THE E-BUSINESS READINESS ASSESSMENT: THE CASE OF THAI-SMES IN THE FOOD PROCESSING INDUSTRY

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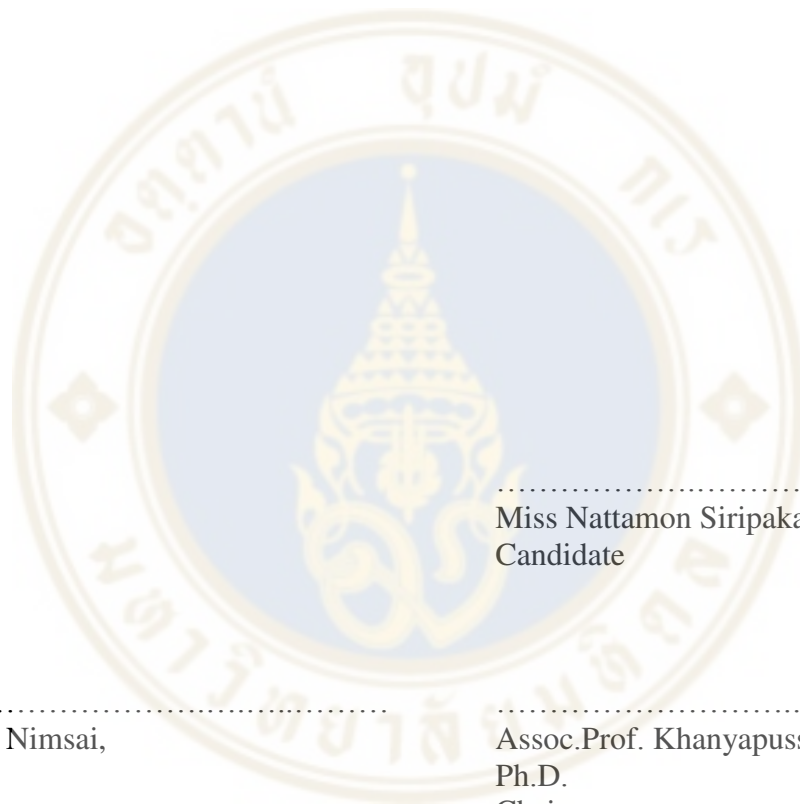THE DEGREE OF MASTER OF MANAGEMENT
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ABSTRACT

According to Thailand economic development policy, Thailand 4.0, the conversion of SMEs into an E-business enterprise is fit for responding to the policy. To respond to the policy, this paper forms four research purposes. First, to develop a blueprint to drive E-business implementation within a more sustainable way. Second, to build a questionnaire for a target company's self-evaluation, aiding the government in understanding the status. Third, to examine the relationship of E-business internal success factors and E-business maturity in the sense of a focus industry. Last, to explore the situation regarding E-business readiness and E-business adoption of a target. The focus population is Thai-SMEs who play roles in one of a remarkable Thailand growth key, the processed food industry. The research methodology is embedded design. Ten cases of in-depth interview are collected to support the creation of a survey and quantitative data discussion. A final form of questionnaire has 42 questions. A convenience sampling method is used for collecting 200 quantitative cases. The result shows that 90% of them have adopted E-business. After describes the difference between "System" and "Information security" in E-business enterprise. It is elevated as one of the readiness characters. The developed E-business adoption guideline has five company's characters by adding the "Information security performance" from ISP10x10M into SOG-e model. There are six E-business internal success factors related to E-business readiness in this context which are Individual difference factors (age), Scope of business operations (product types, sourcing & supply channels), Awareness & Knowledge (managers' knowledge, employee' skill), Perceived behavioral control, Social influence or Subjective norms, and Behavioral intention to use. Currently, readiness of Thai-SMEs in the processed food industry does not meet the government expectation in every aspect. The developed model is valuable for a new player and a traditional business which aim to do online trade.

Keywords: E-business/ E-commerce/ Maturity / Readiness / Information security

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LIST OF ABBREVIATIONS

Abbreviations	Meaning
6-r	A group of data interpretation result of SMEs' EB internal success factors
P-E	A private equity
ANOVA	Analysis of various technology (sometimes call F-test)
AK	Awareness & Knowledge
BI	Behavioral intention to use
BP	Business process
B2B	Business to business interaction
B2C	Business to customer interaction
B2G	Business to government interaction
CEO	Chief executive officer
CP	Competitive pressure
CR	Consumer readiness
CSF	Critical success factor
CRM	Customer relationship management
C2B	Customer to business interaction
C2C	Customer to customer interaction
C2G	Customer to government interaction
DE	Digital evolution index for evaluate the electronic commerce readiness
EB	E-business, Electronic business
EB character	Company character of readiness in E-business operation
EC	E-commerce, Electronic commerce

LIST OF ABBREVIATIONS (cont.)

Abbreviations	Meaning
E-auction	Electronic auction
E-economy	Electronic economy
E-market	Electronic market
E-society	Electronic society
EM	Employee skill
ERP	Enterprise resource planning
FCs	Facilitating conditions
FM	Firm size
G2B	Government to business interaction
G2C	Government to customer interaction
G2G	Government to government interaction
GDP	Gross domestic product
GDP-SMEs	Gross domestic product produced by small and medium enterprises
IOC	Index of item – objective congruence
IDFs	Individual difference factors
ID	Individual difference factors
ICT	Information and communications technology
ISP	Information security performance
IN	Information security
IS	Information system

LIST OF ABBREVIATIONS (cont.)

Abbreviations	Meaning
IT	Information technology
IC	Internet commerce
KPI	Key performance indicators
MK	Managers' knowledge
ONCH	Online channel
OM	Organization mission
PBC	Perceived behavior control
PB	Perceived behavioral control
PEOU	Perceived ease of use
PSQ	Perceived service quality
PT	Perceived trust
PU	Perceived usefulness
QR code	Quick response code
SBOs	Scope of business operations
SB	Scope of business operations
SMEs	Small and medium enterprises
SI	Social influence or Subjective norms
SSCH	Sourcing and supply channels
SS	Staffs / Skills
S.D.	Standard deviation
ST	Strategy
SY	Systems

LIST OF ABBREVIATIONS (cont.)

Abbreviations	Meaning
TAM	Technology acceptance model
ISP 10x10M	Ten by ten information security performance measurement model
AK-r	The result when Awareness & Knowledge data are interpreted by the intervals from the range technique
BI-r	The result when Behavioral intention to use data are interpreted by the intervals from the range technique
EM-r	The result when Employee' skill data are interpreted by the intervals from the range technique
MK-r	The result when Managers' knowledge data are interpreted by the intervals from the range technique
PB-r	The result when Perceived behavioral control data are interpreted by the intervals from the range technique
SI-r	The result when Social influence or Subjective norms data are interpreted by the intervals from the range technique
Thai-SMEs	The small and medium enterprises which listed in Thailand
Thai-food-SMEs	The small and medium enterprises which listed in Thailand and doing a business in the food processing industry
SOG-e	The stage of growth for electronic business
TOE	The technology – organization – environment framework which is a technology adoption model theory
TPR	Trading partner's readiness

CHAPTER I
INTRODUCTION

1.1 Background and Statement of Problems

The business competition in Thailand has continuously intensified, although the situation has fluctuated over time. New technologies and innovations may come to support or take place of existing products and services. These, along with other changes, force enterprises to always adapt themselves in order to survive in this era. This indicates that the readiness of their organization is important for leading them toward organizational goals.

The world has now evolved beyond an old manual system to a complete digital system, which changes the business environment. An ability to see the big picture is a critical leadership quality because the whole world is connected by a variety of channels, especially the online one.

In every second, the world's Internet user population is growing rapidly. Thus, to survive in the heated arena of business competition, a company must equip themselves with anything to cope with any change.

To respond to the digital economic era, Thailand has launched a new policy for the economic development. It focuses on improving national stability, prosperity and sustainability by strengthening the economy and enhancing competitiveness on a sustainable basis. The goal of this policy is to change the value-based economic structure through innovation. The four-dimensional solution becomes a crucial tool. One of these dimensions is to bring the traditional SMEs to the self-immunity smart enterprises and startups (Maesincee, 2016).

The dimensions of the government's policy highlight the importance of small and medium enterprises (SMEs) and a startup. Even in Thailand, small and

medium-sized companies are considered national growth engines that play an important role as a job creator and income distributor.

Food production is the top largest section and has highest employment rate in the manufacturing sector of this country (The Office of SMEs Promotion, 2019). According to Michael Porter, Thailand has a remarkable competitive advantage in the food industry because 80 percent of its raw materials are produced in the country. Frequently, food business activities almost originate and end within the country. If the nation supports this segment, it will encourage agricultural activities, the most basic and immensely popular business activity in Thailand (Ministry of Finance, 2003). For these reasons, the food production segment is defined as one of the new Thailand's key growth drivers that urgently needs supporting research, such as smart food factory technologies, functional food technologies and electronic commerce (Maesincee, 2016).

Many people usually combine food productions with services and consider them as a food industry. However, their core businesses are not the same. To reduce the confusion, a "food processing industry" is used as a specific definition. The rivalry in this industry is intense because of low barriers to entry. To illustrate, there are low switching cost and capital requirement, while the support from government policies is high. Therefore, the enhancement of business capabilities within the food processing industry is urgent. The conversion into an EB enterprise is fit for responding to the policy. EB implementation improve both organizational management performance and productivity. EB initiative company gets benefit in creating enterprise branding and product value. It is also amplifying market expansion and networking formation efficiency. Furthermore, the Thai government urges digital trade to be proactive by creating a proper environment to enhance users' confidence. They focus on emerging SMEs and OTOP to enter the digital market. This is a great time to advocate for the E-commerce (EC) adoption due to the environment context from Technology-Organization-Environment framework (TOE) of Tornatzky and Fleischer (Chen, Windasari, & Pai, 2013). Market value growth in Thailand's EC that supports SMEs has

increased over the last 5 years (The Office of SMEs Promotion, 2019). It's an important signal for businessmen to understand this channel's value and change their business ways. The number of E-marketplaces is continuously increasing. There are E-market places even for fruits and vegetables, which are not long shelf-life products, e.g. Freshket and Getkaset. By acting as an intermediary between buyers and cultivators, they help sellers who have limited access to end consumers by preventing communication errors and distribution errors. They also provide shopping convenience for customers as closing the sales is easier than that in the past. However, Thailand must still develop several areas urgently, such as networking platform, law and regulation process and related research (Maesincee, 2016).

The organizational awareness and readiness to join an EC are crucial for this event. The beginning of evolving business is an assessment of their own talents and resources because it offers an effective way to their strategic planning (Prananto, McKay, & Marshall, 2004). Smooth changes in a company contribute to competitiveness and sustainability in the global context. Since an enterprise change and development process is a sensitive and complex operation, a roadmap is needed. Besides industrial differences in terms of various factors such as culture, infrastructure and government support, the study should select one industry when defining its scope for a clearer outcome and a better implication.

1.2 Research objectives

1. To develop an EB readiness model in order to guide implementation among Thai SMEs.

2. To examine the relationship of EB internal success factors and EB maturity in the sense of Thai-SMEs in the food processing industry.

3. To create an EB readiness questionnaire for SMEs self-evaluation.

4. To explore current situation on EB readiness and EB adoption of the Thai SMEs in the processed food industry through an evaluation questionnaire.

1.3 Research questions

1. In response to Thailand's strategic policy 4.0 and the 20-year national strategy, which EB readiness level should SMEs in the food processing industry be considered as a sufficient level?

2. Which EB internal success factor relate to EB readiness in this context? What is the readiness level among Thai-SMEs in the food processing industry?

CHAPTER II
LITERATURE REVIEWS

2.1 The definition of SMEs and Food processing industry

The size of an enterprise as well as its activities cause divergent business characteristics. Thus, it is an important reason why many studies confine their area. Although there are various ways to define and measure "the small and medium enterprises (SMEs)," depending on a research field and a country, the number of employees is commonly used to describe SMEs. Normally, SME criterion is set by a number of total employees that are fewer than 500 people (Chen, Windasari, & Pai, 2013). SMEs are composed of diverse industries that can be divided by many determinants, such as a public or a private sector and a business type. However, the most popular meaning of SMEs signifies a group of private businesses, namely an ordinary or juristic person, a group of persons, a partnership, a company, a community enterprise or Small and Micro Community Enterprise (Yenpensuk, 2014).

Table 2.1 Differentiation between small, medium and large enterprises

Small Businesses	Medium Businesses	Large Businesses
An Equity held by a founder or a family	Mostly privately held – family or P-E; few with public	Mostly public investor-held equity
Owner management	Owners + professionals in key roles	Professional management
Decision making largely by owner	Decision making by owner/CEO and some key leaders (single/dual)	Distributed decision making by organizational hierarchy
Short-term (seat-of-the-pants) planning, primarily by owner	Some long-term planning, mostly by owner/key executives	Extensive long-term planning horizon by dedicated teams
Informal processes: mostly 'people' get things done	Some formal processes: 'people' get many things done	Formal structure & processes: mostly people independent
Most capital needs met by leveraging personal net worth	Limited sources of capital; some hard to access	Wide range of funding sources

Table 2.1 Differentiation between small, medium and large enterprises (cont.)

Small Businesses	Medium Businesses	Large Businesses
Small customer base, generally local markets	Limited customer base, limited to geographical or industry niche	Diverse markets (many global) with diverse customers
Limited personnel development opportunities	Personnel development limited to key employees	Multiple career development paths and programs
Little external input, mostly from friends and networks	Little external input from friends, networks & ·trusted· professionals	Significant external inputs from networks and consultants having separate governance structure

Reference: Iyer, 2013

The food processing industry is well known as the world's massive industry comprising of diverse business sections. Therefore, it is necessary to define area and definition for clarity. The term "food processing industry" represents an industry concerned with preparing, processing, preserving, distributing, and then serving its goods which are foods produced from agricultural products. Its raw materials are organic substances that are easily deteriorated from microbes and chemical reactions. Food spoilage can cause various potential food hazards that directly affect consumers' health.

Furthermore, global consumer needs at present are food enriched with nutrients for healthy living and convenience, which suit urban lifestyles. Thus, manufacturing processes, no matter if it is a primary, middle or end activity, have to adapt food processing and packaging technology into every step for avoiding any unexpected incident, extending product shelf-life and adjusting food function to provide a satisfied usage condition. Also, semi-finished and finished products must have quality, food safety standards and satisfaction from consumers as well (Food and Drug Administration, 1979; Pornchaloempong & Ratanapanon, n.d.). Referring to Thailand 8th SMEs National Awards 2016 (The Office of SMEs Promotion, n.d.), a type of food processing industry is manufacturing and operations business. The Thai-SMEs characteristic is shown in Table 2.2.

Table 2.2 SME criterion as the small and medium enterprise promotion act issued in 2000, Ministerial regulation issued in 2002 and Thai Revenue Law

Business type	Total employees (people)		Fixed assets (THB million)	
	Small business	**Medium business**	**Small business**	**Medium business**
Manufacturing and operations business	☐ 50	51-200	☐ 50	51-200
Wholesale business	☐ 25	26-50	☐ 50	51-100
Retail business	☐ 15	16-30	☐ 30	31-60
Services business	☐ 50	51-200	☐ 50	51-200

Reference: The ASEAN Secretariat, n.d.

*Remarks:

- In the case that a company's total employees meet a medium enterprise condition, but its total assets do not reach the criteria, the company is a small business. On the other hand, if a company's total assets meet a medium enterprise condition while its total employees do not reach the criteria, the company will be a small business as well.
- Land cost is not included in the assets.

2.2 E-business definition

Even though the term "electronic business (E-business, EB)" and "electronic commerce (E-commerce, EC)" have different meanings, people commonly use these terms interchangeably.

Some define EB with a three-dimension model, which contained products-services, process and intermediary (Spremić, 2003), illustrated in Figure 2.1. Whereas, some characterize it by feature as an application of all electronic interchanges of goods, services, property, ideas or communications, both within an organization as well as with external stakeholders. It supports a wide range of business processes through an electronic medium for purposes of facilitating or conducting business (Morais, Pires, & Gonçalves, 2012; Spremić, 2003; Sudrajat, 2016; Wynn, Phillip, & Erin, 2013). From this definition, EB includes business operations that a company handles by itself. While

EC has a narrower scope concerned only with the interchange of merchandise of financial value (Jones, Wilikens, Morris, & Masera, 2000). Thus, EC is a subset of EB.
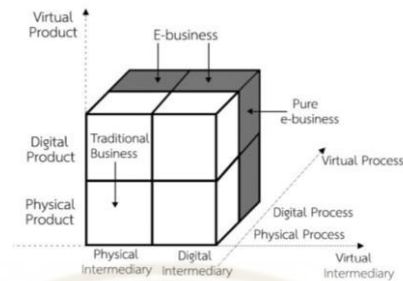
Figure 2.1 Dimensions of E-business
Reference: Spremić, 2003

According to Čiarnienė & Stankevičiūtė (2015), EB summarized concept is a critical and competitive strategy that creates an additional customer value through a computer-mediated network by an innovative IT application in an enterprise and beyond. This establishes internal and external business process automation within their computer's network in order to increase company's competitiveness.

The widely accepted parties that EB activities have to deal with can be classified into three main types of parties and nine types of interaction between them, as shown in Table 2.3. The most common types of interactions between parties in EB are B2C, B2B and C2C. Those parties can exchange only physical products or only digital products or services as well as any combination of them (Petrachkov, 2012).

Table 2.3 Interaction between different parties in E-business

From / To	Consumer	Business	Government
Consumer	C2C	C2B	C2G
Business	B2C	B2B	B2G
Government	G2C	G2B	G2G

Reference: Petrachkov, 2012

Previous studies about EB often determine a starting point of entry at the advent of a company's website because it can provide information to customers. Then buyers can deal with online transactions and track order status (Petrachkov, 2012). A sample of the EB process while an organization operates it in a complete loop is seen in Figure 2.2.
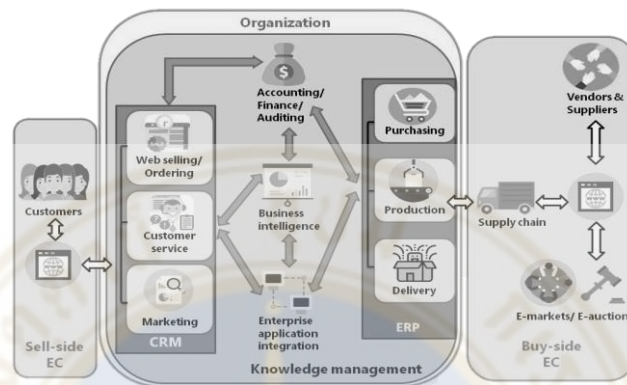
Figure 2.2 Sample of E-business architecture, focusing on only website in the past
Reference: Petrachkov, 2012

However, websites are not the only way to create transactions. E-market place and social media can also perform that role. This means they are part of EB as well. Their relation was shown in Figure 2.3. As aforementioned reason, the new EB progression model should work with all of these.
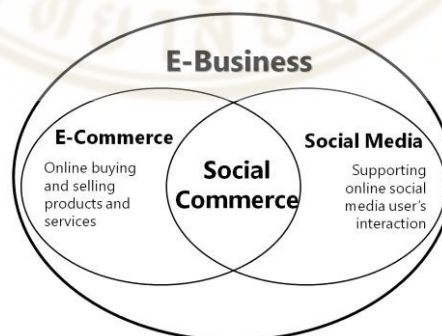
Figure 2.3 E-business scope
Reference: Jantavongso & Pheokla, 2014

In sum, EB is one of company activities driving by many IT and business resources to add more additional customer value for implementing organization. It

creates the value through a computer-mediated network by an innovative IT application related to an enterprise, e.g. products, process, services, and beyond. The advent of a company website or any online channel is a starting point for EB entry. The product can be digital or physical goods, but in this paper, the food, is physical form. B2C, B2B and C2C are the most common kinds of interactions between parties in EB.

2.3 E-business readiness and maturity model

2.3.1 E-business readiness

To drive EB in a company, a management must focus on an evolving within their organization. During the acquisition phase of a system, technology readiness levels are a method for estimating and communicating the maturity of technologies (SwitchPitch, 2019). EB readiness is the EB company's status and ability to deploy and successfully transform EB environments (Trad & Kalpić, 2016).

In this paper, a maturity stage is used to trace an EB readiness level.

2.3.2 E-business maturity model

The maturity models consist of stages from an initial to a maturity state. It aims to assist companies in assessing their as-is situations, to guide step-up initiatives, and to control an evolution (AlGhamdi, Alfarraj, & Bahaddad, 2015).

Numerous surveys reveal that there are various SME barriers and drivers to change a company into EB, especially their infrastructure, awareness and human capital (Chen, Windasari, & Pai, 2013). Almost all SMEs that have only some long-term planning might stick in the middle and need to rely on external organizations. This situation makes a company lack basic sustainable conditions to follow the Sufficiency Economy Philosophy (Savetpanuvong, Tanlamai, & Lursinsap, 2011).

The latter thesis should demonstrate a model that is easy to understand and that provides an IT and business roadmap. It is unnecessary to develop the model in a sequential manner. However, it should expose facilitators and barriers in each stage, as well as provide detailed explanation of the organization's readiness characteristics.

The "stage of growth for EB model" or "SOG-e model" meet these requirements in many aspects. It is chosen to be a main model in a guideline developing process and a reference for a questionnaire creation as the objective.

2.4 Stage of Growth for E-business (SOG-e) model

Referring to AlGhamdi, Alfarraj, & Bahaddad (2015) literature, the SOG-e model is more validated than other principal studies. The model is not a too complicated framework. Anyone who is not an IT expertise can understand and apply this model, which suited to SMEs. This model can provide an obvious detailed roadmap for managers by clarifying uncertainty of role in technology, resources and people.

The SOG-e has two groups of stage that start from the first level to the fourth level. One aims to assess Internet commerce (IC) maturity and another one directs to assess traditional IS/IT maturity. The fifth and the sixth level are the meeting point for these two groups, as shown in Figure 2.4 (McKay, Marshall & Pranato, 2000).

Figure 2.4 The SOG-e model stage and progression of organizational approach

Reference: AlGhamdi, Alfarraj, & Bahaddad, 2015

This EB readiness assessment model focuses on not only EB system progression within an organization, but also the changes of its strategies and processes. Therefore, it comprises of six stages; no online presence, static online presence, interactive online presence, Internet commerce, integrated organization, and extended enterprise (AlGhamdi, Alfarraj, & Bahaddad, 2015). Each of the stages is measured based on four indicators: strategy, system, staff & skill, and business process (Prananto, McKay, & Marshall, 2004).

