees the standardize hardware for working such as desktop and laptop					
33	Your business provides employees the mobile devices for working remotely					

	Software Infrastructure	1	2	3	4	5
34	Your business provides up to date software, needed for employees to work					
35	Your business has security software and updated patch					
36	Your business has enterprise resource planning software to keep recording and tracking data					
37	Your business uses business intelligence software					
38	Your business has real time analytics software and alert					

	Digital Literacy	1	2	3	4	5
39	You can communicate, exchange, and share information by using digital technology					
40	You are appropriate using digital technology suit to work					
41	You have the data analysis tools and skills					
42	You understand and know how to protect and secure your technology devices					
43	You feel comfortable using technology device for personal and work					

Part E: Digital Business Transformation

Please read each of the statements below about digital business transformation and place X in the suitable box that most accurately reflects your opinion of specific statement. 1 means "Strongly disagree"; 2 means "Disagree"; 3 means "Neutral"; 4 means "Agree"; and 5 means "Strongly agree".

	Mobility	1	2	3	4	5
44	Workers have an ability to work outside the office					
45	Your business has virtual private network (VPN) to access the company's data and information					
46	You can monitor the business operation in real time					

	Value of the Data	1	2	3	4	5
47	Your business has software to integrate traditional data sources and new big data					
48	You can leverage the business opportunities in big data					
49	You have an ability to evaluate new analytic algorithms					

	Digital Commerce	1	2	3	4	5
50	Your business has online selling and payment system					
51	Your business has online marketing budget separated from traditional marketing budget					
52	You have digital business strategies for the business					

	New Business Model	1	2	3	4	5
53	Your business runs under new business platform					
54	You are using ecosystem to collaborate the business and their partners					
55	You are focusing on building an application to serve the customers					

Part F: Business Performance

Please read each of the statements below about social media usage to create business performance, and place X in the suitable box that most accurately reflects your opinion of specific statement. 1 means "Strongly disagree"; 2 means "Disagree"; 3 means "Neutral"; 4 means "Agree"; and 5 means "Strongly agree".

	Business Performance (Financial Perspective)	1	2	3	4	5
56	To increase the growth of sales					
57	To increase revenue					
58	To increase return on investment					
59	To reduce operational costs					
60	To reduce business costs					

	Business Performance (Customer / Marketing Perspective)	1	2	3	4	5
61	Better understand of customer perception of the business's product/service					
62	The overall of customers' satisfaction					
63	To retain existing customers					
64	To increase the growth of market share					
65	To improve insights about target market					

	Business Performance (Internal Process Perspective)	1	2	3	4	5
66	To manage customers' complaints					
67	To quickly escalate and resolve the issue					
68	To facilitate strategic decision making and enhances efficiency					
69	To share and pursue CSR initiatives to resolve business crisis					
70	To improve the service process					

	Business Performance (Learning and Growth Perspective)	1	2	3	4	5
71	To gain the brand loyalty and trust					
72	To enhance the brand image					
73	To shape the business's reputation					
74	To establish expertise and credentials					
75	To build communities around the brand and access to new market					

Biography

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