The terms "System" and "Information security (IN)" are involved with IT but they are not the same or a subset of each other. "System" means the coordination of technologies and infrastructures for EB activities that are a proactively supportive action. "Information security" refers to prevention and protection of IT system for enterprise's electronic data security.

There is a further study about top five drivers and inhibitors in each stage of EB progression from SOG-e model, as shown in Table 2.4. These factors make a management in strategic planning easier.

Table 2.4 Top five drivers and inhibitors of EB for each maturity stage

Rank / Stage		Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Stage 1	Driver	Pressure from customers	Supplier-partners EB initiatives	Competitors EB initiatives	Senior management stewardship of EB	New and emerging technology
	Barrier	Expanding the infrastructure for EB	Access to technical skills & expertise	Cost of EB	Managing EB project	Senior management support
Stage 2	Driver	Pressure from customers	Supplier-partners' EB initiatives	New and emerging technology	Competitors' EB initiatives	Senior management stewardship of EB
	Barrier	Access to technical skills & expertise	Expanding the infrastructure for EB	Cost of EB & Managing EB project	Coordination between business-tech people	Senior management support
Stage 3	Driver	Pressure from customers	Changes in strategic direction	Senior management stewardship of EB	Competitors' EB initiatives	Changes in marketplace
	Barrier	Access to technical skills & expertise	Expanding the infrastructure for EB	Managing EB project	Cost of EB	Business technology alignment

Table 2.4 Top five drivers and inhibitors of EB for each maturity stage (cont.)

Stage \ Rank		Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Stage 4	**Driver**	Senior management stewardship of EB	Supplier-partners EB initiatives	New and emerging technology	Changes in marketplace	Competitors EB initiatives
	Barrier	Access to technical skills & expertise	Managing EB project	Reengineering business processes	Coordination between business-tech people	Reengineering business processes
Stage 5	**Driver**	Senior management stewardship of EB	Supplier-partners EB initiatives	Changes in strategic direction	New and emerging technology	Competitors EB initiatives
	Barrier	Access to technical skills & expertise	Reengineering business processes	Expanding the infrastructure for EB	Business technology alignment	Managing EB project
Stage 6	**Driver**	Changes in strategic direction	Senior management stewardship of EB	Changes in marketplace	Pressure from customers	Changes in industry sector
	Barrier	Access to technical skills & expertise	Expanding the infrastructure for EB	Cost of EB	Reengineering business processes	Coordination between business-tech people

Referene: Prananto, McKay, & Marshall, 2004

2.5 EB adoption success factors

Awa, Ukoha, & Emecheta (2012) integrated and improved TAM and T-O-E framework for SMEs' EC adoption, as illustrated in Figure 2.5. This extended model offers pragmatic values, in particular by providing the attitude is formed on the basis of conscious evaluation of constructs/factors which can contribute to positive actions because EC is associated with behavior of high participation.
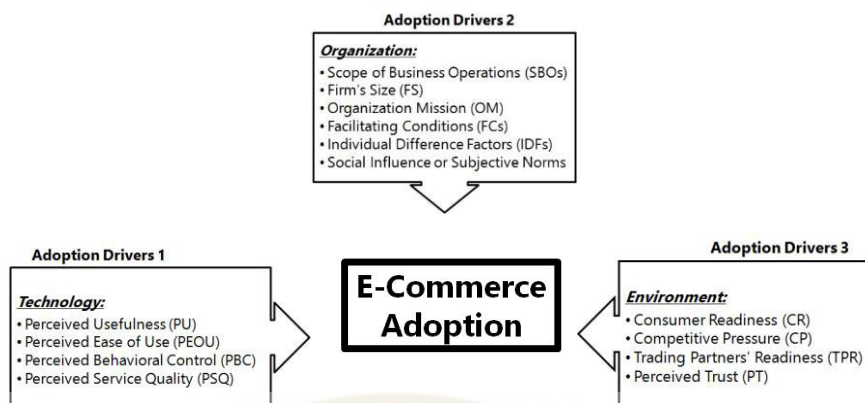
Figure 2.5 Integrated and upgraded TAM and T-O-E theory for SMEs' innovation adoption with diverse theoretical frameworks

Reference: Awa, Ukoha, & Emecheta, 2012

The driver in Figure 2.5 is screened to measure the EB adoption behavior that affects the availability of a company. Internal variables are focused because SMEs can manage and evolve themselves quickly. This made the adoption driver 3, which is an environment, are not chosen. The adoption driver 2 directly related to the organization, therefore, almost all are picked up. Only facilitating conditions is out because it did not influence the decisions of EC adoption (Idris, Edwards, & McDonald, 2017).

It is found that Perceived behavioral control (PBC) (both internal and external) to be very strong determinants of perceived ease of use and intention to use an innovation (Awa, Ukoha, & Emecheta, 2012). For this reason, Perceived usefulness (PU) and Perceived ease of use (PEOU) were screened out from the adoption driver 1.

The integrated TAM and T-O-E framework emphasizes Perceived service quality (PSQ) as crucial determinants. However, it is not present as a distinct core of EB readiness in any principal model. The listed model is shown in Table 2.5.

Table 2.5 Comparison of EB maturity models

Inventor/ Model's owner/ Organization name	Perspective	Model type	Emphasis	Verification	Focus	Source	Stages
KPMG	Business	Linear	Nonspecific	No	EC	Private Sector	3
Model of Rayport & Jaworski	Technology	Linear	Nonspecific	No	EB	Academia	4
Model of Rao	Technology	Linear	SME	No	EB	Academia	4
Model of Chan & Swatman	Business	Linear	Nonspecific	Yes	EB	Academia	4
Model of Grant	Business	Linear	SME	Yes	EB	Academia	5
Model of Wrycza	Technology	Linear	SME	No	EB	Academia	5
Model of McKay	Technology	Linear	Nonspecific	No	EB	Academia	6
Model of Earl	Business	Linear	Nonspecific	No	EB	Academia	6
Model of Alonso Mendo and Fitzgerald	Business	Linear	SME	No	EB	Academia	6
The SOG-e model (Mckay, Marshall & Pranato)	Technology	Linear	Nonspecific	Yes	EB	Academia	6

Reference: AlGhamdi, Alfarraj, & Bahaddad, 2015; Mendo & Fitzgerald, 2005; Wrycza, Jerzy, & Gajda, 2007

PSQ is related to "Trust" which is one of EB critical success factors (Choshin & Ghaffari, 2017; Costante, Hartog, & Petković, 2015; Rattanaditt, 2012). Virtual companies must demonstrate and sustain "Trust" among their digital transaction stakeholders to survive (Jantavongso & Li, 2003; Stouthuysen, 2020). It is essential in digital interactions, especially when transactions move beyond the confines of simple concepts (Awa, Ukoha, & Emecheta, 2012). Moreover, Nielsen poll (2015) issued that a trusted company is the most powerful driver to build sustainability and to influence consumer purchase intent. In Figure 2.6, the relationships between stakeholders and "trust" in digital transactions are seen.
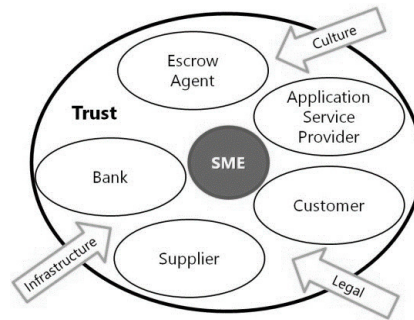
Figure 2.6 Trust relationships within digital transaction's stakeholders

Reference: Jantavongso & Li, 2003

Security is one of the fundamental keys to shape trust, customer satisfaction and customer loyalty which are EC key success factors (Choshin & Ghaffari, 2017; Costante, Hartog, & Petković, 2015; Du & Tang, 2014).

As per the significance of security, one of the proper objectives is to establish a useful EB development assessment model that contains evolving security along with other business sections. The detail about adding security into the assessment model is described in next topic, 2.6 10 by 10 information security performance measurement model (ISP 10X10M).

By investigating EC key success factors, as Table 2.6, "Awareness and knowledge" is another interesting driver. Choshin & Ghaffari(2017) suggest that if individuals lack the requisite awareness and knowledge to understand IT and EC and lack the necessary norms, ideas and etiquette, EC would not thrive. Therefore, from this value, this factor is counted as another criterion for adoption achievement. Nevertheless, "Customers' awareness" is not considered as one of a measurement because it is beyond the reach of a corporation.

Table 2.6 Summary of investigating EC key success factors

Variables	Related works
Infrastructure • Organizational infrastructures • Technological infrastructures • Internet speed • Network traffic	Chang, Chang, Ho, Yen, & Chiang, 2011; Kurnia et al., 2015; Piris, Fitzgerald, & Serrano, 2004; Xiao, & Dong, 2015
Cost • Cost of access to internet • Technological costs • Support costs • Inside and outside organization costs	Chang et al., 2011; Thorleuchter, & Van den Poel, 2012; Turban, Rainer, & Potter, 2005
Customer satisfaction • Security of personal information • Customer trust • Ease of access to information • Removing time and location limitations	Beyari & A bareshi, 2016; Hoseinpoor, Danae, & Haghtalab, 2013; Nakayama, 2009; Rattanaditt, 2012; Sa et al., 2016; Wetzels, Odekerken-Schröder, & van Oppen,2009
Awareness and knowledge • Customers' awareness • Employees' skill • Managers' knowledge	Chang, Yen, Chiang, & Parolia, 2013; Falk, & Hagsten, 2015; Fathian et al., 2008

Reference: Choshin & Ghaffari, 2017

Likoebe M. Maruping (2017) describe behavioral intention to use an IT is considered the sole proximal determinant of IT adoption and use. Behavioral intention to use (BI) appears in many theories as a factor which happens before user usage or behavior. This is also another strong component in testing whether the target group has the intention of implementing EB and the will to continue its advancement, which influence the readiness level.

The screening and adding of EB driver result are named as "EB internal success factor". In sum, there are Individual Difference Factors (ID), Firm's size (FM), Scope of business operations (SB), Awareness and knowledge (AK), Perceived behavioral control (PB), Social influence or Subjective norms (SI), Behavioral intention to use (BI). These factors' definition used in this thesis are outlined in Table 2.7. EB

internal success factor is used to state the SMEs' current situation and to make a questionnaire does not base on only one aspect.

Table 2.7 Definition of EB internal success factors for SMEs

SMEs' E-Commerce adoption & success factors	Description	References
Awareness and knowledge	The understanding and ability of employees and managers or owners about EB, information security, IT tools and infrastructures.	Choshin and Ghaffari (2017)
Behavioral intention to use	The extent to which a person has created responsive plans to act the behavior or not.	Maruping, Bala, Venkatesh, and Brown (2017)
Firm's size	One of the ways to separate private businesses into groups. For Thai SMEs, the government divides them by the number of staffs and their fixed assets.	Yenpensuk, Kumpinee (2014)
Individual Difference Factors	The key actor differences which affect organizational characteristics. From the previous paper, there are 4 indicators: gender, age, education and experience of decision makers, e.g. a manager or an owner of that company.	Awa, Ukoha, and Emecheta (2012)
Perceived behavioral control	The degree to which feeling that someone can perform the behavior. This feeling is influenced by 3 beliefs: behavioral beliefs, normative beliefs and control beliefs.	Idris, Edwards, and McDonald (2017)
Scope of business operations	The activities and some information which indicate and describe one's food business. There are two indicators in this study which is product types and sourcing and supply channels.	Thames-Coromandel District Council (n.d.)
Social influence or Subjective norms	"Social influence" refers to the degree to which someone perceives that his important persons believe he should implement a new system. "Subjective norms" is defined as an independent evaluation of someone about social pressure to act out the behavior. Even though both meanings are not the same, these are relatively equivalent.	Several studies (Idris, Edwards, & McDonald, 2017; Awa, Ukoha, & Emecheta, 2012)

2.6 10 by 10 information security performance measurement model (ISP 10X10M)

According to the significance of security as previous topic, information security (IN) is chosen to enlarge an EB enterprise success and sustain. Because if the system is not safe to store data or cause any inconvenience in use, a stakeholder would not trust that company to do a business with. Moreover, Information systems (IS) are dynamic and complicate by their nature and people who deal with, as shown through affecting factors of the system in Figure 2.7. These reasons make a guideline is needed when an organization intend to build IN.
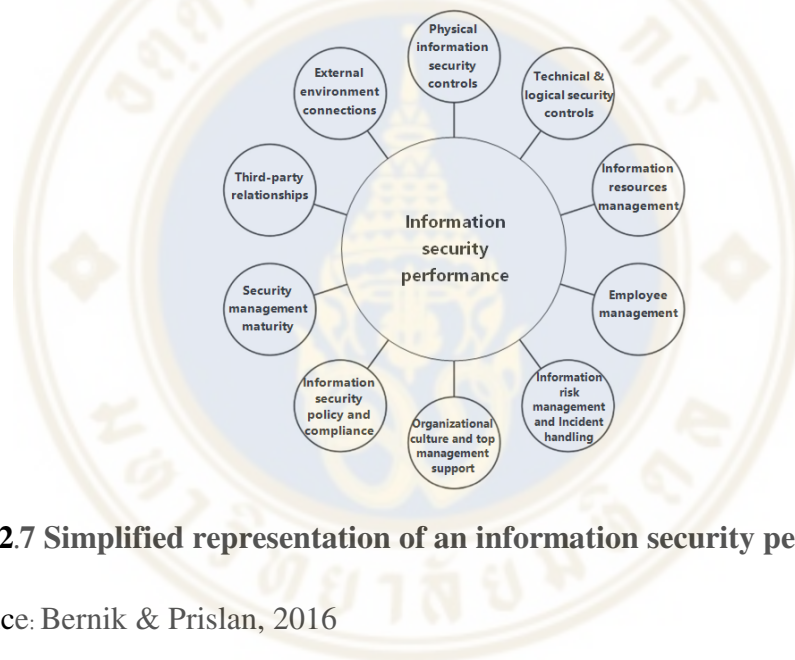
Figure 2.7 Simplified representation of an information security performance system
Reference: Bernik & Prislan, 2016

A prediction of threats to information security is an organization's troublesome, especially in a company that does not have any clue about their performance and needs (Bernik & Prislan, 2016). Even though a combination of quantitative and qualitative measuring methods is the most reliable way to achieve an enterprise's information security goal, it is too much of requirements. Accordingly, Bernik & Prislan (2016) developed a model called ISP 10X10M from updated standards and researches. ISP 10X10M structure is made up of ten critical success factors (CSF), which include ten key performance indicators (KPI) in each CFS, see Figure 2.8. They

brought only a quantitative informaion security assessing approach to their study and constituted a model that is not too complicated, which is easier than the combined means and faster to get results. Also, this model is more applicable to SMEs than others (Bernik & Prislan, 2016).

This model similar to the SOG-e model as a linear development type with six stages model making it easy to apply. From all the aforementioned advantages, this model was thus chosen as an IN-building approach to corporate EB growth.

For these reasons, EB readiness indicators should be an enterprise' character and performance in the aspect of strategy, system, staff & skill, business process and information security. Their definitions and characters are described in Table 2.8.

Table 2.8 Description of fully development company characters

	Maturity indicator	Definition	Description of fully development company characters
A.	Strategy (ST)	Planning, setting goals and directions guiding a company to a medium to long-term prospects. More importantly, it must be relevant to implementing EB operations. The medium-term plan is a map with periods of one to five years and the long-term plan is a plan with a period of five years or more.	There are practical short-term and long-term strategies to enable that company to fully implement EB operations and to deal with situations that may occur according to a regular evaluation.
B.	System (SY)	Information systems to enable EB operations include hardware, software, personal information, operating procedures and coordination of systems related to various departments.	There is an information system that connects between departments, enables seamless sharing of data, and links to partner networks, allowing smooth execution of activities between them.
C.	Staff & Skill (SS)	Staff: persons assigned to be responsible or related to an organization's EB operations. Skill: ability and knowledge which are necessary and enough for EB operations.	There is an executive committed to establishing EB vision and a team of enough knowledgeable and experienced staffs who are responsible for running and monitoring EB operations.
D.	Business process (BP)	Business operations, which are often hierarchical and logically linked in order to create results or values that lead to achieving organizational goals.	Within and between network participants, EB operations have become an integral part of business processes.

Table 2.9 Description of fully development company characters (cont.)

E.	Information security (IN)	Systems and environment securing data recorded in digital files or accessible via electronic media. Any records can only be accessed by the personnel of the authority.	There is a specific strategy for information security that is fully supported and incorporated with corporate culture. Officially, data security systems are introduced. Its performance is measured and modified with appropriate measures that are constantly updated to cope with current or future developments.
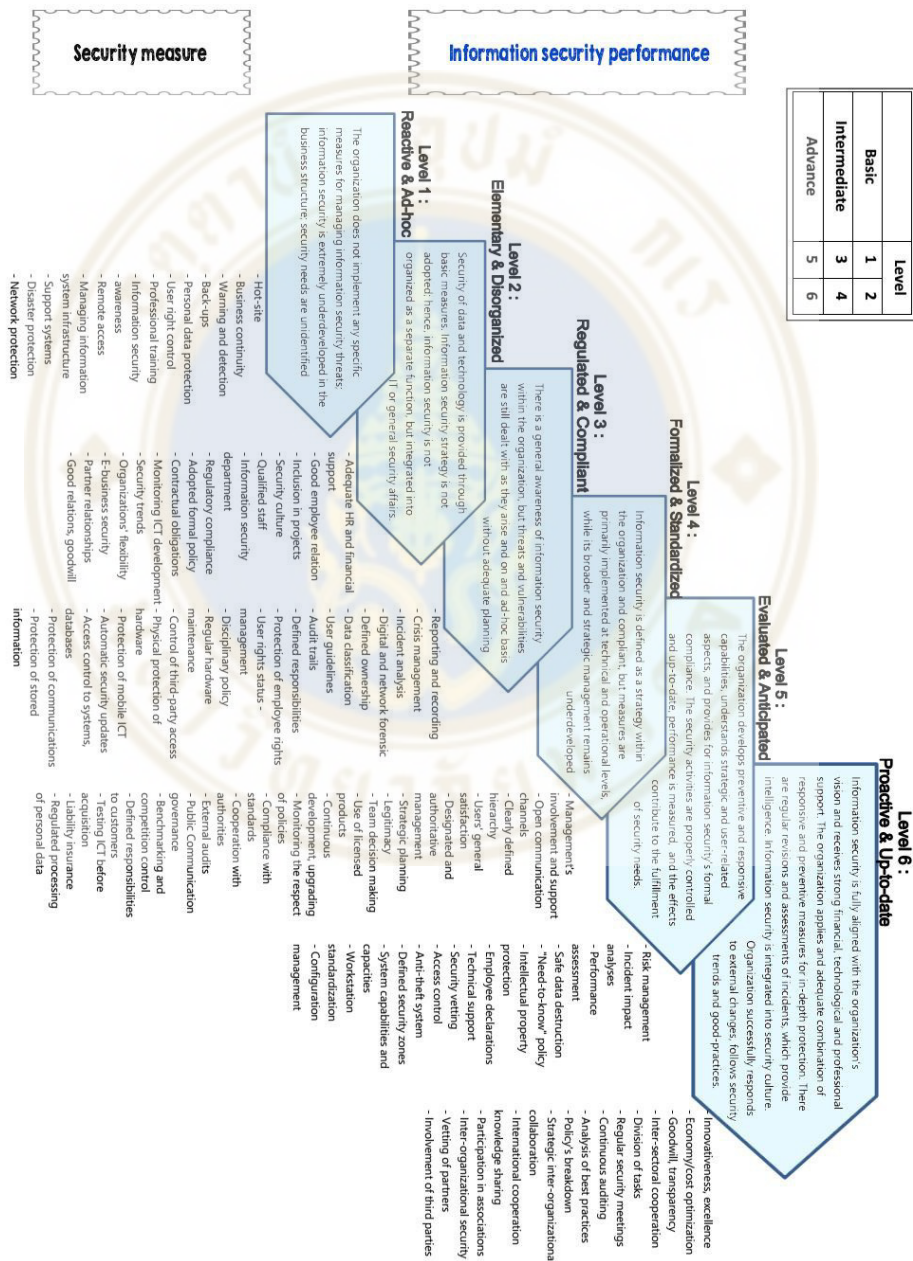
Figure 2.8 Information security performance levels according to the ISP 10×10M

Reference: Bernik & Prislan, 2016.

CHAPTER III
RESEARCH METHODOLOGY

EB maturity of Thai SMEs in the food processing industry is conducted in the following order:

3.1 Research design

3.2 Population, samples and sampling method

3.3 Research tools and techniques

3.4 Reliability and validity analysis

3.5 Data collection

3.6 Statistical tools

3.1 Research design

At the beginning, this paper was planned to use a convergent parallel design for another conceptual framework. However, it was found that any target could not state what research questions need. To solve this problem, the old plan is replaced by an embedded design. The new plan is to use qualitative data collection to support quantitative data discussion, as shown in Figure 3.1.
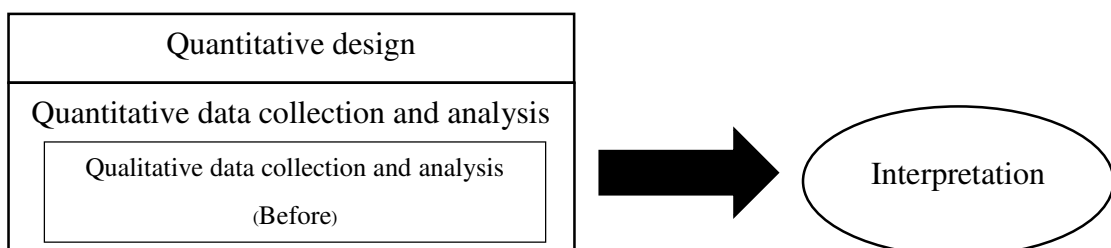
Figure 3.1 Mixed methods, embedded design

Designing process starts with a data compilation process to gather secondary data as described in chapter 1 and 2. Based on the review, the evolving EB does not base on only one aspect, but rather lies in the mixture of dimensions, as shown in Figure 3.2 and 3.3. The figures facilitate a development of this study's experimental framework and research variables. Then, the researcher conducts an in-depth interview. By collecting data from relevant parties on experts, the data shows their personal perspectives and experiences on the overall status of Thai SMEs and on the development situation of EB. The results are used to answer the research question 2, develop a survey, and utilize in the discussion section.

Figure 3.2 Literature review Venn diagram
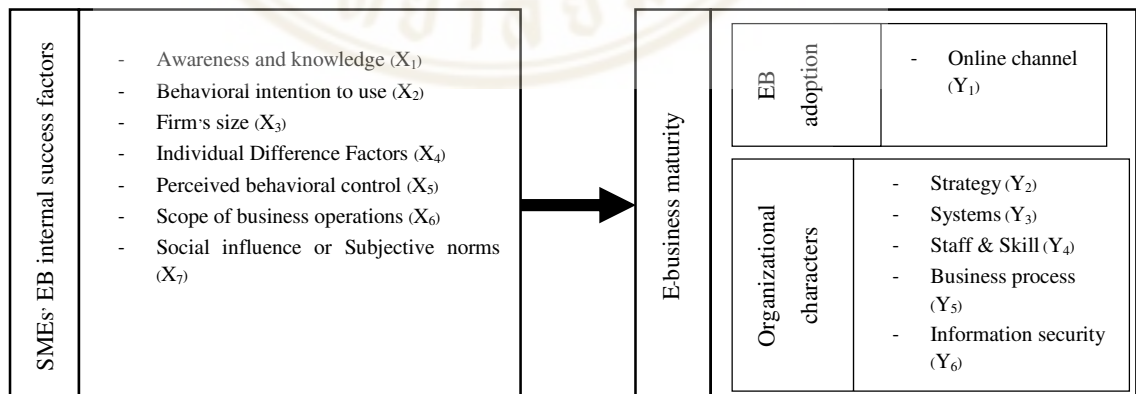
*Remark: There are seven sub-models in the framework. Online channel is a filter for a company who started doing EB. The relationship has been tested between SMEs' EB internal success factors and Organizational characters.

Figure 3.3 Conceptual framework (quantitative method)

Another part is a survey. A questionnaire is used to find factors about EB maturity of the target and independence between the SMEs' EB internal success factors and EB characters. These findings answer first and third research question, while presenting their profiles in each readiness level.

3.2 Population, samples and sampling method

3.2.1 Population

This exploratory has two population types, which are population for quantitative and qualitative method, as followed:

3.2.1.1 Population for the quantitative method: 126,781 companies that are food processing SMEs are characterized by the small and medium enterprise promotion act issued in 2000, Ministerial regulation issued in 2002 and Thai revenue law as shown in Table 2.2 (The Office of SMEs Promotion, 2019).

3.2.1.2 Population for the qualitative method: this section population includes experts who are associated with 1. EB initiative and implement, 2. current situation about EB initiative of SMEs in Thai food processing industry, or 3. the government expectations.

3.2.2 Samples

3.2.2.1 Samples for the quantitative method: a questionnaire was sent to SMEs under the convenience sampling method via offline and online channels, e.g. mobile applications. Participants could reach the online questionnaire via https://goo.gl/forms/LiI9Xx2dSJrRsWey1 or scan a QR code as shown in Figure 3.4. For the offline survey, they received the questionnaire in a paper format.

Figure 3.4 QR code for an online survey

After estimating proportion (estimate p by $\hat{p}$) from 50 Thai-food-SMEs in a pilot study, the number of respondents is calculated by using the below formula when N is 126,781 of food processing SMEs (The Office of SMEs Promotion, 2019).

$$n = \frac{N \times \hat{p} \times (1 - \hat{p})}{(N - 1)\left(\dfrac{d^2}{Z^2_{\alpha/2}}\right) + \hat{p}(1 - \hat{p})}$$

When

N:	the number of all food processing SMEs in Thailand	α:	the chance of the null hypothesis rejection when it is true (0.05)
n:	the needed sample size	d:	the margin of error (5%)
$\hat{p}$:	estimated value of "p"	$Z_{\alpha,2}$:	the value from a standard normal distribution related to desired confidence level (Z=1.96 for 95% confidence)
P:	the proportion of Thai-food-SMEs which already have an online channel		

(The Pennsylvania State University, 2017)

As per the calculation, the sample size should be collected at least 175 cases. However, the researcher collected 200 cases, which mean it is comprehensive and enough for analysis.

3.2.2.2 Samples for the qualitative method: The interviewees are selected by a purposive sampling method. Since the success of EB initiative in this industry deals with various parties, the target participants should come from a variety of sources. For that reason, they are classified into 5 categories, as examined in Table 3.1.

Table 3.1 Samples of qualitative research method

	Sample profile	Number of sample (person)	Code name
1.	Thai-SMEs in the food processing industry	2	R_1, R_2
2.	Online marketer	1	R_3
3.	Thai government agency	2	R_4, R_5
4.	Professional in Information Technology field	4	R_6, R_7, R_8, R_9
5.	Organization change and development agent / HR	1	R_{10}
	Total	**10**	

3.3 Research tools and techniques

3.3.1 Quantitative research tools and techniques

3.3.1.1. Survey design: EB characters have only been brought up through external observation points of EB running company. In order to support the government backing, it needs to find internal factors affecting EB readiness of Thai SMEs in the food processing industry. For this reason, hypotheses listed in Table 3.2 are developed for finding an EB readiness influencer.

Table 3.2 Hypotheses

	Hypothesis
H_1	Individual difference factors (gender) influences the growth of EB readiness (strategy) of Thai-SMEs in the food processing industry
H_2	Individual difference factors (gender) influences the growth of EB readiness (systems) of Thai-SMEs in the food processing industry
H_3	Individual difference factors (gender) influences the growth of EB readiness (staffs / skills) of Thai-SMEs in the food processing industry
H_4	Individual difference factors (gender) influences the growth of EB readiness (business process) of Thai-SMEs in the food processing industry
H_5	Individual difference factors (gender) influences the growth of EB readiness (information security) of Thai-SMEs in the food processing industry

Table 3.2 Hypotheses (cont.)

	Hypothesis
H_6	Individual difference factors (age) influences the growth of EB readiness (strategy) of Thai-SMEs in the food processing industry
H_7	Individual difference factors (age) influences the growth of EB readiness (systems) of Thai-SMEs in the food processing industry
H_8	Individual difference factors (age) influences the growth of EB readiness (staffs / skills) of Thai-SMEs in the food processing industry
H_9	Individual difference factors (age) influences the growth of EB readiness (business process) of Thai-SMEs in the food processing industry
H_{10}	Individual difference factors (age) influences the growth of EB readiness (information security) of Thai-SMEs in the food processing industry
H_{11}	Individual difference factors (education) influences the growth of EB readiness (strategy) of Thai-SMEs in the food processing industry
H_{12}	Individual difference factors (education) influences the growth of EB readiness (systems) of Thai-SMEs in the food processing industry
H_{13}	Individual difference factors (education) influences the growth of EB readiness (staffs / skills) of Thai-SMEs in the food processing industry
H_{14}	Individual difference factors (education) influences the growth of EB readiness (business process) of Thai-SMEs in the food processing industry
H_{15}	Individual difference factors (education) influences the growth of EB readiness (information security) of Thai-SMEs in the food processing industry
H_{16}	Awareness & Knowledge influences the growth of EB readiness (strategy) of Thai-SMEs in the food processing industry
H_{17}	Awareness & Knowledge influences the growth of EB readiness (systems) of Thai-SMEs in the food processing industry
H_{18}	Awareness & Knowledge influences the growth of EB readiness (staffs / skills) of Thai-SMEs in the food processing industry
H_{19}	Awareness & Knowledge influences the growth of EB readiness (business process) of Thai-SMEs in the food processing industry
H_{20}	Awareness & Knowledge influences the growth of EB readiness (information security) of Thai-SMEs in the food processing industry
H_{21}	Perceived behavioral control influences the growth of EB readiness (strategy) of Thai-SMEs in the food processing industry
H_{22}	Perceived behavioral control influences the growth of EB readiness (systems) of Thai-SMEs in the food processing industry
H_{23}	Perceived behavioral control influences the growth of EB readiness (staffs / skills) of Thai-SMEs in the food processing industry

Table 3.2 Hypotheses (cont.)

	Hypothesis
H_{24}	Perceived behavioral control influences the growth of EB readiness (business process) of Thai-SMEs in the food processing industry
H_{25}	Perceived behavioral control influences the growth of EB readiness (information security) of Thai-SMEs in the food processing industry
H_{26}	Social influence or Subjective norms influences the growth of EB readiness (strategy) of Thai-SMEs in the food processing industry
H_{27}	Social influence or Subjective norms influences the growth of EB readiness (systems) of Thai-SMEs in the food processing industry
H_{28}	Social influence or Subjective norms influences the growth of EB readiness (staffs / skills) of Thai-SMEs in the food processing industry
H_{29}	Social influence or Subjective norms influences the growth of EB readiness (business process) of Thai-SMEs in the food processing industry
H_{30}	Social influence or Subjective norms influences the growth of EB readiness (information security) of Thai-SMEs in the food processing industry
H_{31}	Behavioral intention to use influences the growth of EB readiness (strategy) of Thai-SMEs in the food processing industry
H_{32}	Behavioral intention to use influences the growth of EB readiness (systems) of Thai-SMEs in the food processing industry
H_{33}	Behavioral intention to use influences the growth of EB readiness (staffs / skills) of Thai-SMEs in the food processing industry
H_{34}	Behavioral intention to use influences the growth of EB readiness (business process) of Thai-SMEs in the food processing industry
H_{35}	Behavioral intention to use influences the growth of EB readiness (information security) of Thai-SMEs in the food processing industry
H_{36}	Firm size influences the growth of EB readiness (strategy) of Thai-SMEs in the food processing industry
H_{37}	Firm size influences the growth of EB readiness (systems) of Thai-SMEs in the food processing industry
H_{38}	Firm size influences the growth of EB readiness (staffs / skills) of Thai-SMEs in the food processing industry
H_{39}	Firm size influences the growth of EB readiness (business process) of Thai-SMEs in the food processing industry
H_{40}	Firm size influences the growth of EB readiness (information security) of Thai-SMEs in the food processing industry
H_{41}	Scope of business operations (product types) influences the growth of EB readiness (strategy) of Thai-SMEs in the food processing industry
H_{42}	Scope of business operations (product types) influences the growth of EB readiness (systems) of Thai-SMEs in the food processing industry

Table 3.2 Hypotheses (cont.)

	Hypothesis
H_{43}	Scope of business operations (product types) influences the growth of EB readiness (staffs / skills) of Thai-SMEs in the food processing industry
H_{44}	Scope of business operations (product types) influences the growth of EB readiness (business process) of Thai-SMEs in the food processing industry
H_{45}	Scope of business operations (product types) influences the growth of EB readiness (information security) of Thai-SMEs in the food processing industry
H_{46}	Scope of business operations (sourcing and supply channels) influences the growth of EB readiness (strategy) of Thai-SMEs in the food processing industry
H_{47}	Scope of business operations (sourcing and supply channels) influences the growth of EB readiness (systems) of Thai-SMEs in the food processing industry
H_{48}	Scope of business operations (sourcing and supply channels) influences the growth of EB readiness (staffs / skills) of Thai-SMEs in the food processing industry
H_{49}	Scope of business operations (sourcing and supply channels) influences the growth of EB readiness (business process) of Thai-SMEs in the food processing industry
H_{50}	Scope of business operations (sourcing and supply channels) influences the growth of EB readiness (information security) of Thai-SMEs in the food processing industry

The questionnaire had been proposed to five experts to help verify its validity. In order to improve it in a more appropriate and consistent manner, the questionnaire is handled as their recommendations.

A try out process had been employed to collect 50 samples and to test a new questionnaire reliability by Cronbach's alpha coefficient. The analyzation suggested a further improvement. Then a complete version is finished.

3.3.1.2. Questionnaire: The questionnaire includes multiple-choice questions, checklist questions and five-point Likert scale questions. The tool has five sections as Table 3.3.

Table 3.3 Question aim

Section	Question	Question aim	Factors covered	Style
1	1-3	To collect SMEs' individual difference factors.	- Individual difference factors: gender, age, and education	Multiple choice

Table 3.3 Question aim (cont.)

Section	Question	Question Aim	Factors Covered	Style
2	4-7	To acquire general information of respondents, which is firm size and scope of business operations.	- Firm size: total employees, fixed assets - Scope of business operations: product types, sourcing & supply channels (SSCH)	Multiple choice & checklist
3	8-20	To obtain SMEs' opinions on these questions by answering agree or disagree with phrases shown in the survey.	- Awareness & Knowledge: managers' knowledge, employee' skill - Perceived behavioral control: behavioral beliefs, normative beliefs, control beliefs - Social influence or Subjective norms - Behavioral intention to use	Likert scale
4	21	To indicate whether the respondent's organization has entered EB or not. This question also presents SMEs' favorite online channels which help in the discussion chapter. If there is at least one online channel for an organization, that is already running EB.	- Online channel (ONCH)	Checklist
5	22-46	To gather SMEs' opinions about EB maturity by answering agree or disagree with phrases shown in the survey.	- EB maturity characters: strategy, systems, staffs/skills, business process, information security performance	Likert scale

Questionnaire section three and five are employed to collect target respondents' attitudes. Sentences extracting from the upgraded maturity model described in the survey are used as standards for respondents to judge how their businesses match a fully developed an EB company. By answering one of five recognition degrees, their internal necessary factors and EB maturity level are assessed. The rating scale is shown in Table 3.4.

Table 3.4 Rating scale

Score	5	4	3	2	1
Meaning	Strongly agree	Agree	Neutral	Disagree	Strongly disagree

For data interpretation of internal success factors and EB readiness, the intervals from the range technique is used to interpret each factor data, as following:

Formula of the intervals from the range technique

$$\text{Interval} = \frac{(\text{Maximum score} - \text{Minimum score})}{\text{A number of class interval}}$$

Score definition is displayed by Table 3.6 and 3.7. Outcomes are converted into ordinal data, which can be evaluated by Frequency analysis, Cross tab, Chi-square and Mann-Whitney U - Test (Vanichbuncha & Vanichbuncha, 2017).

Table 3.5 Calculated interval

	Maximum score	Minimum score	Number of class interval	Calculated interval
Internal success factors	5	1	5	0.8
EB readiness	25	5	6	3.33

Table 3.6 Interpretations of internal success factors score

Score	Meaning
4.21 – 5.00	Strongly agree
3.41 – 4.20	Agree
2.61 – 3.40	Neutral
1.81 – 2.60	Disagree
1.00 – 1.80	Strongly disagree

Table 3.7 Interpretations of EB maturity score

Score	Meaning
21.68 - 25.00	Level 6
18.34 - 21.67	Level 5
15.01 - 18.33	Level 4
11.68 - 15.00	Level 3
8.34 - 11.67	Level 2
5.00 - 8.33	Level 1

3.3.2 Qualitative research tools and techniques

3.3.2.1. Process for conducting in-depth interviews: participating stakeholders are categorized after the literature review and framework creation are finished. In summary, they must be experts who can provide information from various perspectives and an overview about (1) EB operations in Thailand, (2) SMEs that are food producers in the Thai food processing industry, (3) Government agent who can provide expectation in response to the Thailand 4.0.

The second step is to identify what information is needed from whom. From the literature reviews, the topics to be asked about perspectives and insight of the specialists were generated into two major topics: (1) Variables which supposed to influence the level of readiness and the perception of its significance when doing EB, (2) The current state of the target's understanding of the interpretations of the EB, as well as how it relates to the target organization's current context and level of readiness. Then, a design exploration must follow ethical research standards, including reviews by ethical research committee. This results in updates as per suggestions. A final step is employed to collect data from all the ten experts.

3.3.2.2. Process Instrument development: an interview protocol and an interview guide are issued for each participant. All questions are open-end. In addition to the questions about two major topics in the interview guide, it is composed of four parts: (1) research objectives, (2) an informed consent, (3) fundamental keywords definition, and (4) questionnaire suggestion. Every guideline has matching questions. Therefore, it can be checked with Triangulation method.

3.4 Instrument assessment

3.4.1 Validity and reliability in quantitative studies

3.4.1.1 Validity measurement: to verify content validity, Index of item - objective congruence (IOC) is used. The researcher presented the questionnaire to the advisor and four other experts to evaluate according to the following criteria:

+1: a question obviously matches the objectives

0: unsure / unclear

-1: a question undoubtedly does not match the objectives

Then, an IOC formula, (Rovinelli & Hambleton, 1976), is applied to the scoring of each question across raters.

$$IOC = \frac{\sum R}{N}$$

When

IOC: Index of Item-Objective Congruence

R: score from each rater

N: number of raters

*Remark:

- The questionnaire will pass since IOC $\geq$ 0.5. (Rovinelli & Hambleton, 1976).
- An item which does not achieve objectives must be modified under the expert's guidance.

From an evaluation of 48 questions, a prototype questionnaire score is between 0.6 – 1.00. This means it is suitable for the exploration. However, following expert's suggestions, the questionnaire is updated without affecting the evaluation results. Variables and segmentation criteria are mentioned in Table 3.8 – 3.11.

Table 3.8 Variable 1 - 3 and segmentation criteria

	Variable	**Code**	**Sub-variable**	**Types of assessment items**	**Measurement scales**	**Segmentation criteria**		**Reference**
						Symbol	**Meaning**	
1	Individual difference factors	ID						Awa, Ukoha, and Emecheta (2012)
		ID 1.1A	Gender	Multiple choice	Nominal	1	Male	
						2	Female	
		ID 1.2A	Age	Multiple choice	Ordinal	1	< 18 years old	
						2	18 - 24 years old	
						3	25 - 34 years old	
						4	35 - 44 years old	
						5	45 - 54 years old	
						6	> 55 years old	
		ID 1.3A	Education	Multiple choice	Ordinal			
						2	Secondary school / High school	
						3	Vocational certificate	
						4	High vocational certificate	
						5	Diploma / Associate's degree	
						6	Bachelor's degree	
						7	Master's degree	
						8	Doctor Degree	

Table 3.8 Variable 1 - 3 and segmentation criteria (cont.)

	Variable	Code	Sub-variable	Types of assessment items	Measurement scales	Segmentation criteria		Reference
						Symbol	Meaning	
2	Firm size	FM						Awa, Ukoha, and Emecheta (2012)
		FM 2.1A	Total employees	Multiple choice	Ordinal	1	≤ 50 people	The ASEAN Secretariat (n.d.)
						2	51-200 People baht	
						3	> 200 people	
		FM 2.2A	Fixed assets	Multiple choice	Ordinal	1	≤ 50 Million baht	The ASEAN Secretariat (n.d.)
						2	51-200 million baht	
						3	> 200 people	
3	Scope of business operations	SB						Awa, Ukoha, and Emecheta (2012)
		SB 3.2A	Product types	Checklist	Nominal	1	Bakery wares	Thai food and drug administration (2017)
						2	Beverages, excluding dairy products	
						3	Cereals and cereal products, excluding bakery wares	
						4	Confectionery	
						5	Dairy products and analogues	
						6	Edible ices	
						7	Eggs and egg products	
						8	Fats and oils, and fat emulsions	
						9	Fish and fish products	
						10	Food stuffs intended for particular nutritional uses	
						11	Fruits and vegetables, including nuts and seeds	
						12	Meat and meat products	

Table 3.8 Variable 1 - 3 and segmentation criteria (cont.)

	Variable	Code	Sub-variable	Types of assessment items	Measurement scales	Segmentation criteria		Reference
						Symbol	**Meaning**	
						13	Prepared foods	
						14	Ready-to-eat savories	
						15	Salts, spices, soups, sauces, salads and protein products	
						16	Substances added to food, and others	
						17	Sweeteners, including honey	
		SB 3.3A	SSCH	Checklist	Nominal	1	Catering	
						2	Distributer	
						3	Eat-in-premises or mobile food stall	
						4	Export	
						5	Home delivery	
						6	Import	
						7	Internet	
						8	Market	
						9	Retail	
						10	Takeaway	
						11	Wholesale	
						12	Others: _____	

Table 3.9 Variable 4 ‑ 7 and segmentation criteria

	Variable	Code	Sub-variable	Types of assessment items	Measurement scales	Question for an assessment	Reference
4	Awareness & Knowledge	AK					Choshin and Ghaffari (2017)
		AK 4.1A				You have knowledge and understanding about running EB.	Sittisomboon and Neanna (2013)
		AK 4.1B	Managers' knowledge	Likert scale	Interval	You can initiate EB in your organization by yourself.	Sittisomboon and Neanna (2013)
		AK 4.1C				You have knowledge and understanding about information security.	Choshin and Ghaffari (2017)
		AK 4.2A	Employee' skill	Likert scale	Interval	Your employees can use the tools used to conduct EB very well.	Sittisomboon and Neanna (2013)
5	Perceived behavioral control	PB					Awa, Ukoha, and Emecheta (2012)
		PB 5.1A	Behavioral beliefs	Likert scale	Interval	You believe running EB is good for your organization.	Several studies (Gao & Bai, 2014; Thongmala, 2015.)
		PB 5.2A	Normative beliefs	Likert scale	Interval	If your organization does EB, it increases more acceptance from those in the society.	
		PB 5.3A	Control beliefs	Likert scale	Interval	If your organization runs EB and encounters problems, you can handle them.	Several studies (Gao & Bai, 2014; Thongmala, 2015.)

Table 3.9 Variable 4 - 7 and segmentation criteria (cont.)

	Variable	Code	Sub-variable	Types of assessment items	Measurement scales	Question for an assessment	Reference
6	Social influence or Subjective norms	SI					
		SI 6.1A				If your organization runs EB, customers or partners will be more satisfied with its service.	Several studies (Gao & Bai, 2014; Sittisomboon & Neanna, 2013.)
		SI 6.1B		Likert scale	Interval	The current situation makes your organization adopt EB.	Sutanonpaiboon and Pearson (2006)
		SI 6.1C				Government support has influenced your decision to implement EB.	Sittisomboon & Neanna (2013)
7	Behavioral intention to use	BI					Awa, Ukoha, and Emecheta (2012)
		BI 7.1A				It is a good idea to adopt EB to create a competitive advantage for your organization.	Nakalertkavee (2010)
		BI 7.2A		Likert scale	Interval	Your organization has studied and prepared for EB adoption.	Sittisomboon and Neanna (2013)
		BI 7.3A				Your organization aims to run EB in the long run.	Gao and Bai (2014)

Table 3.10 Variable 8 and segmentation criteria

	Variable	Code	Types of assessment items	Measurement scales	Segmentation criteria		Reference
					Symbol	**Meaning**	
8	Online channel (ONCH)	ON					Awa, Ukoha, and Emecheta (2012)
		ON 8.1A	Checklist	Nominal	1	Facebook	
					2	Instagram	
					3	Inwshop	
					4	Lazada	
					5	Line	
					6	Shopee	
					7	Website	
					8	Doesn't exist	
					9	Others: _____	

Table 3.11 Variable 9 - 13 and segmentation criteria

	Variable	Code	Types of assessment items	Measurement scales	Question for an assessment	Reference
9	Strategy	ST				Prananto, McKay, and Marshall (2004)
		ST 9.1A			There is some sense of direction for EB initiatives.	
		ST 9.2A			There is a formal strategy for EB initiatives.	
		ST 9.3A	Likert scale	Interval	There are endeavors to integrate and arrange EB initiatives with business strategy.	
		ST 9.4A			There are regular meetings to review and update internal EB strategies in order to adapt to the current situation.	
		ST 9.5A			There are usually external strategic conversations with suppliers and business partners to improve running EB.	

Table 3.11 Variable 9 - 13 and segmentation criteria (cont.)

	Variable	Code	Types of assessment items	Measurement scales	Question for an assessment	Reference
10	Systems	SY				Prananto, McKay, and Marshall (2004)
		SY 10.1A			Your organization has begun to implement IT systems and applications for EB.	
		SY 10.2A			There are business strategies that support IT development for EB operations.	
		SY 10.3A	Likert scale	Interval	There are budget allocations from other areas to support IT development for EB operations.	
		SY 10.4A			IT systems are extremely embedded with various applications of your organization, resulting in a seamless data exchange within the organization.	
		SY 10.5A			Your organizational activities are fully linked with business partners through IT systems.	
11	Staffs / Skills	SS				Prananto, McKay, and Marshall (2004)
		SS 11.1A			There is an officially assigned staff handling EB initiatives.	
		SS 11.2A			There is an officially assigned IT staff handling EB initiatives and operations.	
		SS 11.3A	Likert scale	Interval	There is a collaboration between business-oriented and IT staff handling EB initiatives and operations.	
		SS 11.4A			Your organization sets up a team bringing staffs together from various departments to drive EB.	
		SS 11.5A			There is a staff in your organization, including executives, who understands about EB and has a role to play in the organization initiatives.	

Table 3.11 Variable 9 - 13 and segmentation criteria (cont.)

	Variable	Code	Types of assessment items	Measurement scales	Question for an assessment	Reference
12	Business process	BP				Prananto, McKay, and Marshall (2004)
		BP 12.1A	Likert scale	Interval	EB initiatives are perceived to have some significance in your current business processes.	
		BP 12.2A			There is a process engineering in your organization caused by EB initiatives.	
		BP 12.3A			Because of EB initiatives, internal activities of your organization are streamlined, and your corporate functions are reorganized.	
		BP 12.4A			EB is a main method to do business in your organization.	
		BP 12.5A			EB plays a key role in a cooperation between your organization and partners to emerge an external linking network.	
13	Information security	IN				Bernik & Prislan (2016)
		IN 13.1A	Likert scale	Interval	There is basic data protection, such as virus protection, defining authority and data encryption.	
		IN 13.2A			There is general awareness of information security within your organization and an ability to solve immediate problems.	
		IN 13.3A			There is a strategy for information security within your organization and assigned staffs with authority to take care of involved issue.	
		IN 13.4A			Your organization develops both preventive and responsive capability to suit its strategy and user's expectations.	

Table 3.11 Variable 9 - 13 and segmentation criteria (cont.)

	Variable	Code	Types of assessment items	Measurement scales	Question for an assessment	Reference
		IN 13.5A			Information security is fully associated with your organization's culture, and continuously able to adapt to new good practices.	

3.4.1.2 Reliability: by Cronbrach's alpha coefficient (□) calculation of 50 samples, survey reliability is analyzed. Table 3.12 presents the alpha of the questionnaire.

Cronbrach's alpha coefficient

$$\square_{\square\square} = \left(\frac{\square}{\square-1}\right)\left(\frac{1-\sum \square_\square^2}{\square_0^2}\right)$$

When

$\square_{\square\square}$: internal consistency of questionnaire

N: the number of samples

n: the number of questions

$\square_0^2$: the variance of the observed total test scores

$\square_\square^2$: the variance of component i for the current sample of persons

Criteria to accept reliability measurement equals to 0.7

(Pongwichai, 2015)

Table 3.12 Cronbrach,s Alpha Coefficient of the questionnaire

Part	Factors	Question (items)	Cronbrach's Alpha coefficient (α)	
			Try out unit (n = 50)	All units (n = 200)
3	SMEs, EB internal success factors		0.946	0.943
	1. Awareness & Knowledge	4	0.897	0.906
	2. Perceived behavioral control	3	0.808	0.819
	3. Social influence or Subjective norms	3	0.917	0.874
	4. Behavioral intention to use	3	0.859	0.875
5	Organizational characters		0.984	0.986
	5. Strategy	5	0.956	0.949
	6. Systems	5	0.960	0.956
	7. Staffs / Skills	5	0.959	0.963
	8. Business process	5	0.924	0.938
	9. Information security performance	5	0.981	0.972
	Total	38	0.982	0.981

*Remark: for more detail of Cronbrach,s Alpha coefficient result, see Appendix

Nunnally (1978) recommended a reliability score for exploratory research, basic research, and important research to be at least 0.7, 0.8 and 0.9 respectively. The score of a try out group is 0.982, while each question is between $0.924 - 0.981$. In case of 200 samples, the alpha is 0.981, while each question is between $0.938 - 0.972$. Therefore, the survey is reliable and proper to use for this research.

3.4.1.3 Triangulation method for qualitative research: one of frequently mentioned methods in qualitative inquiry is the Triangulation method. It is classified into four types of triangulation: theory triangulation, data source triangulation, investigator triangulation, method triangulation (Denzin, 2006).

This method has also been used in this paper. By collecting data from many groups of experts at different periods of time with the same questions, it is found that both experts within the same group and in different groups answer the questions in a similar way. Additionally, sometimes even doing data collection with an

assistant who joins the data collection, the answer is still in the same direction. During an interview, there are respondents' behavior observations for methodological triangulation. At the end of the interview, there is also a list of issues to get the full response. The collected data are compared with the secondary data from many researchers who have studied neighboring topics to verify for the most precise and reliable information as described in Chapter 2.

3.5 Analytical and statistical tools

3.5.1 Descriptive analysis

3.5.1.1 Percentage (%)

$$Percentage = \frac{f\,(100)}{N}$$

When

f: Sum of Neutral represents scores

N: the number of samples

3.5.1.2 Mean ($\bar{x}$)

$$Mean = \frac{\sum x}{N}$$

When

$\sum x$: the summation of represents scores

N: the number of samples

3.5.1.3 Mode (Mo): the mode is found by collecting and organizing data to count the frequency of each result. The result with the highest count of occurrences is the mode of the set, also referred to as the modal value.

3.5.2 Inferential statistics

3.5.2.1 Mann-Whitney U - Test (Wilcoxon rank-sum Test): this tool is used in comparison between expected and current Thai-food-SMEs' readiness level. It because samples are nominal and ordinal scales after the interpretations as Table 3.11. (Saihing, Pathwong, Jeampiromsuk, & Waiyotyawan, 2007; Pongwichai, 2015)

$$Z = \frac{U_2 - \mu_u}{\sigma_u}$$

$$U_1 = n_1 \times n_2 + \frac{n_1(n_1 + 1)}{2} - R_1$$

$$U_2 = n_1 \times n_2 + \frac{n_2(n_2 + 1)}{2} - R_2$$

$$\mu_u = \frac{n_1 \times n_2}{2}$$

$$\sigma_u = \sqrt{\frac{n_1 \times n_2(n_1 + n_2 + 1)}{12}}$$

When

n: the number of items in each sample

U: U Statistic, the result of performing a Mann Whitney U test

R: the sum of ranks in the sample

The null and alternative research hypotheses for the Mann-Whitney U test are stated as follows:

$\square_0 : \square_\square \geq \square_\square$

$\square_1 : \square_\square < \square_\square$

When

$\square_\square$: SMEs' EB readiness level of each character

$\square_\square$: Expected EB readiness level of each character

3.5.2.2 Test of independence: because samples are nominal and ordinal scales, Pearson Chi-square is used to measure the association between EB readiness characters and EB internal success factors. However, a Monte Carlo method is used for an alternative method when the conditions for a chi squared test are not met. The condition in this case is there are more than 20% of cells with values <5 (Vanichbuncha & Vanichbuncha, 2017).

$$\chi^2 = \sum_{i=1}^{\square} \sum_{j=1}^{\square} \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

$$E_{ij} = \frac{O_i \times O_j}{n}$$

When

χ^2: Pearson's chi square statistic

O_{ij}: observed frequency in cells (i, j)

E_{ij}: expected frequency in cell (i, j)

O_i: observed frequency in row i

O_j: observed frequency in column j

n: the number of overall samples

The null and alternative research hypotheses for the test of independence are stated as follows:

$H_0 : O_i = E_i$

or there is no association between the factor and the character

$H_1 : O_i \neq E_i$

or there is some association between the factor and the character

3.5.3 Content analysis

Content from the interview is analyzed by using component analysis method. All data is itemized in accordance with the internal success factors and EB characters before being compared and concluded with analytic induction.

CHAPTER IV
RESULTS

An offline and online questionnaire was launched in April - June 2018 for collecting Thai SMEs' EB maturity. There were 200 respondents from 70 offline questionnaires and 130 online questionnaires, which account for 35% and 65% of the total survey respectively. As a result of a reviewing process, there are valid 190 questionnaires and 10 invalid questionnaires. The data was analyzed by statistical software, SPSS, and then presented. The following is a list of this research finding and analysis.

4.1   Developed EB State of Growth assessment model

4.2   Conclusion of Thailand's EB development from expert interview results

4.3   The expected readiness level for Thai-food-SMEs to achieve the economic model policy "Thailand 4.0" and the 20-year national strategy

4.4   A study on an online presence of Thai-food-SMEs and their EB maturity

4.5   Test for independence between SMEs' EB internal success factors and EB characters

4.6   Summary of Thai-food-SMEs' general organization information (Individual difference factors, Firm size and Scope of business operations)

4.7   Summary of Thai-food-SMEs' other EB internal success factors (SMEs' EC internal adoption & success factors)

4.8   Comparisons between expected and current Thai-food-SMEs' readiness level

4.1 Developed EB State of Growth assessment model

Form the similar of ISP 10X10 M structure to the SOG-e model and this easiness to use, it is combined together to create an upgraded EB implement blueprint. The final model illustrates in Table 2.9. By clarifying the uncertainty of position in technologies, resources and individuals, the updated maturity model shows a simple structured path for managers.

In a part of the EB readiness standard evaluation as referred to in Chapter3, Table 4.1 is used as a reference for the development of questionnaires.

Table 4.1 The developed EB State of Growth assessment model

Stage	Organization character and performance (EB character)				
	Strategy	**Systems**	**Staffs / Skills**	**Business Processes**	**Information security performance**
Stage 1	No strategy and planning for EB development and implementation.	Uncoordinated and unconnected systems with limited applications.	No formally appointed staff to handle EB initiatives.	EB initiatives have no impact on existing business processes. Traditional business processes are unaffected by EB initiatives.	The organization does not implement any specific measures for managing information security threats; information security is extremely underdeveloped in the business structure. Security needs are unidentified.
Stage 2	Ad-hoc strategy. No formal strategy but there is some sense of direction for EB initiatives.	Increasing use of IS/IT in many aspects of the business, but little input from business strategy in making IS/IT investments.	Designated staff with expanded responsibility to develop and maintain EB initiatives.	EB initiatives have little impact on existing business processes.	Security of data and technology is provided through basic measures. Information security strategy is not adopted; hence, information security is not organized as a separate function, but integrated into IT or general security affairs.

Table 4.1 The developed EB State of Growth assessment model (cont.)

Stage	Organization character and performance (EB character)				
	Strategy	**Systems**	**Staffs / Skills**	**Business Processes**	**Information security performance**
Stage 3	There is a formal strategy for EB initiatives with a technology-centric tendency which has little or no consideration for business strategy.	Greater infusion and diffusion of IS/IT with some input from business strategy.	Dedicated staff with technical expertise but without enough business knowledge.	EB initiatives have considerable impact on existing business processes and may require process changes.	There is a general awareness of information security within the organization, but threats and vulnerabilities have to be dealt with as they arise on an ad-hoc basis without adequate planning.
Stage 4	EB initiatives and activities support the achievement of business goals. There are attempts to integrate and coordinate EB initiatives with business strategy.	Greater inputs from business strategy, but still some IT-driven investments.	Dedicated staff with technical expertise with the help of, or together with, business-oriented staff.	EB initiatives are a driver of business process reengineering. Reengineering of business processes to accommodate the integration between IS/IT, Internet based system, and various parts of the organization.	Information security is defined as a strategy within the organization and compliance, but measures are primarily implemented at technical and operational levels, while its broader and strategic management remains underdeveloped.

Table 4.1 The developed EB State of Growth assessment model (cont.)

Stage	Organization character and performance (EB character)				
	Strategy	**Systems**	**Staffs / Skills**	**Business Processes**	**Information security performance**
Stage 5	Strategy is regularly reviewed and updated. Strategy review session involves participation and input from IS/IT and business people. EB initiatives are influenced by business needs. Strategy for EB may aim to seek and evaluate new opportunities to provide strategic value for the business.	Systems are focused on internal activities to provide added value to business activities. IS/IT systems are highly integrated with various parts of the organization which results in a seamless information exchange within the organization.	A team of staff from different departments of the organization manage the EB initiatives. A steering committee may be formed to oversee the development of EB initiatives.	EB initiatives play a vital role in streamlining the organization's internal operations and reorganizing of business functions to shorten process cycle time and deliver value to customers.	The organization develops preventive and responsive capabilities, understands strategic and user-related aspects, and provides for information security's formal compliance. The security activities are properly controlled and up-to-date, performance is measured, and the effects contribute to the fulfillment of security needs.
Stage 6	There are constant and dynamic strategy and planning sessions that include both IS/IT and business people. On-going strategic conversation within the organization and externally with suppliers and business partners to drive EB initiatives as a source of competitive advantage.	Systems are focused on seamless interorganizational activities. Corporate systems are highly integrated internally as well as externally, reaching out to business partners' corporate systems.	Management is committed to an EB vision and involved in its implementations. The organization has access to all requisite skills and knowledge for the EB initiatives.	EB initiatives play a vital role in restructuring the processes linking external business network members to accommodate interorganizational systems. Integrations of the EB initiative and business processes between the organization's and its business partners.	Information security is fully aligned with the organization's vision and receives strong financial, technological and professional support. The organization applies an adequate combination of responsive and preventive measures for in-depth protection. There are regular revisions and assessments of incidents, which provide intelligence. Information security is integrated into security culture. Organization successfully responds to external changes, and follows security trends and good-practices.

Reference: Bernik & Prislan, 2016; Prananto, McKay, & Marshall, 2004

4.2 Conclusion of Thailand's EB business development from expert interview results

4.2.1 Challenging constraints and ways of supporting EB implementation and development

There are 20 key words can be analyzed in the topic of "Variables which supposed to influence the level of readiness and the perception of its significance when doing EB". Information reinforce the third research purpose discussion set out in Table 4.2. It introduces the sub-topics discussed by the experts that they encourage these factors have related to EB maturity.

Table 4.2 Sub-topics discussed by the experts under the topic of variables that have an impact on the level of readiness and awareness of its importance while doing EB

	Sub-topic	R1	R2	R3	R4	R5
						Expert
Variables which supposed to influence the level of readiness and the perception of its significance when doing EB	Gender					
	Age	▨	▨	▨	▨	▨
	Education				▨	▨
	Firm size					▨
	Product types					
	SSCH					▨
	MK			▨	▨	▨
	EM	▨		▨	▨	▨
	AK		▨		▨	
	PB			▨		▨
	SI	▨			▨	
	BI			▨		

* Remark: gray cells show that the expert had informed and discussed in the sub-topic

Table 4.2 Sub-topics discussed by the experts under the topic of variables that have an impact on the level of readiness and awareness of its importance while doing EB (cont.)

	Sub-topic	Expert				
		R6	R7	R8	R9	R10
Variables which supposed to influence the level of readiness and the perception of its significance when doing EB	Gender					
	Age	■				
	Education	■				
	Firm size	■				
	Product types					
	SSCH					
	MK	■				■
	EM					
	AK	■				
	PB					
	SI		■	■	■	■
	BI	■				

* Remark: gray cells show that the expert had informed and discussed in the sub-topic

Table 4. 3 Summary of experts who mention the variables that have an impact on the level of readiness and awareness of its importance while doing EB in each sub-topic

	Sub-topic	Referring expert	Total (People)
Variables which supposed to influence the level of readiness and the perception of its significance when doing EB	Gender	-	0
	Age	R_1, R_2, R_3, R_4, R_5, R_6	6
	Education	R_4, R_5, R_6	3
	Firm size	R_5, R_6	2
	Product types	R_2, R_3	2
	SSCH	R_5, R_6	2
	MK	R_3, R_4, R_5, R_6, R_{10}	5
	EM	R_1, R_2, R_4, R_5	4
	AK	R_2, R_4, R_6	3
	PB	R_3, R_5	2
	SI	R_1, R_4, R_7, R_8, R_9, R_{10}	6
	BI	R_3, R_6	2

From the overview of the data, the results can be gathered and analyzed as follows:

EB constraints in Thailand are language, generations' adaptation, data limitation when bypassing website, budget for education and investment, the lack of supporting platforms for the food sector, and other factors that can be managed domestically such as E-marketplace, online advertisement space and logistics - especially for transporting chilled and frozen products. One of EB expert points out that "*the biggest area in the food sector is frozen food, but there are not many frozen food deliveries to consumers' home in Thailand because frozen food is not yet popular among Thai people.*" These constraints lead to a worrying topic. An expert conveys his concern that "*we don't really have anything that truly belongs to us. In the 4.0 world, we rely our economy on EB from other countries. Then how can we grow in a sustainable way? Thai people all rely on foreign platforms. Our money is definitely sent out of the country.*"

Apart from the mentioned problems, there are still other basic problems such as managers' understanding of how important new changes are, resistance to adapting to changes within an organization, staff's lack of knowledge and capability to deal with EB, etc. The five interesting topics that prevent EB development as described below:

1) Some product characteristics are not suitable for selling through an online channel

This is a common problem in EB implementation. However, experts give suggestions about this topic, which are good explanations that can link to the possibility of developing EB readiness in Thailand.

As stated, that "*not every product is suitable for an online channel*," most of them fail solely because of the product characteristics. If it fits the platform and the market, the lack of marketing skills is not a problem. It can be concluded that some research is still needed to find a suitable way to sell them on the online platform.

It can be clearly seen from an expert's examples that *"most Thai SMEs have Facebook but they are rarely active. Some people sell two flavors of soft drink product. On the first day, they promote the first flavor. Then, on the second day, they promote the second flavor. On the third day, however, they don't know what else to do. They will follow other people's way of promoting their Facebook pages. Many successful Facebook pages usually come up with a unique or even innovative way of promotion. Therefore, good products for the online market should be innovative and hard to find."*

It is noted that *"we have many convenience stores and food is fully distributed throughout the nation."* Therefore, there is a very small gap for food to be marketed via an online channel, except the case of doing things like Omni in China. Experts recommend that SMEs shouldn't focus on EB as the platform for selling online only. However, they should look at the other way and integrate both online and offline in order to create a new way of doing market strategy and to increase the chance of EB success rate. This is one of the commonly overlooked benefits.

2) Corporate's mission and regulation create limitation, but the government can support SMEs

Doing EB requires a massive amount of resources and supporting factors to achieve the company's goals. Thus, it is essential that the government sector or other independent sector supports SMEs in terms of funding, giving advice and knowledge, creating other supportive platforms, and ensuring efficient integration of food related platforms where SMEs can manually manage by themselves. Most of the time, these platforms require the government's authority to activate. Unfortunately, interviewees state that corporates' missions and regulations usually create limitation that prevents them from getting support from the government.

3) Thailand lacks human resources with the ability to develop EB such as Data scientist and people who have expertise in both food industry and EB

Another requirement to do EB is that a company needs specific groups of human resources which are (a) Versatile people and (b) Data scientists.

(a) Versatile people

This group of people will contribute to increasing work efficiency because they can integrate many areas of knowledge and utilize them in various situations. Moreover, they will be the center of an organization who can connect and guide people in the company. It will be best if managers belong to this group or they at least have some understanding about food business and useful EB tools. It is not necessary that they can write a program or an application by themselves.

However, the biggest challenge is that it is typically hard to find these versatile people. According to experts, a person who has a good understanding of EB does not want to step into the food industry, while a food expert finds it difficult to comprehend EB. If managers do not understand this issue, then they will be less likely to sort out this problem.

In addition, one expert suggests two popular methods that can reduce a shortage of the abovementioned group of people. These methods are job rotation, which allows them to have a chance to practice both jobs, and a new department, which is established specifically to fix this problem by merging technology with different departments.

(b) Data scientists

Data scientists are needed in an organization as they can collect and analyze data to achieve the big data for planning a strategy and responding to a situation properly. Moreover, they can utilize their skills and knowledge to create a program or an application for summarizing and visualizing data that are customized and suitable for the company.

These specialists are in a shortage globally, resulting in a very high level of salary. That is the main reason why small SMEs cannot afford a permanent data scientist. Alternatively, SMEs can hire a temporary or outsourcing data scientist or find other platforms that can support the need. These solutions, however, lead to other two problems, which are 1. System reliability concern 2. Data loss concern.

4) Differences in knowledge, culture, beliefs and scale of company with a vision towards Thailand and internationally, particularly when doing business in the processed food industry

One expert talk about managing problems or learning and getting new to an organization. They provide an example of the management situation where even though the owner of the company had worked with an international corporation and had received different working cultures. They say even the management has this profile, it's still hard to run EB in a small or a medium enterprise in Thailand. With the fact that our society has Asian characteristics and Thai style, it makes them unable to apply the model they learned in every situation. Therefore, experience in operating business within the industry that the organization is affiliated with is important.

5) Taxes and policy assistance, considering the benefit of this business model

It is a topic of business relevance that is not often discussed. This is strongly linked to the scale of the organization. In term of EB implement, a company usually scale up when it's become more mature. There must be a lot of additional parts compared to traditional business operations. As the size of the organization grows, the tax rate will differ. If the government administer a policy and fund the initiative at the right moment, it can enable SMEs to improve to bigger self-contained organizations. At the same time, specialists are also skeptical about the neglect of the government to take this region further. It would provide more benefits for a smaller business such as a micro company which would also cause the bigger company to be unable to grow or downsizing.

4.2.2 EB development situation and SMEs' progression in the Thai food processing industry

In the topic of "the current state of the target's understanding of the interpretations of the EB, as well as how it relates to the target organization's current context and level of readiness", it is can extract into 12 main points. This information

supports the fourth objective discussion. Table 4.4 is presented to show sub-topics which the experts are concern and talk about under this part of interview.

Table 4.4 Issues discussed by specialists in the subject: the current state of SMEs' understanding of the EB's definitions, and how it contributes to the current context and level of readiness of the target company

	Sub-topic	Experts				
		R1	R2	R3	R4	R5
The current state of the target's understanding of the interpretations of the EB, as well as how it relates to the target organization's current context and level of readiness.	EB recognition				▓	▓
	Concerning over EB initiative			▓		▓
	Acknowledging the value of EB				▓	▓
	Comprehension about EB					▓
	The risk of investment in EB and its profit					▓
	Overview of the actual situation associated with the implementation of EB in the target field for SMEs				▓	▓
	Action and reflection of SMEs for EB acceptance and enhancement of readiness following the launch of the policy				▓	
	Barriers and limitations of SMEs while doing EB					▓
	Important support in EB adoption, deployment and development				▓	▓
	Processes and departments in an organization while EB is introduced by SMEs	▓	▓			
	Awareness in information management and understanding	▓		▓	▓	▓
	Perspectives on the effect of information security risk mitigation in relation to SMEs and stakeholders	▓	▓		▓	▓

* Remark: gray cells show that the expert had informed and discussed in the sub-topic

Table 4.4 Issues discussed by specialists in the subject: the current state of SMEs' understanding of the EB's definitions, and how it contributes to the current context and level of readiness of the target company (cont.)

	Sub-topic	Experts				
		R₆	R₇	R₈	R₉	R₁₀
The current state of the target's understanding of the interpretations of the EB, as well as how it relates to the target organization's current context and level of readiness.	EB recognition					
	Concerning over EB initiative		■			
	Acknowledging the value of EB					
	Comprehension about EB	■				■
	The risk of investment in EB and its profit					
	Overview of the actual situation associated with the implementation of EB in the target field for SMEs					■
	Action and reflection of SMEs for EB acceptance and enhancement of readiness following the launch of the policy					
	Barriers and limitations of SMEs while doing EB				■	
	Important support in EB adoption, deployment and development				■	
	Processes and departments in an organization while EB is introduced by SMEs					
	Awareness in information management and understanding	■	■			
	Perspectives on the effect of information security risk mitigation in relation to SMEs and stakeholders	■				

* Remark: gray cells show that the expert had informed and discussed in the sub-topic

Table 4.5 Summary of experts who discussed the current state of the target's context and level of readiness divided by sub-topics

	Sub-topic	Referring expert	Sum
The current state of the target's understanding of the interpretations of the EB, as well as how it relates to the target organization's current context and level of readiness	EB recognition	R$_4$, R$_5$	2
	Concerning over EB initiative	R$_3$, R$_5$, R$_7$	3
	Acknowledging the value of EB	R$_1$, R$_2$, R$_3$, R$_4$, R$_5$	5
	Comprehension about EB	R$_5$, R$_6$, R$_{10}$	3
	The risk of investment in EB and its profit	R$_1$, R$_2$, R$_3$, R$_5$, R$_6$, R$_7$	6
	Overview of the actual situation associated with the implementation of EB in the target field for SMEs	R$_1$, R$_2$, R$_3$, R$_4$, R$_5$, R$_8$, R$_{10}$	7
	Action and reflection of SMEs for EB acceptance and enhancement of readiness following the launch of the policy	R$_4$, R$_5$	2
	Barriers and limitations of SMEs while doing EB	R$_5$, R$_6$, R$_7$, R$_8$, R$_9$	5
	Important support in EB adoption, deployment and development	R$_5$, R$_6$, R$_7$, R$_8$, R$_9$	5
	Processes and departments in an organization while EB is introduced by SMEs	R$_1$, R$_2$, R$_6$	3
	Awareness in information management and understanding	R$_1$, R$_3$, R$_4$, R$_5$, R$_6$, R$_7$	6
	Perspectives on the effect of information security risk mitigation in relation to SMEs and stakeholders	R$_1$, R$_2$, R$_4$, R$_5$, R$_6$	5

From the summary of content that has been done by the content analysis, the information can be compiled and summarized as follows:

Business these days already know some scopes of EB. However, experts suggest that most people are interested in adopting EB for their business, but they are not certain about how to utilize it efficiently. Moreover, they consider EB merely as digital marketing rather than digital business.

According to one expert's opinion, *"online food store is not just for merchandising but also for advertising"* because nobody believed that EC has developed to become one of the main channels since Thailand has never had an outstanding platform for selling and marketing food products. Besides, there are other

barriers for doing EB in the food processing industry such as the lack of mass marketing channel at a national level and no proper logistic system that can immediately support operational aspects, i.e. distribution and delivery. All these barriers become constraints for SMEs to have confidence in investing and building a corporate website. Therefore, the most popular selling platforms that usually come to SMEs' mind are Facebook, Line and Instagram.

Facebook is the most common and most used channel because of its high number of success cases. Moreover, the government and the private sector support this channel by giving advice on Facebook content marketing. Therefore, both seller and buyer become more familiar with this channel. As one of the expert states that "*SMEs usually prefer Facebook platform because building a whole new website will require them to invest a lot of time, money and effort into it and they usually find it too expensive and time-consuming to make profits. Therefore, they decide to reject the website platform.*"

However, according to the expert's opinion, using Facebook as the only bypass channel without having a website to collect back end data is no longer enough. It is necessary to increase other channels in order to gain more customers and to accumulate enough marketing-related data for analytic processes (also known as big data). This constraint is one of the reasons why Thai SMEs cannot develop their way of doing business and expand into international E-marketplace.

Apart from investment funding and language constraints, there is some additional information from expert interviewees: "*doing bypass reduces SMEs' confidence about whether they should start working on E-marketplace or not. Therefore, SMEs hardly uses Thai E-marketplace and they are thus unlikely to do international E-marketplace.*"

"*If we don't have our own Website, in the next ten years, we will be short of better statistical data than data given by Facebook or Inwshop. But if we do invest in the website, we will have a chance to enhance our business strategy in the future.*"

"Our country, Thailand, supports Facebook training fees. That's why majority of the budget is put into Facebook platform rather than Big Data. We all know that in the near future, we will have to rely on Big data. If we don't prepare, we are likely to face another big problem later."

"The cost of doing full scale EB including Big data is very high, so SMEs cannot afford to do it. There are many examples of businesses that try to adapt to EB environment such as recruiting E-employees. This is likely to be impossible especially for a long-established company. However, it is more possible in the case of a new startup business who finds it easier to add E-system into their small business regime. Since EB is a new way of doing business, it is hard for employees from older generations to adapt to this change. Simply put, it is hard to create an EC economy. Personally, I believe that doing business like O2O or Omni just like in China is more possible."

"The lack of data is an important constraint for developing EB. SY readiness needs to be planned and developed according to the strategy and growth of a company. One expert strongly suggests that "it is hard to decide and create EB environment when we don't have enough data to use in implementation planning. It is not just about installing and being ready to use."

It can be seen from interview data that the size of a company and the type of an industry greatly affect EB implementation. The interviewee states that *"expanding and developing EB is more common in a large sized company but less common in the food industry sector"*. Another expert also states the same thing that *"the food industry is probably the last sector to implement EB."*

Another reason why the size of a company critically affects EB implementation is the way of doing business. This is especially true in SMEs where owners take responsibility in almost every part of the business. They face problems every day and that leads them to think that their companies are never ready for changes, not to mention cash flows and cost of implementing EB. They assume that they are not

ready to invest a lot of money into this big project for the big change. Therefore, they don't really have a clear, long-term plan as they tend to focus on everyday problems. Moreover, there are many comments that match comments from Table 2.1. However, from interviewing with SMEs from Generation Y that are less than five years old as well as those from Gen X that are more than ten years old, their different ways of doing business can be concluded in Table 4.4 as follows.

Table 4.6 Differences in ways of doing business between 2 types of SMEs

Companies led by Generation Y and aged less than five years old	Companies led by Generation X and aged more than ten years old
The purchasing process involves using the Internet and business connection to acquire a cheaper price.	Still using a conventional way of product sourcing: no or minimum Internet involved.
Doing most of the work electronically because of convenience and security reasons.	Only using general programs such as Microsoft Office and private communication via Line account.
Trying to create a paperless organization.	Still focusing on physical document, although Line communication is implemented.
Trying to implement other systems but most employees are not ready for new technology.	Managers are not keen on technology. They may use IT department to support basic programs and to be present in the online world, although they find it hard to achieve.

Apart from affecting the working process, different generations have a huge effect on technological adaptation and implementation. Generation Y uses technology since they were young, while Generation X hardly know what is going on in the technological world. It is much harder for Gen X to adapt to new changes and be part of the integration. As a result, SMEs from Gen X need to recruit and pay more for extra employees who can deal with technological development, which may be seen as not worthwhile for them. Another solution is training their current staff, but it is time consuming and costly. Moreover, not every staff, particularly Gen X, is willing to participate in learning these changes. Combining all these reasons together, they find that EB is the last thing they need in their businesses.

Data security is already well known and concerned for a long time, especially when doing a business. Collecting and securing electronic data is not easy

and it requires sophisticated and specific knowledge, which is unfamiliar by many people. As a result, only a few SMEs are interested in investing and implementing data security in their businesses. An expert gives an analogy that "*data security is generally important, but people usually think it is not as important as four basic necessities for living. So, they will not invest in it until they have fulfilled all the necessities. They will also focus on selling without realizing that it is risky for a business if they do not take care of their data security. However, they will appreciate it when they utilize other aspects of it.*"

According to experts, other reasons why data security gains low popularity among Thai SMEs are their SME environment, which is full of chaos from managing everything by oneself, as well as Thai people's characteristic, which does not teach them to understand the importance of data security as much as other nations. More importantly, since the size of SMEs is not large, data security becomes rather intangible and SMEs do not generally know how to deal with it until they start looking into the whole supple chain system at a deeper level. Therefore, one of the obstacles that can prevent EB from growing sustainably is the lack of data security and concern on system reliability among Thai SMEs.

However, although this problem can bring about a massive damage to a company, there is a low chance that it will occur among Thai SMEs. Thus, it usually goes to the very end of the to-do-list. On the other hand, many experts strongly suggest that SMEs should rather focus on data loss prevention. The most mentioned topics are 1) preventing employees from using data for personal benefits or for harming the company, and 2) making employees realize the importance of the company's data and help secure it as well as the company's image and systems. There are many real-life examples regarding these mentioned topics. Some of the consequences cause such a huge loss to SMEs that they are concerned about data loss and thus afraid of using or developing EB.

4.3 The expected readiness level for Thai-food-SMEs to achieve the economic model policy "Thailand 4.0" and the 20-year national strategy

The government representative gives an interview about expectations toward the Thai-food-SMEs' characteristics as described in the following:

1. There are EB initiatives and activities supporting the achievement of business goals. There are attempts to integrate and coordinate EB initiatives with business strategy.

2. Implemented IT solutions should support business activities, and then convert an organization into a paperless office.

3. They should have at least one EB expert. This expert can be the owner, while other staffs are from an outsourcing company. A full team of experts is not necessary as it is hard for a small organization like an SME to afford talented and skillful people.

4. Since BP in doing EB requires a rather huge amount of integrated budget, SMEs' BP mostly focuses on only an online channel. According to both product shelf-life and their supply chain that SMEs must deal with, it is suggested that SMEs should do a traditional trade and EB in parallel. Generally, when a company start doing EB, EB initiatives are seen as an extension that has no impact on an existing business process. It is about boosting to overtake the main BP if an implementation is successful. It is also necessary to speed up EB part, which helps to push a company through the S-curve that is essential for the achievement of the government plan.

5. SMEs are not large enough to own a computer center. Most IN problems are an information leakage, caused mainly by humans. Thus, awareness of the possible issue is vital for doing EB. From the government's opinion, there is no need to create a security policy or to emphasize the development of in-house IT structure. It is enough that the SMEs only promote and grow IN awareness in their organizational culture. Moreover, the SMEs must have sufficient IN awareness to encourage their company to drive EB.

6. There is no data to analyze and specify the expected number of Thai-food-SMEs who are ready for the government strategy.

From the above information, the expected level of readiness for Thailand to achieve the purpose can be concluded in Table 4.7.

Table 4.7 Expected readiness level to achieve the economic model policy "Thailand 4.0"

EB readiness characteristics	ST	SY	SS	BP	IN
Expected readiness level (1 - 6)	4	5	4	5	3
Expected number of mature SMEs (%)	-	-	-	-	-

4.4 A study on an online presence of Thai-food-SMEs and their EB maturity

4.4.1 An online presence and EB adoption of the target

The survey shows that 90% of Thai SMEs in the food processing industry have an online presence, which means they have entered EB. In general, they usually use at least 2 online channels in each company. The top three popular online channels are Facebook (81.6%), Line (57.4%) and Instragram (29.5%), while only 18% of them create their own website.

E-business adoption

10%

90%

■ Not yet ■ Already
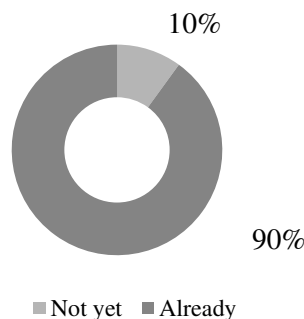
Figure 4.1 EB adoption among Thai-SMEs in the food processing industry

Number of online channels (Channels)
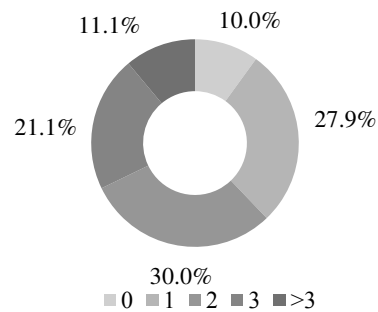
Figure 4.2 Online channels number each company uses.
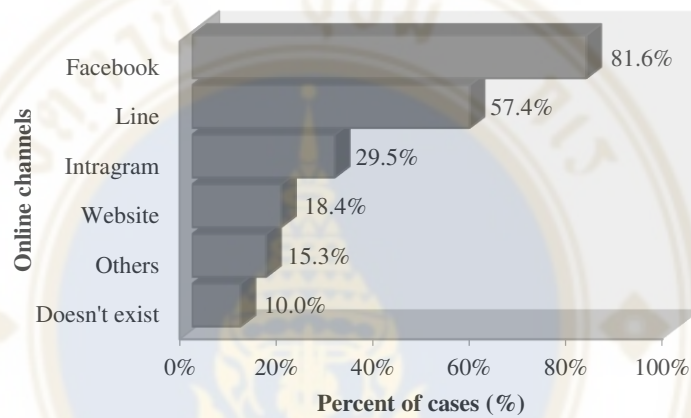
Figure 4.3 Popularity of online channel selection

        Since this research focuses on Thai-SMEs who have already started doing EB, the following information is summarized and displayed by using only 171 SMEs with some degree of EB readiness.

4.4.2 EB maturity

        After converting the survey results from a five-level interval scale format into a six-level scoring format to match with the maturity model, the data is transformed into a nominal scale through Compute Variable function in SPSS. The frequency of each EB character is calculated and presented in terms of percentage in Table 4.8. Gray cells are the most frequent answers of each characteristic, which means

current SME readiness. In summary, the majority of Thai-food-SMEs have the current

EB readiness levels in different characteristics as follows:

1. ST characteristic: There are 31.6% each of the SMEs who

have ST readiness at second and third level.

2. SY characteristic: There are 29.8% of the SMEs who have

SY readiness at readiness second level.

3. SS characteristic: There are 31.6% of the SMEs who have

SS readiness at third level.

4. BP characteristic: There are 36.3% of the SMEs who have

BP readiness at third level.

5. IN characteristics: There are 33.3% of the SMEs who have

BP readiness at third level.

Table 4.8 EB readiness of Thai SMEs in the food processing industry

Readiness Level Characteristic	Percent (%)					
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
ST	18.1	31.6	31.6	16.4	2.3	0.0
SY	22.2	29.8	28.7	16.4	2.9	0.0
SS	31.0	25.1	31.6	10.5	1.8	0.0
BP	22.2	28.7	36.3	11.7	1.2	0.0
IN	28.7	25.7	33.3	8.8	3.5	0.0

*Remark: Gray cells are Mode of each Characteristic

4.5 Test for independence between SMEs' EB internal success factors

and EB characters

Before determining whether EB readiness characteristics interacted with

responses for SMEs' EB internal success factors through Chi-square analysis, some

data has been transformed. The changes are described as follows:

1. Number of staffs and fixed assets are recoded in terms of firm size (FM).

2. The MK, EM, AK, PB, SI and BI are interpreted by the intervals from the range technique. The processed data turn into MK-r, EM-r, AK-r, PB-r, SI-r and BI-r, respectively. The transformed factors are grouped as the "6-r".

As shown in Table 4.4, the test for independence by the Chi-square method is presented. Factors that are significant with at least one of the five readiness characters are age, education, firm size, product types, channel, MK-r, EM-r, AK-r, PB-r, SI-r and BI-r. There are significant relationships between the 6-r and EB readiness characters. Gender is the only one factor that has no significance at all. These data also provide hypotheses results, as shown in Table 4.9.
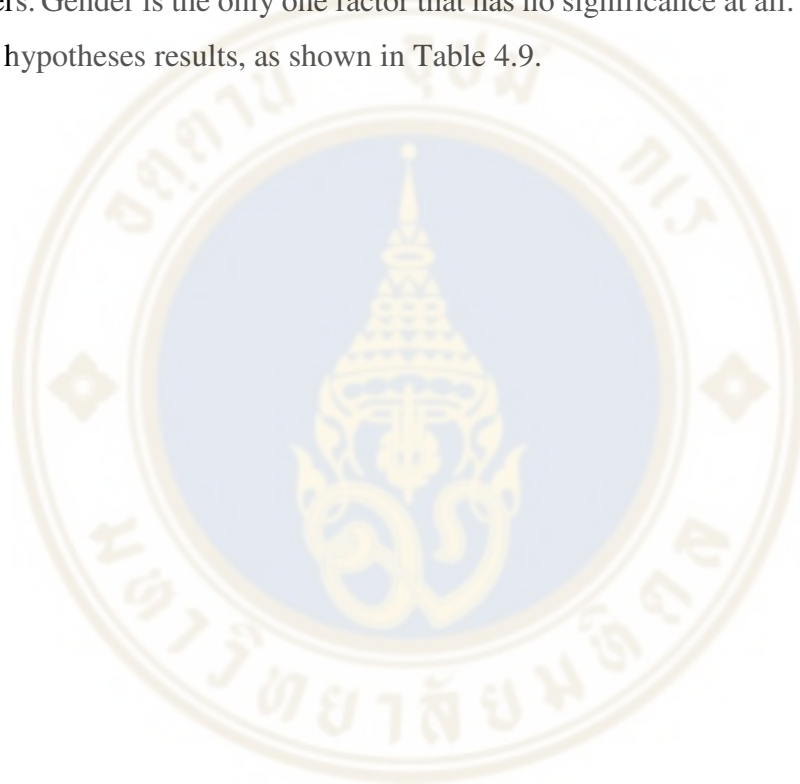
Table 4.9 Test for independence between SMEs' EB internal success factors and EB characters at 95% confidence interval

Test for independence result			Monte Carlo Sig. (2-sided) at 95% confidence interval				
SMEs' EB internal success factors (X)			EB readiness characters (Y)				
			ST	SY	SS	BP	IN
ID	Gender						
ID	Age		.002[b]		.003[b]		.040[b]
ID	Education					.031[b]	
FM	Firm size			.005[b]			
SB	Product types	Bakery wares			.014[b]		.035[b]
		Beverages, excluding dairy products					
		Cereals and cereal products, excluding bakery wares					
		Confectionery					
		Dairy products and analogues					
		Edible ices					
		Eggs and egg products					
		Fats and oils, and fat emulsions				.033[b]	
		Fish and fish products					
		Food stuffs intended for particular nutritional uses				.024[b]	.016[b]

Table 4.9 Test for independence between SMEs' EB internal success factors and EB characters at 95% confidence interval (cont.)

Test for independence result			Monte Carlo Sig. (2-sided) at 95% confidence interval				
SMEs' EB internal success factors (X)			EB readiness characters (Y)				
			ST	SY	ST	BP	ST
		Fruits and vegetables, including nuts and seeds					
		Meat and meat products	.007[b]				
		Prepared foods		.031[b]			
		Ready-to-eat savories					
		Salts, spices, soups, sauces, salads and protein products					
		Substances added to food, and others					
		Sweeteners, including honey					
SB	Channel	Catering	.025[b]			.007[b]	.022[b]
		Distributer					
		Eat-in-premises or mobile food stall					
		Export	.001[b]	.027[b]	.016[b]	.020[b]	.000[b]
		Home delivery	.015[b]		.023[b]		
		Import					.028[b]
		Internet	.000[b]	.031[b]		.006[b]	.007[b]
		Market		.026[b]			
		Retail					
		Takeaway					.022[b]
		Wholesale					.004[b]
		Others					
MK-r			.000[b]	.000[b]	.000[b]	.000[b]	.000[b]
EM-r			.000[b]	.000[b]	.000[b]	.000[b]	.000[b]
AK-r			.000[b]	.000[b]	.000[b]	.000[b]	.000[b]
PB-r			.000[b]	.000[b]	.000[b]	.000[b]	.000[b]

Table 4.9 Test for independence between SMEs' EB internal success factors and EB characters at 95% confidence interval (cont.)

Test for independence result			Monte Carlo Sig. (2-sided) at 95% confidence interval				
SMEs' EB internal success factors (X)			**EB readiness characters (Y)**				
			ST	**SY**	**ST**	**BP**	**ST**
SI-r			.000[b]	.000[b]	.000[b]	.000[b]	.000[b]
BI-r			.000[b]	.000[b]	.000[b]	.000[b]	.000[b]

*Remark:

- ☐ There is no significance between 2 factors.
- b. Based on 1,000,000 sampled tables, while starting seeds are upon each condition.

Table 4.10 Hypotheses results

SMEs' EB internal success factors (X)		EB readiness characters (Y)									
		ST		**SY**		**SS**		**BP**		**IN**	
		code	result	code	result	code	result	code	result	code	result
ID	(Gender)	H_1	✗	H_2	✗	H_3	✗	H_4	✗	H_5	✗
ID	(Age)	H_6	✓	H_7	✗	H_8	✓	H_9	✗	H_{10}	✓
ID	(Education)	H_{11}	✗	$H1_2$	✗	H_{13}	✗	H_{14}	✓	H_{15}	✗
FM		H_{16}	✗	H_{17}	✓	H_{18}	✗	H_{19}	✗	H_{20}	✗
SB	(Product types)	H_{21}	✓	H_{22}	✓	H_{23}	✓	H_{24}	✓	H_{25}	✓
SB	(Channel)	H_{26}	✓	H_{27}	✓	H_{28}	✓	H_{29}	✓	H_{30}	✓
AK		H_{31}	✓	H_{32}	✓	H_{33}	✓	H_{34}	✓	H_{35}	✓
PB		H_{36}	✓	H_{37}	✓	H_{38}	✓	H_{39}	✓	H_{40}	✓
SI		H_{41}	✓	H_{42}	✓	H_{43}	✓	H_{44}	✓	H_{45}	✓
BI		H_{46}	✓	H_{47}	✓	H_{48}	✓	H_{49}	✓	H_{50}	✓

* Remark:

- ✓ Accept the hypothesis, or there is a relationship between these 2 factors.
- ✗ Reject the hypothesis, or there is no relationship between these 2 factor..

4.6 Summary of Thai-food-SMEs' general organization information (Individual difference factors, Firm size and Scope of business operations)

4.6.1 Individual difference factors (ID)

Most respondents are female (65.3%). Their age is mainly in the range of 25 – 34 years old (34.7%), and majority graduated with a bachelor's degree (48.9%).

Gender

34.7%

65.3%

■Male ■Female
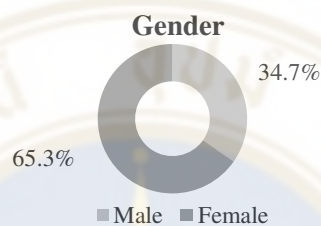
Figure 4.4 Percentage of respondents by gender

Age (years)

0.5%   8.9%

18.4%   11.1%

26.3%   34.7%

■< 18 ■>= 55 ■18 – 24 ■25 – 34 ■35 – 44 ■45 – 54
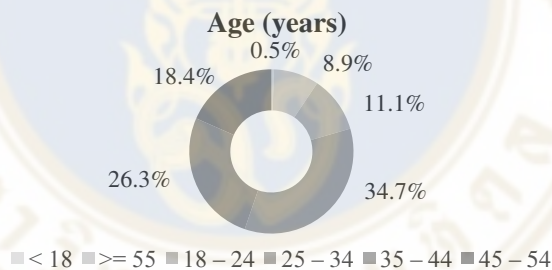
Figure 4.5 Percentage of respondents by age

Education

0.5%   8.4%

18.4%   12.1%

2.6%
3.2%
5.8%

48.9%

■Primary School / Elementary School   ■Secondary School / High School
■Vocational Certificate   ■High Vocational Certificate
■Diploma / Associate's Degree   ■Bachelor Degree
■Master Degree   ■Doctor Degree
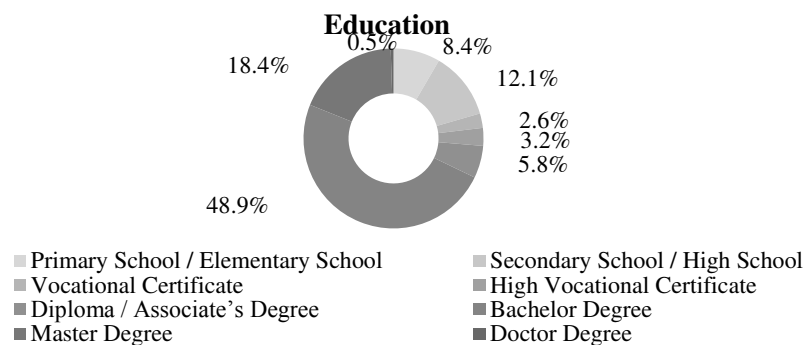
Figure 4.6 Percentage of respondents by education

4.6.2 Firm size (FM)

96.3% of respondents are small enterprises with a number of employees to be less than or equal to 50 or with an asset excluding land to be less than or equal to 50 million baht, while only 3.7% are medium enterprises.

Table 4.11 Percentage of respondents' firm size

Firm size		Total employees (people)	Fixed assets (million baht)		Total (%)
			≤50	51-200	
Small (S)	Percent (%)	≤50	92.1%	1.6%	96.3%
		51-200	2.6%	0.0%	
Medium (M)	Percent (%)	51-200	0.0%	3.7%	3.7%

4.6.3 Scope of business operations (SB)

More than half of respondents have only one product type (56.7%). The most popular product category is bakery wares (26.8%). The SMEs tend to use only one SSCH (28.1%), even there are a variety of them, and the most popular SSCH is retail (48.5%).
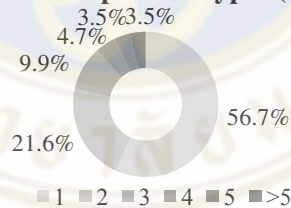
Figure 4.7 Percentage of product types per company
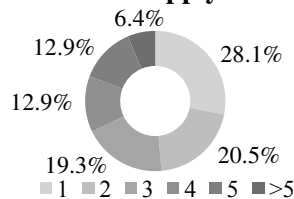
Figure 4.8 Percentage of SSCH per company
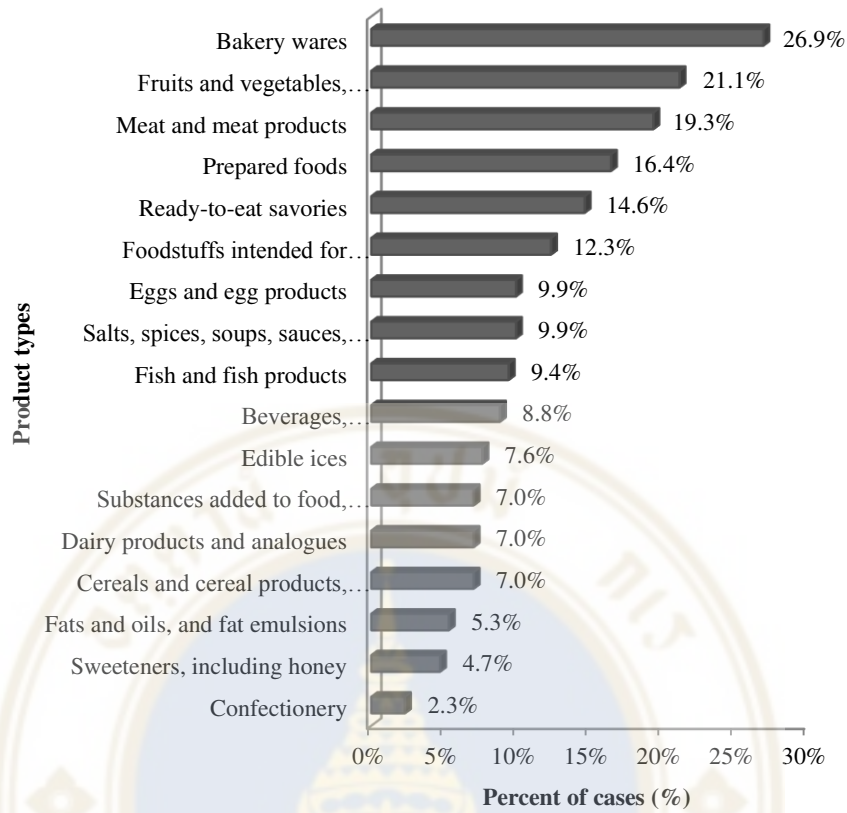
Figure 4.9 Percentage of product category popularity
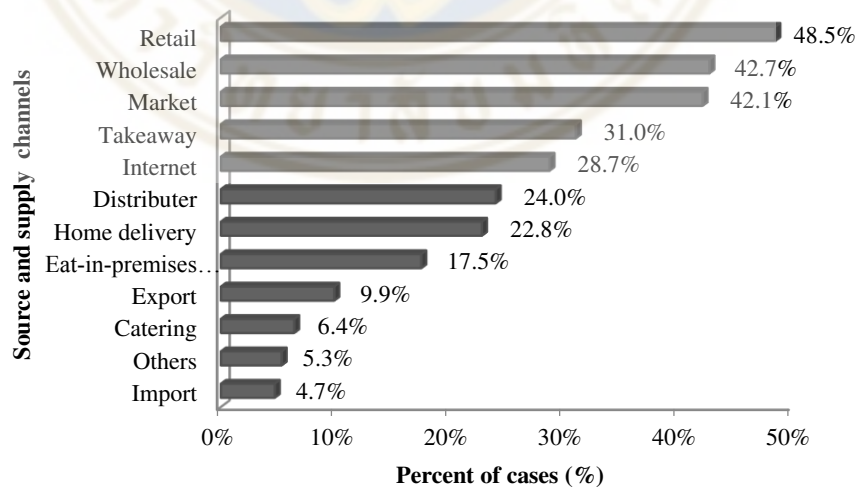
Figure 4.10 Percentage of SSCH popularity

4.7 Summary of Thai-food-SMEs' other EB internal success factors (SMEs' EC internal adoption & success factors)

Approximately 40% of target SMEs who have started doing EB give opinions about adoption and success factors that there are certain factors for their companies. The factor gaining their highest confidence is MK-r (53.8%), while BI-r is the lowest one (38.6%). Nevertheless, all of them are in a neutral level when compared to the completed EB developing company.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
MK-r	14.0%	19.3%	53.8%	11.1%	1.8%
EM-r	18.7%	29.2%	40.4%	8.8%	2.9%
AK-r	15.8%	31.0%	40.9%	9.4%	2.9%
PB-r	4.1%	9.4%	40.9%	34.5%	11.1%
SI-r	5.8%	10.5%	41.5%	26.3%	15.8%
BI-r	5.3%	12.9%	38.6%	21.1%	22.2%
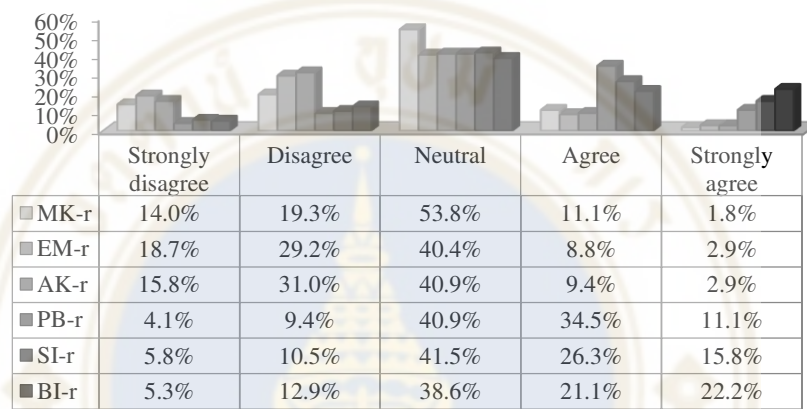
Figure 4.11 Percentage of the SMEs' EB internal adoption factors in terms of confidence level

Figure 4.12 – 4.15 represent the details of this group of factors. 53% of respondents express that they are aware of EB but are not confident in their knowledge whether they have taken a full action in EB adoption. Also, most of them choose a neutral choice than clear alternatives like agree or disagree. 48% of the SMEs believe in their management unit's ability to deploy EB, but they need some more research in detail before acting, especially in IN where 88.3% of them are concerned. When this perspective is compared with IN readiness level, the result shows their concern about IT part for IN, while IN awareness is moderately ready as expected. In addition, entrepreneurs are not confident in their staff's skill in using EB tools competently. Unsurprisingly, 47.4% of executives are also not confident in handling any problem when doing this kind of business.

However, the SMEs' perspective in doing EB is quite positive. They think that doing EB is beneficial to the organization and believe that EB can encourage partners and stakeholders to be more satisfied and able to accept their organization. Besides these advantages, 44.5% of them believe that it is necessary to run EB in their industry for the current situation where competition is high. These beliefs affect their intention in running EB and make 48.5% of them aim to do it in the long run. However, the government can increase this rate by supporting their adoption process because 38.0% of them say that the support affects their decision to do EB in the long term.
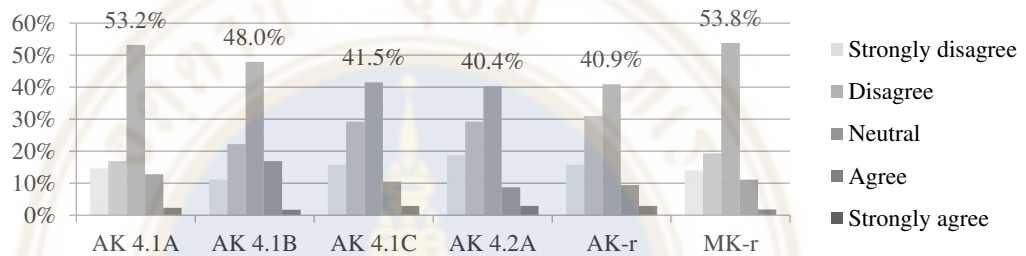
Figure 4.12 Survey results in the topic of Awareness & knowledge (AK)
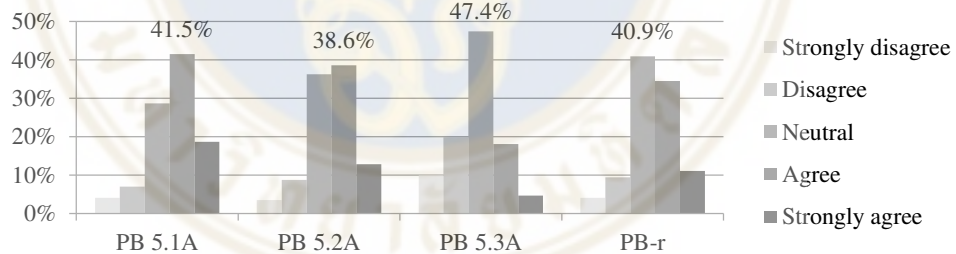
Figure 4.13 Survey results in the topic of Perceived behavioral control (PB)
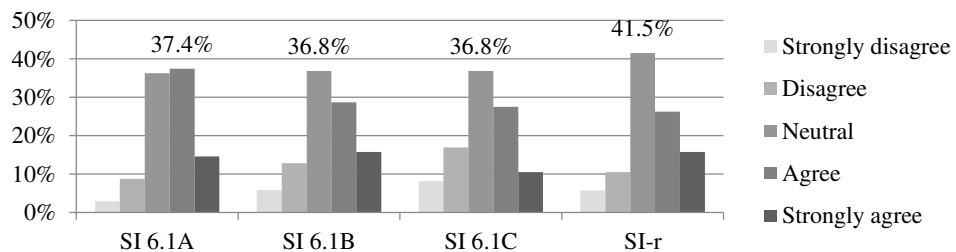
Figure 4.14 Survey results in the topic of Social influencer or subjunctive norm (SI)
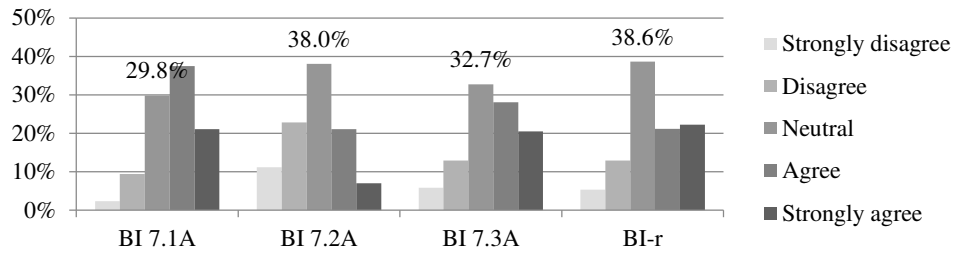
Figure 4.15 Survey results in the topic of Behavioral intention to use (BI)

Graphs of MK-r, EM-r, AK-r, PB-r, SI-r and BI-r data are presented in Figure 4.16-4.20, where "0" represents a neutral value while the distance from zero represents a degree of each factor in their companies. According to five graphs in figure 4.16-4.20 below, a level of the six factors is correlated with a maturity stage. SMEs' managers, who are in a company with first and second readiness level, are normally concerned about their lack of AK, especially EM. The PB-r and SI-r are still at a neutral level, even though they are quite confident in their managers. Moreover, the BI-r is in a disagree - neutral range, which indicates that they are not ready and that they are hesitant to fully focus on EB development and implementation.

When looking at a group with third level for each factor, except BP, they feel that their organization has a moderate level of these factors and they are not sure about developing and focusing on EB. While SMEs who have BP character in third level are quite confident in doing this EB.

Despite having EB maturity level at fourth and fifth level, these SMEs are not confident about their AK. However, they are certain to focus on an implementation progress for doing EB in the long run. SI which has occurred by an external factor rather affects these groups.
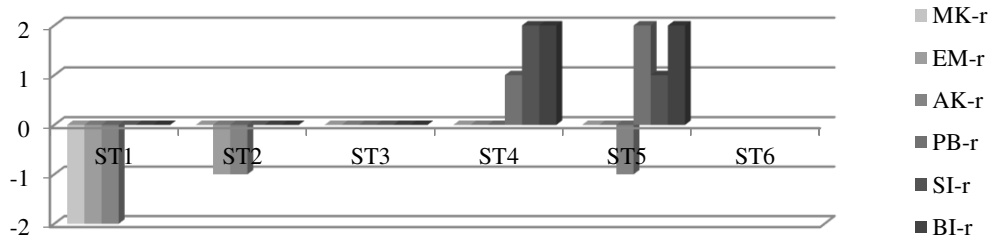
Figure 4.16 MK-r, EM-r, AK-r, PB-r, SI-r and BI-r data divided into each stage of ST
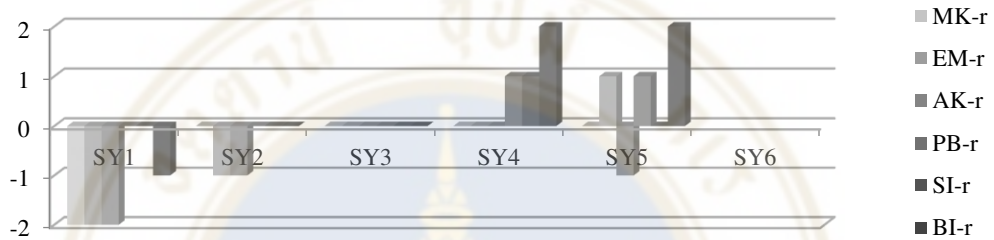
Figure 4.17 MK-r, EM-r, AK-r, PB-r, SI-r and BI-r data divided into each stage of SY
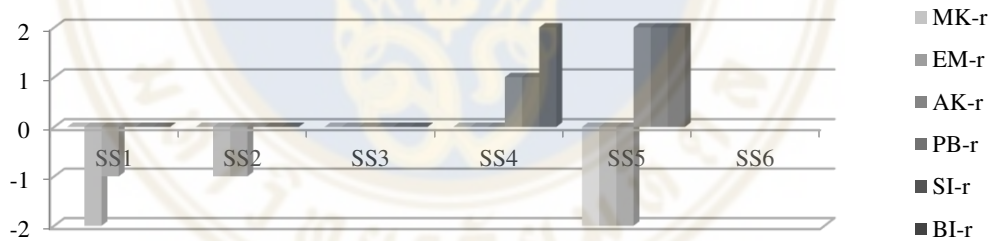
Figure 4.18 MK-r, EM-r, AK-r, PB-r, SI-r and BI-r data divided into each stage of SS
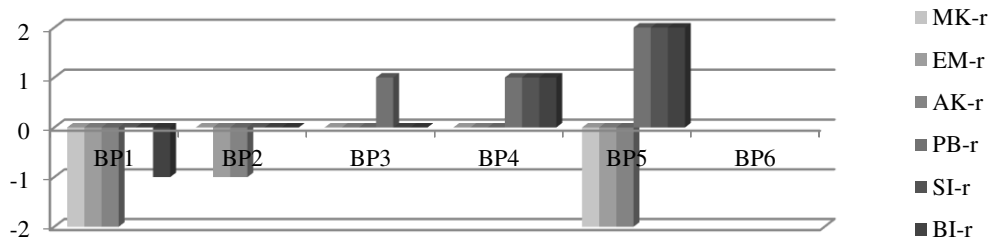
Figure 4.19 MK-r, EM-r, AK-r, PB-r, SI-r and BI-r data divided into each stage of BP
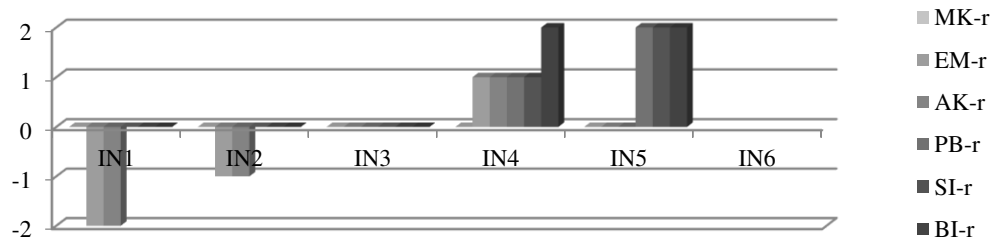
Figure 4.20 MK-r, EM-r, AK-r, PB-r, SI-r and BI-r data

divided into each stage of IN

4.8 Comparisons between expected and current Thai-food-SMEs' readiness level

Since the Mann-Whitney U test assessment result is 0.000, which is less than the critical level at 0.050, the study must deny the assumption H_0 and accept the assumption H_1. The results show that all 171 SMEs that have started doing EB have a significantly lower readiness level than expectation in every aspect at 95% confidence level.

Table 4.12 Comparison of the availability level of the sample with the expected level of readiness

Characteristics		Mode	N	Mean Rank	Mann-Whitney U Value	Mann-Whitney U Prob
ST	Expected	4	171	239.0	3078.0	.000
	Sampling	2, 3	171	104.0		
SY	Expected	5	171	254.5	427.5	.000
	Sampling	2	171	88.5		
SS	Expected	4	171	245.0	2052.0	.000
	Sampling	3	171	98.0		
BP	Expected	5	171	256.0	171.0	.000
	Sampling	3	171	87.0		
IN	Expected	3	171	207.5	8464.5	.000
	Sampling	3	171	135.5		

CHAPTER V
DISCUSSION

In this chapter, the result discussions in detail as the objectives and research questions is presented as follow:

5.1 The developed EB maturity model

5.2 The relationship between SMEs' EB internal success factors and EB readiness

5.3 Current EB readiness situation and characteristics of SMEs in the processed food industry based on comparisons of the SMEs' most popular answers of EB internal success factors and EB characters

5.1 The developed EB maturity model

The findings data correspondingly imply that IN is a fundamental issue. However, most businesses are not large enough, as well as lacking IT expertise. It is made a growth pattern is not clearly visible, also an IN initiative is difficult to begin.

According to previous studies, the ISP $10 \times 10M$ shows the linear path of six stages development, which are compatible to the SOG-e model. The strength of this model is that it is clear in both the character description and security measures, so entrepreneurs that got some basic IT skills can understand and use it. Therefore, one of research objective can be achieved by combining the two studies as showed in Table 4.1 of Chapter 4.

The resulting model provides both a guideline for observing the level of EB development in the enterprise and serves as a model for strategic planning. It is flexible in usage as well. SOG-e model developers McKay, Marshall, & Prananto (2000) explicitly state that organizations can select their own pace of investment, or

even develop across the phase. In addition, the fact that the design is simplified into an easy-to-read table makes it user-friendly. Since they also fear technical knowledge, they see it as impossible to grasp and reach. In the term of strategic planning, a business should have the upgraded SOG-e model (Table 4.1), the IN-performance measure ISP10x10M (Figure 2.8), top five drivers and inhibitors of EB for each maturity stage (Table 2.5), and the related internal success factors. They must also keep track on up-to-date data and ensure that short-term and medium-term strategic plans are always adapted. If an organization works in this direction, it has improved its efficiency and its competitive potential in a sustainable manner.

5.2 Independence of EB internal success factors and EB characters (Test for independence)

From the opinions of ten experts on the factors affecting EB business operations, it is found that out of ten topics experts saw that there are nine variables. The term, which is not stated at all, is the gender of the person who has the power to organize, plan and execute the organization as the executive or owner of the organization. The most mentioned subjects are management age and SI, proposed by six out of ten experts.

The survey result shows almost all factors influence with at least one of the five characters of EB readiness. The 6-r group affecting all characters. There are three factors that only affect some of them which are FM and two sub-factors under ID which are management's age and education. On the other hand, the gender has no relation with EB readiness leve. Most results can explain by evidences and theories refer to Awa, Ukoha, & Emecheta (2012) and Likoebe M. Maruping (2017) who reviewed and suggested that the chosen variables influence EB readiness.

First, FM only affects SY. The effect on the SY factor corresponds to the experts mention and theoretical. Two experts say that business size affects system implementation and development decisions. Awa, Ukoha, & Emecheta (2012) also

mention about one of significant obstacles to transcending of SMEs is lacking technological expertise.

Second, Age effects on SY, SS and IN. As the experts' viewpoint, generation has had an impact on adaptation, learning and technology selection, including implementation. Moreover, SMEs with the more experiences, the more awareness of IN they gain. Prior studies have shown that the age of the decision-maker(s) has an effect on the tendency to search and try out novelties. Early adoptions are commonly young in most technology-led markets.

Third, Education related to BP character of the business. There are four experts have pointed out this factor. In specific, a versatile employee and a data scientist who are importance to run this form of enterprise. According to several articles, education is related to personal innovativeness, belief/value systems, risk-taking, cognitive preferences, and the receptivity of innovation. Weak education encourages investor sentiment, challenges to reform, and replication of innovators who could be more educated, more cosmopolitan in their social relations, more open to the media, and more engaged outside their societies.

The only factor that has no relation to any EB characters is gender. In Awa, Ukoha, & Emecheta (2012) study, it mentioned that young men often have a habit of finding and trying new things which increase their chances of new technology adoption. However, no expert has mentioned gender in the interview about the barriers and support factors to the development of EB. It can be deduced to support that, for the Thai-food-SMEs, gender does not correlate with the development of EB readiness.

To make the survey simpler, EB internal success factors must be rescreened. By filtering only variables involving at least three characters, the remaining are ID, SB, AK, PB, SI and BI. The new assessment has 42 questions left over from the reduction of FM and some options in the ID, SB, ON variables as shown in Table 5.1-5.2.

Table 5.1 Reformed variable 1 - 3 and segmentation criteria

	Variable	Code	Sub-variable	Types of assessment items	Measurement scales	Segmentation criteria		Reference
						Symbol	Meaning	
1.	Individual difference factors	ID						Awa, Ukoha, and Emecheta (2012)
		ID 1.2A	Age	Multiple choice	Ordinal	1	< 18 years old	
						2	18 - 24 years old	
						3	25 - 34 years old	
						4	35 - 44 years old	
						5	> 45 years old	
3.	Scope of business operations	SB						Awa, Ukoha, and Emecheta (2012)
		SB 3.3A	SSCH	Checklist	Nominal	1	Catering	Thames-Coromandel District Council (n.d.)
						2	Export	
						3	Internet	
						4	Others: _____	

Table 5.2 Reformed variable 8 and segmentation criteria

	Variable	Code	Types of assessment items	Measurement scales	Segmentation criteria		Reference
					Symbol	Meaning	
8.	Online channel	ON					Awa, Ukoha, and Emecheta (2012)
		ON 8.1A	Checklist	Nominal	1	Facebook	
					2	Line	
					3	Website	
					4	Doesn't exist	
					5	Others_____	

5.3 Current EB readiness situation and characteristics of the Thai-food-SMEs based on comparisons of the SMEs' most popular answers of EB internal success factors and EB characters

The percentage of target Thai-SMEs who have been started doing EB is 90. Most of these organizations' managers are women with a bachelor's degree. Their age ranges from 25 to 34 years. Most are a small business which popular with bakery items. Generally, they have just one SSCH and it is mainly a retail store. It is, therefore, clear that ONCH is often available, but not used or is merely a digital marketing tool. While they generally have two ONCHs, with 81.6% of the data, FB is the most popular channel.

Score interpretation shows that most SMEs believe that their company has some degree of these variables, but not certain it is enough. They are seriously concerned about an IN, but they are not confidence in their understanding of it. Although it is not enough to meet expectations, most companies are aware of this area as the government needs it and finds it significant.

Most inadequate factor in terms of internal success factors for doing EB is AK, particularly EM. Management believes that in this type of business activity, PB is essential for the company and enhances recognition of stakeholders. The PB is highly found in the business which BP is at third level. All these findings allow the first research question and purpose to be answered.

In various points, the results are consistent with the experts. It helps clarify understanding and makes us aware that business today knows and wants to implement some EB standard, but only lacks in-depth knowledge to take full advantage of the opportunity. Rather, of using them as digital business, they are only using part of digital marketing. Facebook is the most widely accepted digital platform, as there are many successful examples and funding from both the public and private sectors has been receive. It is more familiar to both buyers and sellers than other networks with this network.

Comparing the expected level with the findings in all areas, the readiness levels of entrepreneurs in this industry are lower than expected, with 95% confidence. Mode of the readiness results indicate the target SMEs' character as Table 5.3.

Table 5.3 The description of target SMEs' characters

EB characters	Description
ST	Most SMEs, 63.2%, still only use the ad-hoc strategy and need to develop IT systems but have not yet set a goal to use it as the main business model. Half of these companies have already merged with EB operations in their original formats. Only 16.4% are ready at maturity level defined by the government standard. The standard character is that they initiative to do EB and have activities endorse business goals. Besides, they efforts to align and coordinate EB initiatives with business strategy are being made.
SY	The target's readiness is at second level. This show us that most of them are starting to have IT strategies to support EB operation. Increasingly, they use IS in many dimensions, but offer little input from business strategy for making IS investments. Less than 3% of the target matching the expectation as a seamless internal information exchange organization.
SS	Thirty-one-point-six percent of the SMEs had a dedicated staff who had technical expertise with some business knowledge. On the other hand, focusing on level four expected by the government, there are only 10.5% of them had made the dedicated staff work together with a business-oriented staff.
BP	The percentage of Thai-food-SMEs who have improved their business operation in order to comply with EB is 36.3%. Only 1.2% of the targets that EB affects their internal management and urgently need BP change as the government expected.
IN	When compared to other characters, only the SMEs' IN readiness of reached level three as expected by the government. There is general awareness of an IN within the organization. Nevertheless, threats and vulnerabilities are still mentioned as they continue arise while there is not adequate planning. 33.3% of them, with very little investment, are taking control of awareness and developing this level of readiness. As expert's opinion, company's security is basic concern of an entrepreneur and the government do not require any high technology. It is therefore unsurprising that the IN readiness is close to meet the requirement.

According to Awa, Ukoha, & Emecheta (2012), the target community has a poor passing rate, since the uptake of the Internet and its infrastructure in business is

slower in small companies than in larger ones. Adoption is slower among smaller firms, possibly because of 1. resistance to reform, 2. lack of knowledge about the potential of the EC, 3. lack of trust in the protection of its transactions, 4. lack of technical competence and confusion about its advantages, 5. lack of economy of scale advantage and ease of decline, as well as 6. the capabilities to bear the associated risks and to promote trading partners. Moreover, the lack of awareness-raising models to inspire SMEs to embrace them indicates that the superlative passion of online business is still under-utilized, possibly because of the hurdles to transcending big technological, administrative and cultural problems.

The poor passing rate is compatible with expert interview interpretations, also. The reason of the result can be categorized into five issues as follows:

1. Acknowledge & belief: more than half of the targets, 58.5%, have known benefits of EB, while 53.2% of the SMEs lack confidence in their knowledge of running EB. Likewise, almost 50% of them show the lack of confidence to do EB by choosing only "Neutral" answer when they were asked about their preparation to initiate and develop it in the future.

An expert-interviewed can explain this situation. They say the SMEs have good knowledge about EB only for digital marketing section, while they do not believe it will become popular as a channel. As their belief, there are not many SMEs that focus to fully develop this kind of business operation.

2. Infrastructure: the key elements of basic factors, such as Internet speed and the ease of access in Thailand, are increasing considerably. However, other components are not enough to facilitate the level of attracting SMEs to fully invest and continue to develop to the expected level. For example, a platform for sale and distribution of food which the government can be managed by itself or easily requesting cooperation.

3. Back end data: 82.6% of the SMEs do not have their own websites. They usually skip their own websites creation and turn to a ready-made channel because the ready-made channel is convenient and appears to be more economical for small

beginners. As they do not have any official website to access in-depth data to further build on big data and use it for strategic purposes, this situation causes a huge problem.

4. Language: it must be admitted that Thai people are very concerned about communication in foreign languages. On the other hand, the language is very necessary when it must grow in EB business until the export stage. The growth will be significant driving force behind development of EB readiness characters as the government required.

5. Budget & funds: EB development requires considerable resources. Since there is not any fixed development model, this kind of business can be considered one of the high-risk models. In addition, a sponsor like the government agency stuck with many obstacles. For example, rules and regulations combined with their organization's mission make it impossible to fully support, especially, while they need to use their government authority for management. While entrepreneurs have a good aspect and are interested in it, these reasons cause EB readiness of SMEs is not a high tendency and did not meet the expected criteria.

CHAPTER VI
CONCLUSION

The overview of this research and ideas to further develop or expand its finding are compiled and presented as following subjects.

6.1. Summary of Research

6.2. Research contribution

6.3. Recommendations

6.1 Summary of Research

The research method uses mixed methods to study EB readiness level of Thai-SMEs in the processed food industry. Qualitative information was gathered through interviews ten relevant experts, asking for the government's preferences, the industry's current situation and a questionnaire design recommendation. Quantitative data were collected from the target SMEs with 200 questionnaires during April-June 2018 using online and offline channels.

Survey questionnaire design begins with an IOC assessment of 48 questions by five experts in finding its validity. The evaluation results are in range of 0.60-1.00, which has passed IOC standard at 0.5. However, there are a few improvements as the specialist recommendation before trying out. To find the questionnaire reliability, Cronbrach's Alpha Coefficient is used. The result is that a test with a score of 0.982 with an assessment criterion of at least 0.7 is approved.

The SPSS statistics base version 25.0 is used for calculating descriptive statistic (percentage, mode, mean), and analytical statistic (Mann-Whitney U test, Pearson-Chi square and Monte Carlo method).

First research objective is to modify EB maturity model. The finished model is created by integrating the ISP 10X10 M with SOG-e model. There are five

business characters to track EB readiness of a company, which are ST, SY, SS, BP, and IN. In the term of strategic planning, a business should have 1. the upgraded SOG-e model (Table 4.1), 2. the IN-performance measure from ISP10x10M (Figure 2.8), 3. summary of top five drivers and inhibitors of EB for each maturity stage (Table 2.5), and 4. the related internal success factors to help measuring a company. They can monitor up-to-date details and verify that strategic plans are still effective in the short and medium term. When a company operates along these lines, it has sustainably increased its performance and strategic ability.

To find EB internal success factors which have relationship with EB maturity in the sense of this industry as the research second purpose, collected data are calculated by Monte Carlo method. Acceptable drivers are screened with a condition that variables must involving at least three characters. The remaining are six out of seven factors which are ID (age), SB (product type and channel), AK, PB, SI and BI. It can also be demonstrated that, in this case, certain variables can theoretically be used to promote the growth of EB's company in the sense of Thai-SMEs in a focus industry. At the end of the questionnaire development, there are 42 questions. This final version of the questionnaire makes the third objective of this research is completed.

The last objective is to explore current status of the target group. The findings bring the accomplishment of the first research objective. 171 cases out of 200 companies have do EB, which can interpret as the percentage of target Thai-SMEs who have been started doing EB is 90. Most of these organizations' managers are women with a bachelor's degree. Their age ranges from 25 to 34 years. Most are a small business which popular with bakery items. Generally, they have just one SSCH and it is mainly a retail store. It is, therefore, clear that ONCH is often available, but not used or is merely a digital marketing tool. While they generally have two ONCHs, with 81.6% of the data, FB is the most popular channel. Moreover, score interpretation shows that most SMEs believe that their company has some degree of these variables, but not certain it is enough. They are seriously concerned about an IN, but they are not confidence in their understanding of it. Although it is not enough to meet expectations, most companies are aware of this area as the government needs it and finds it significant.

Most inadequate factor in terms of internal success factors for doing EB is AK, particularly EM. Management believes that in this type of business activity, PB is essential for the company and enhances recognition of stakeholders. The PB is highly found in the business which BP is at third level. All these findings allow the first research question and purpose to be answered.

In various points, the results are consistent with the experts. It helps clarify understanding and makes us aware that business today knows and wants to implement some EB standard, but only lacks in-depth knowledge to take full advantage of the opportunity. Rather, of using them as digital business, they are only using part of digital marketing. Facebook is the most widely accepted digital platform, as there are many successful examples and funding from both the public and private sectors has been received. It is more familiar to both buyers and sellers than other networks with this network.

Mann-Whitney U test assessment result is 0.000, which is less than the critical level at 0.050. This means it must deny the assumption H_0 and accept the assumption H_1. The results show that SMEs who have started doing EB have a significantly lower readiness level than expectation in every aspect at 95% confidence level. According to the expert, the main barriers to the development of EB operations in Thailand are 1) Infrastructure: especially, in food platforms that can be locally managed, 2) Acknowledge & belief, 3) Back end data: lack of data and analyst, 4) Basics: language, budget & funds and technology adaptation for each generation.

6.2 Research contribution

6.2.1 Academic contribution

This research demonstrating how importance of Information security and applied it to create a developed recommendation plan for success and sustain EB adoption. Moreover, the group of variables named "EB internal success factors" is presented. These variables aim to let SMEs use to measure and promote their readiness during EB implement process. Behavioral intention to use is combined with the EB success factors. The EB internal success factors shown in this paper are tested that it

has relationship to EB maturity in the sense of Thai-SMEs in the food processing industry.

6.2.2 Managerial implication

The maturity model is a useful business tool, which offers an organization's current status. It is also an obvious, detailed roadmap that is easy for managers to understand and guide a company in business planning through change and development. The developed model created from this paper is valuable for a new entrepreneur and any business that is moving from a traditional business to an online enterprise. Since the evolving process of an enterprise consists of systematic processes, it is easy to distract from the intended goal.

A SOG-e model comes with five facilitators and obstacles in each stage of progression from a former study. This research chooses it to develop for more benefits and convenient. By adding an information security as one of EB characters, the new model contains five EB organizational readiness character describe each of six levels. The newly added factor is associated with success and sustainability of an EB enterprise confirmed by many researchers (Choshin & Ghaffari (2017); Costante, Hartog, & Petković (2015) and Du & Tang (2014)).

In making an investment decision to enhance the readiness in each aspect, knowing the relationship between EB internal success factors and desired growth in needed dimension is important. It is speeding up the company's execution while saving costs.

During business growth, it is essential to analyze the level of capability in order to adjust the development plan in order to better match the current situation. Therefore, the questionnaire that is created is very necessary and useful for surveying the organization's readiness.

For these reasons, three results of the study which are the upgraded model, EB internal success factors and the questionnaire are an essential tool in an EB initiative enterprise. Since the results allow management to make a strategic decision and to bring about a smooth transition, which means a higher degree of competitiveness.

6.2.3 Policy implication

The faster in the growth of E-business, the higher success rate of the government policies. The Thai government can use current situation which founded to shape their plan for more accuracy in supporting Thai-food-SMEs. The model can be used to motivate an entrepreneur, especially SMEs, to develop themselves in the self-sufficiency operating way under the country's vision, Thailand 4.0. They can publish the model's questionnaire to assess any target readiness such that they are aware of their position. Also, the private sector gets a better plan to deal with their lack of skills or materials and to effectively improve their businesses to where they should be. In fact, it might also minimize government expenditures to benefit these small and medium-sized businesses, because more reliable statistics and figures enable the government to spend its budget more efficiently and effectively.

6.3 Recommendations

6.3.1 Recommendations for the government and its agencies

Making EB to be widely used and creating more sustainable digital economy can be achieved only by the government authority. To assist related sectors and achieving the national 20- year strategy, the government should consider the following seven suggestions as their support policy.

1. Three keys for this situation are specific policy, measurement method and delegation of authority to government agencies, regarding support of entrepreneurs to be more convenient. The main objective of the keys is to provide advice and assistance in transferring EB knowledge and necessary information to SMEs. However, these also help continuously in monitoring the progress of the development making the agencies faster and easier to create a backing strategy.

2. The assigned agencies should provide training programs together with consultation, since many entrepreneurs need advice from a level that doesn't have any foundation to practical application.

3. Specific policies or measures to set up a national digital platform supporting EB should be adopted. An E- market place, an advertising channel and a

transportation management platform are an important infrastructure in promoting this kind of business operation.

4. The government agencies should be empowered to act as intermediaries between SMEs, government, international organizations and the platforms to encourage and facilitate international digital trade.

5. A campaign which describe benefits of doing EB and how to do it for SMEs should be launched. This campaign must also give them information about a generated developing model as the government's expectations.

6. Skilled labor training for EB operation should be speed up. Especially a data scientist and a versatile person, who is a specialist in both EB and food business.

7. Budget support should be provided for an online market research and EB adoption in SMEs.

6.3.2 Recommendations for private firms

In order to successfully adopt EB operation and increase sustainability in a company, the following suggestions should be considered by SMEs or interested entrepreneurs.

1. Create EB developing roadmap by using the readiness model and the adoption drivers help in making strategic decisions. The roadmap helps the entrepreneurs operate their company smoother and can be continuously developed to meet their expectation.

2. Illustrate the roadmap to staff clearly. This let them understand an organization direction and be able to coordinate better to achieve goals.

3. Conduct an internal survey and analysis of market readiness on a regular basis. Monitoring of their company and business preparation is neede.. The findings endorse the modification of the operating strategy. It makes the strategy a decent fit for their business condition.

6.3.3 Recommendations for the higher education

When running EB, essential resources such as a data scientist and a versatile person can't be missing. There is an urgent need to build people with expertise in EB, food business and language for this sector. Higher education should consider in

order to open a course for the creation of these people to meet the industry demand. For example, adding EB in the course of entrepreneur, especially, for food business section.

6.3.4 Recommendations for further research

The more needed information gains, the more accurate plans you get. To enhance EB development in Thai-business and support its government achievement, the national strategy. An information from a further study may has some benefit in other section, such as marketing and human resources. The further study should further expand the scope of research with the following reference.

6.3.4.1 The number of samples and interesting factors: with respect to the limitations of this research, amount of data and various interesting factors, the quantitative research studying only few factors are suggested. The suggested study is more convenient to collect more samples. It will discover more vertical details by applying the questionnaire, especially, adding some expanding question for each selected factor.

6.3.4.2 The strength and direction of a correlation between adoption drivers and EB characters: by the Chi-square testing, the research presented only independence testing between adoption drivers and EB characters. On the other hand, if we know strength and direction of a correlation, a business can screen and focus on their interested or critical factors. This is another key to help them manage their funding, which is one of the biggest limitations in EB developing. According to this reason, the further researcher should do a correlation and regression analysis.

6.3.4.3 Other innovation adoption drivers: according to Awa, Ukoha, and Emecheta (2012), there are innovation adoption drivers which are not examine the relationship with EB characters. All of them supported by studies which say they are success adoption drivers for SMEs, and therefore this is an area of great potential not yet explored and is the suggested subject of future research.

6.3.4.4 A focus industry: Thailand 4.0 is a national strategy which focuses on ten industries, for example, food for the future, agriculture and biotechnology. One of the strategies aims to intergrade innovation, technology and management systems in the focus industries operation. Accordingly, EB is one of the tools to enhance these industries leapfrogging and tackle a turbulent situation, like these days. For that reason, the future research studying about correlations between adoption drivers and EB readiness in the other industries is suggested.

6.3.4.5 More complex relationship test: the relation between the internal factors and EB maturity has only been evaluated to decide whether these supporting factors are significant. However, we have not known how it performs. Therefore, data should be gathered and checked on how these aspects impact to better improve strategy and policy planning. A new study can start by selecting appropriate factors and placing them as moderators in more complex relationships for EB development. Some examples of a research question are "How does the age of each decision maker impact readiness?", "When SMEs classified by product type, what is the most level of readiness they are in?", etc.

6.3.4.6 Strategy consultation: Provide a corporate plan if separated by multiple parameters and correlated further with them as discussed in 6.3.4.5.

6.3.4.7 Criteria for dividing the degree of readiness from the collected score: therefore, the requirements for grading have been identified for AlGhamdi (2014) because of limitations and periods of analysis. If greater clarification is required, more precise score range studies should be performed. Because when measured in various situations, the optimal scoring scale of each degree of readiness cannot be separated equally.

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APPENDIX
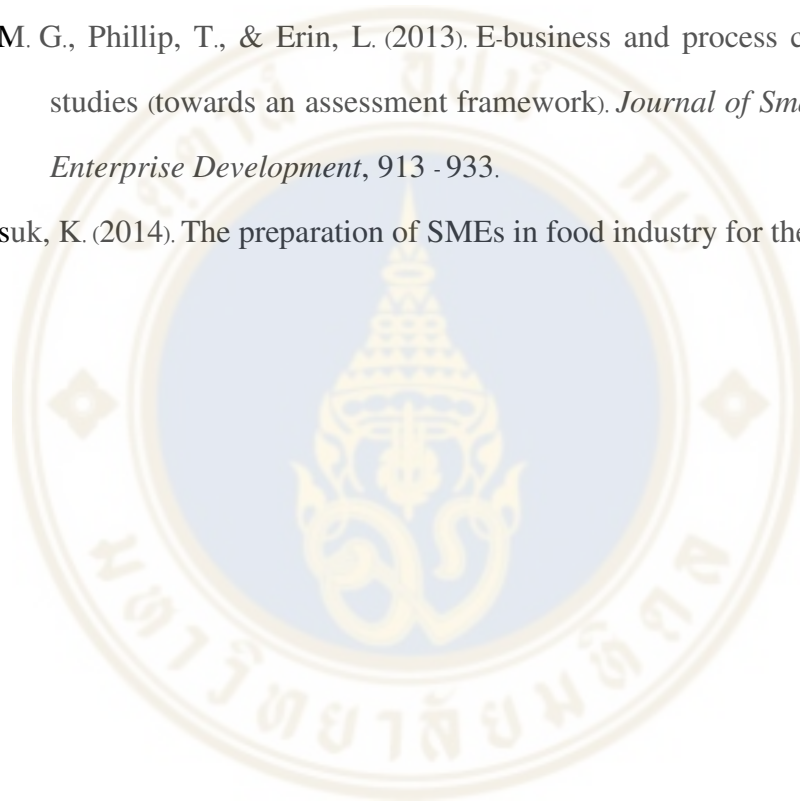
A. Survey result summary

A.1 E-business already?

		Frequency	Percent	Valid Percent	Cumulative Percent
	Not yet	19	10.0	10.0	10.0
Valid	Already	171	90.0	90.0	100.0
	Total	190	100.0	100.0	

A.2 How many online channels do they use?

		Frequency	Percent	Valid Percent	Cumulative Percent
	0	19	10.0	10.0	10.0
	1	53	27.9	27.9	37.9
	2	57	30.0	30.0	67.9
	3	40	21.1	21.1	88.9
Valid	4	12	6.3	6.3	95.3
	5	6	3.2	3.2	98.4
	6	2	1.1	1.1	99.5
	7	1	.5	.5	100.0
	Total	190	100.0	100.0	

A.3 Statistics

		E-business already?	How many online channels do they use?
N	Valid	190	190
	Missing	0	0
Mean		.90	2.02
Median		1.00	2.00
Mode		1	2
Std. Deviation		.301	1.317
Range		1	7
Minimum		0	0
Maximum		1	7
Percentiles	25	1.00	1.00
	50	1.00	2.00
	75	1.00	3.00

A.4 Popularity of online channel selection

Code	Online channels	Frequency (companies)	Percent of total companies (%)
ON8.1A	Facebook	155	81.6
	Line	109	57.4
	Instagram	56	29.5
	Website	35	18.4
	No ONCH	19	10
	Shopee	10	5.3
	Lazada	7	3.7
	Other	7	3.7
	Inwshop	5	2.6

A.5 Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ชาย	66	34.7	34.7	34.7
	หญิง	124	65.3	65.3	100.0
	Total	190	100.0	100.0	

A.6 Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 18 ปี	1	0.5	0.5	0.5
	18 – 24 ปี	21	11.1	11.1	11.6
	25 – 34 ปี	66	34.7	34.7	46.3
	35 – 44 ปี	50	26.3	26.3	72.6
	45 – 54 ปี	35	18.4	18.4	91.1
	>= 55 ปี	17	8.9	8.9	100.0
	Total	190	100.0	100.0	

A.7 Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ประถมศึกษา หรือเทียบเท่า	16	8.4	8.4	8.4
	มัธยมศึกษา หรือเทียบเท่า	23	12.1	12.1	20.5
	ประกาศนียบัตรวิชาชีพ	5	2.6	2.6	23.2
	ประกาศนียบัตรวิชาชีพชั้นสูง	6	3.2	3.2	26.3
	อนุปริญญา	11	5.8	5.8	32.1
	ปริญญาตรี	93	48.9	48.9	81.1
	ปริญญาโท	35	18.4	18.4	99.5
	ปริญญาเอก	1	.5	.5	100.0
	Total	190	100.0	100.0	

A.8 Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<= 5 ปี	95	50.0	50.0	50.0
	6 - 10 ปี	40	21.1	21.1	71.1
	11 - 15 ปี	18	9.5	9.5	80.5
	16 - 20 ปี	18	9.5	9.5	90.0
	> 20 ปี	19	10.0	10.0	100.0
	Total	190	100.0	100.0	

A.9 Statistics: Individual Difference Factors

		Gender	Age	Education	Experience
N	Valid	190	190	190	190
	Missing	0	0	0	0
Mean		1.65	3.78	5.09	2.08
Median		2.00	4.00	6.00	1.50
Mode		2	3	6	1
Variance		.228	1.337	3.860	1.876
Percentiles	25	1.00	3.00	4.00	1.00
	50	2.00	4.00	6.00	1.50
	75	2.00	5.00	6.00	3.00

A.10 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Gender	190	1	2	1.65	.477	.228
Age	190	1	6	3.78	1.156	1.337
Education	190	1	8	5.09	1.965	3.860
Experience	190	1	5	2.08	1.370	1.876
Valid N (listwise)	190					

A.11 Total employees * Fixed assets * Firm size Crosstabulation

Firm size				Fixed assets		Total
				<=50 ล้านบาท	**51-200 ล้านบาท**	
S	**Total employees**	**<=50 คน**	Count	175	3	178
			% of Total	95.6%	1.6%	97.3%
		51-200 คน	Count	5	0	5
			% of Total	2.7%	.0%	2.7%
	Total		Count	180	3	183
			% of Total	98.4%	1.6%	100.0%
M	**Total employees**	**51-200 คน**	Count		7	7
			% of Total		100.0%	100.0%
	Total		Count		7	7
			% of Total		100.0%	100.0%

A.12 Number of products on shelf of each company

Code	Number of products	Frequency (companies)	Percent (%)
SB3.1A	5	22	11.6
	20	21	11.1
	1	17	8.9
	2	16	8.4
	6	11	5.8
	3	11	5.8
	12	9	4.7
	10	9	4.7
	8	9	4.7
	7	8	4.2
	40	7	3.7
	30	7	3.7

A.13 Number of products on shelf of each company

Code	Number of products	Frequency (companies)	Percent (%)
	15	7	3.7
	4	7	3.7
	50	5	2.6
	100	3	1.6
	9	3	1.6
	1000	2	1.1
	180	2	1.1
	22	2	1.1
	21	2	1.1
	500	1	0.5
	80	1	0.5
	60	1	0.5
	58	1	0.5
	36	1	0.5
	34	1	0.5
	32	1	0.5
	18	1	0.5
	17	1	0.5
	11	1	0.5

A.14 $SSCH Frequencies

		Responses		Percent of
		N	Percent	Cases
	Catering	11	2.3%	6.4%
	Takeaway	53	10.9%	31.0%
	Market	72	14.8%	42.1%
	Import	8	1.6%	4.7%
	Home delivery	39	8.0%	22.8%
Sourcing &	Distributer	41	8.5%	24.0%
Supply CH[a]	Wholesale	73	15.1%	42.7%
	Retail	83	17.1%	48.5%
	Eat-in-premises or mobile food stall	30	6.2%	17.5%
	Export	17	3.5%	9.9%
	Internet	49	10.1%	28.7%
	Others	9	1.9%	5.3%
Total		485	100.0%	283.6%

a. Dichotomy group tabulated at value 1.

A.15 $ProductType Frequencies

		Responses		Percent of
		N	Percent	Cases
Product type[a]	Salts, spices, soups, sauces, salads and protein products	17	5.2%	9.9%
	Ready-to-eat savories	25	7.7%	14.6%
	Eggs and egg products	17	5.2%	9.9%
	Beverages, excluding dairy products	15	4.6%	8.8%
	Cereals and cereal products, derived from cereal grains, from roots and tubers, pulses, legumes and pith or soft core of palm tree, excluding bakery wares	12	3.7%	7.0%
	Fats and oils, and fat emulsions	9	2.8%	5.3%
	Meat and meat products, including poultry and game	33	10.2%	19.3%
	Fruits and vegetables (including mushrooms and fungi, roots and tubers, pulses and legumes, and aloe vera), seaweeds, and nuts and seeds	36	11.1%	21.1%
	Bakery wares	46	14.2%	26.9%
	Dairy products and analogues	12	3.7%	7.0%
	Confectionery	4	1.2%	2.3%
	Substances added to food which are not fall in category 1-16 and not for direct consumption	12	3.7%	7.0%
	Fish and fish products, including mollusks, crustaceans, and echinoderms	16	4.9%	9.4%
	Sweeteners, including honey	8	2.5%	4.7%
	Prepared foods	28	8.6%	16.4%
	Foodstuffs intended for particular nutritional uses	21	6.5%	12.3%
	Edible ices, including sherbet and sorbet	13	4.0%	7.6%
Total		324	100.0%	189.5%

a. Dichotomy group tabulated at value 1.

A.16 Statistics: How many types do their sell?

N	Valid	171
	Missing	0
Median		1.00
Mode		1
Std. Deviation		1.637
Minimum		1
Maximum		11
Percentiles	25	1.00
	50	1.00
	75	2.00

A.17 How many types do their sell?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	97	56.7	56.7	56.7
	2	37	21.6	21.6	78.4
	3	17	9.9	9.9	88.3
	4	8	4.7	4.7	93.0
	5	6	3.5	3.5	96.5
	6	1	.6	.6	97.1
	7	1	.6	.6	97.7
	8	1	.6	.6	98.2
	9	2	1.2	1.2	99.4
	11	1	.6	.6	100.0
	Total	171	100.0	100.0	

A.18 Statistics: How many channels do they use?

N	Valid	171
	Missing	0
Median		3.00
Mode		1
Std. Deviation		1.657
Range		6
Minimum		1
Maximum		7
Percentiles	25	1.00
	50	3.00
	75	4.00

A.19 How many channels do they use?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1**	48	28.1	28.1	28.1
	2	35	20.5	20.5	48.5
	3	33	19.3	19.3	67.8
	4	22	12.9	12.9	80.7
	5	22	12.9	12.9	93.6
	6	6	3.5	3.5	97.1
	7	5	2.9	2.9	100.0
	Total	171	100.0	100.0	

A.20 Statistics: Thai-food-SMEs' EB readiness level

		STRed	SYRed	SSRed	BPRed	INRed
N	**Valid**	171	171	171	171	171
	Missing	0	0	0	0	0
Mode		2ᵃ	2	3	3	3
Std. Deviation		1.042	1.097	1.067	.998	1.089
Range		4	4	4	4	4
Percentiles	**25**	2.00	2.00	1.00	2.00	1.00
	50	3.00	2.00	2.00	2.00	2.00
	75	3.00	3.00	3.00	3.00	3.00

a. Multiple modes exist. The smallest value is shown

A.21 EB readiness of Thai SMEs in the food processing industy

Readiness / Characteristic		Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
ST	Frequency (companies)	31	54	54	28	4	0
	Percent (%)	18.1	31.6	31.6	16.4	2.3	0
SY	Frequency (companies)	38	51	49	28	5	0
	Percent (%)	22.2	29.8	28.7	16.4	2.9	0
SS	Frequency (companies)	53	43	54	18	3	0
	Percent (%)	31	25.1	31.6	10.5	1.8	0
BP	Frequency (companies)	38	49	62	20	2	0
	Percent (%)	22.2	28.7	36.3	11.7	1.2	0
IN	Frequency (companies)	49	44	57	15	6	0
	Percent (%)	28.7	25.7	33.3	8.8	3.5	0

B. Internal success factors data (6-r)

B.1 Survey results in the topic of Awareness & knowledge (AK)

Question	You have knowledge and understanding about running EB.		You can initiate EB in your organization by yourself.		You have knowledge and understanding about information security.		Your employees can use the tools used to conduct EB very well.		AK-r		MK-r	
Code	**AK 4.1A**		**AK 4.1B**		**AK 4.1C**		**AK 4.2A (EM-r)**					
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Strongly disagree	25	14.60%	19	11.10%	27	15.80%	32	18.70%	27	15.80%	24	14.00%
Disagree	29	17.00%	38	22.20%	50	29.20%	50	29.20%	53	31.00%	33	19.30%
Neutral	91	53.20%	82	48.00%	71	41.50%	69	40.40%	70	40.90%	92	53.80%
Agree	22	12.90%	29	17.00%	18	10.50%	15	8.80%	16	9.40%	19	11.10%
Strongly agree	4	2.30%	3	1.80%	5	2.90%	5	2.90%	5	2.90%	3	1.80%

B.2 Survey results in the topic of Perceived behavioral control (PB)

Question	You believe running EB is good for your organization.		If your organization does EB, it increases more acceptance from those in the society.		If your organization runs EB and encounters problems, you can handle them.		PB-r	
Code	**PB 5.1A**		**PB 5.2A**		**PB 5.3A**			
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Strongly disagree	17	4.10%	6	3.50%	17	9.90%	7	4.10%
Disagree	34	7.00%	15	8.80%	34	19.90%	16	9.40%
Neutral	81	28.70%	62	36.30%	81	47.40%	70	40.90%
Agree	31	41.50%	66	38.60%	31	18.10%	59	34.50%
Strongly agree	8	18.70%	22	12.90%	8	4.70%	19	11.10%

B.3 Survey results in the topic of Social influencer or subjunctive norm (SI)

Question	If your organization runs EB, customers or partners will be more satisfied with its service.		The current situation makes your organization adopt EB.		Government support has influenced your decision to implement EB.		SI-r	
Code	SI 6.1A		SI 6.1B		SI 6.1C			
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Strongly disagree	5	2.90%	10	5.80%	14	8.20%	10	5.80%
Disagree	15	8.80%	22	12.90%	29	17.00%	18	10.50%
Neutral	62	36.30%	63	36.80%	63	36.80%	71	41.50%
Agree	64	37.40%	49	28.70%	47	27.50%	45	26.30%
Strongly agree	25	14.60%	27	15.80%	18	10.50%	27	15.80%

B.4 Survey results in the topic of Behavioral intention to use (BI)

Question	It is a good idea to adopt EB to create a competitive advantage for your organization.		Your organization has studied and prepared for EB adoption.		Your organization aims to run EB in the long run.		BI-r	
Code	BI 7.1A		BI 7.2A		BI 7.3A			
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Strongly disagree	4	2.30%	19	11.10%	10	5.80%	9	5.30%
Disagree	16	9.40%	39	22.80%	22	12.90%	22	12.90%
Neutral	51	29.80%	65	38.00%	56	32.70%	66	38.60%
Agree	64	37.40%	36	21.10%	48	28.10%	36	21.10%
Strongly agree	36	21.10%	12	7.00%	35	20.50%	38	22.20%

C. Current Thai-food-SMEs' organization information and EB characters

C.1 Most popular answer of SMEs who have Strategy readiness at second level

ST2_SME's Character	N	Median	Mode			
			Value/Code	Meaning	Frequency	%
Gender	54	2	2	Female	37	68.5
Age	54	4	3	25 – 34 years	19	35.2
Education	54	6	6	Bachelor's degrees	25	46.3
Experience	54	1	1	<= 5 years	29	53.7
Firm size	54	1	1	S	52	96.3
Number of products	54	9.5	20	20	9	16.7
How many types do their sell?	54	1	1	1	30	55.6
How many channels do they use?	54	2.5	1	1	18	33.3
MK Mean	54	2.67	2	2	13	24.1
EM Mean	54	2	2	2	29	53.7
AK Mean	54	2.42	2	2	12	22.2
PB Mean	54	3.33	3.67	3.67	11	20.4
SI Mean	54	3	3	3	12	22.2
BI Mean	54	3	3	3	11	20.4
How many online channels do they use?	54	2	2	2	20	37.0
ST Readiness	54	2	2	2	54	100.0
ST Result	54	0	0	Fail	54	100.0
SY Readiness	54	2	2	2	38	70.4
SY Result	54	0	0	Fail	54	100.0
SS Readiness	54	2	2	2	31	57.4
SS Result	54	0	0	Fail	53	98.1
BP Readiness	54	2	2	2	32	59.3
BP Result	54	0	0	Fail	54	100.0

C.1 Most popular answer of SMEs who have Strategy readiness at second level (cont.)

ST2_SME's Character	N	Median	Mode			
			Value/Code	Meaning	Frequency	%
IN Readiness	54	2	2	2	28	51.9
IN Result	54	0	0	Fail	43	79.6
MK Result	54	3	3	Neutral	27	50.0
EM Result	54	2	2	Disagree	29	53.7
AK Result	54	2	2	Disagree	30	55.6
PB Result	54	3	3	Neutral	16	29.6
SI Result	54	3	3	Neutral	26	48.1
BI Result	54	3	3	Neutral	28	51.9
Range_Number of products	54	1	1	1-10	30	55.6
Range_Number of product type	54	1	1	1	30	55.6
Range_Number of Sourcing & Supply channel	54	2.5	1	1	18	33.3
Range_Number of online channels	54	2	2	2	20	37.0
Type of product	111	-	-	Bakery wares	18	16.2
Sourcing & Supply channel	149	-	-	Market	29	19.5
Online channel	115	-	-	Facebook	48	41.7

C.2 Most popular answer of SMEs who have Strategy readiness at third level

ST3_SME's Character	N	Median	Mode			
			Value/Code	Meaning	Frequency	%
Gender	54	2	2	Female	32	59.3
Age	54	3	3	35 – 44 years	6	11.1
Education	54	6	6	Bachelor's degrees	33	61.1
Experience	54	1	1	<= 5 years	33	61.1
Firm size	54	1	1	S	53	98.1
Number of products	54	7	5	5	9	16.7

C.2 Most popular answer of SMEs who have Strategy readiness at third level (cont.)

ST3_SME's Character	N	Median	Mode			
			Value/Code	Meaning	Frequency	%
How many types do their sell?	54	1	1	1	30	55.6
How many channels do they use?	54	2	1	1	18	33.3
MK Mean	54	3	3	3	25	46.3
EM Mean	54	3	3	3	35	64.8
AK Mean	54	3	3	3	21	38.9
PB Mean	54	3.33	3.33	3.33	14	25.9
SI Mean	54	3.33	3	3	18	33.3
BI Mean	54	3.33	3	3	16	29.6
How many online channels do they use?	54	2	2	2	20	37.0
ST Readiness	54	3	3	3	54	100.0
ST Result	54	0	0	Fail	54	100.0
SY Readiness	54	3	3	3	35	64.8
SY Result	54	0	0	Fail	53	98.1
SS Readiness	54	3	3	3	39	72.2
SS Result	54	0	0	Fail	52	96.3
BP Readiness	54	3	3	3	36	66.7
BP Result	54	0	0	Fail	54	100.0
IN Readiness	54	3	3	3	34	63.0
IN Result	54	1	1	Pass	40	74.1
MK Result	54	3	3	Neutral	39	72.2
EM Result	54	3	3	Neutral	35	64.8
AK Result	54	3	3	Neutral	34	63.0

C.2 Most popular answer of SMEs who have Strategy readiness at third level (cont.)

ST3_SME's Character	N	Median	Mode			
			Value/Code	Meaning	Frequency	%
PB Result	54	3	3	Neutral	29	53.7
SI Result	54	3	3	Neutral	27	50.0
BI Result	54	3	3	Neutral	16	29.6
Range_Number of products	54	1	1	1	30	55.6
Range_Number of product type	54	1	1	1	30	55.6
Range_Number of Sourcing & Supply channel	54	2	1	1	18	33.3
Range_Number of online channels	54	2	2	2	20	37.0
Type of product	113	-	-	Fruits and vegetables, including nuts and seeds	16	14.2
Sourcing & Supply channel	136	-	-	Wholesale	25	18.4
Online channel		-	-	Facebook	50	43.5

C.3 Most popular answer of SMEs who have Systems readiness at second level

SY2_SME's Character	N	Median	Mode			
			Value/Code	Meaning	Frequency	%
Gender	51	2	2	Female	37	72.5
Age	51	4	3	25 – 34 years	17	33.3
Education	51	6	6	Bachelor Degrees	26	51.0
Experience	51	1	1	<= 5 years	32	62.7
Firm size	51	1	1	S	49	96.1
Number of products	51	8	20	20	8	15.7
How many types do their sell?	51	1	1	1	28	54.9
How many channels do they use?	51	3	1	1	16	31.4
MK Mean	51	2.67	2.00	2	13	25.5
EM Mean	51	2	2	2	28	54.9

C.3 Most popular answer of SMEs who have Systems readiness at second level (cont.)

SY2_SME's Character	N	Median	Mode			%
			Value/Code	Meaning	Frequency	
AK Mean	51	2.33	2	2	12	23.5
PB Mean	51	3.33	3.67	3.67	10	19.6
SI Mean	51	3.33	3	3	11	21.6
BI Mean	51	3	3	3	12	23.5
How many online channels do they use?	51	2	2	2	20	39.2
ST Readiness	51	2	2	2	38	74.5
ST Result	51	0	0	Fail	48	94.1
SY Readiness	51	2	2	2	51	100.0
SY Result	51	0	0	Fail	51	100.0
SS Readiness	51	2	2	2	32	62.7
SS Result	51	0	0	Fail	51	100.0
BP Readiness	51	2	2	2	30	58.8
BP Result	51	0	0	Fail	51	100.0
IN Readiness	51	2	2	2	30	58.8
IN Result	51	0	0	Fail	39	76.5
MK Result	51	3	3	Neutral	26	51.0
EM Result	51	2	2	Disagree	28	54.9
AK Result	51	2	2	Disagree	29	56.9
PB Result	51	3	3	Neutral	22	43.1
SI Result	51	3	3	Neutral	20	39.2
BI Result	51	3	3	Neutral	26	51.0
Range_Number of products	51	1	1	1	30	58.8
Range_Number of product type	51	1	1	1	28	54.9
Range_Number of Sourcing & Supply channel	51	3	1	1	16	31.4
Range_Number of online channels	51	2	2	2	20	39.2
Type of product	105	-	-	Bakery wares	16	15.2

C.3 Most popular answer of SMEs who have Systems readiness at second level (cont.)

SY2_SME's Character	N	Median	Mode			%
			Value/Code	Meaning	Frequency	
Sourcing & Supply channel	147	-	-	Market	27	18.4
Online channel	112	-	-	Facebook	44	39.3

C.4 Most popular answer of SMEs who have Staff & Skill readiness at third level

SS3_SME's Character	N	Median	Mode			%
			Value/Code	Meaning	Frequency	
Gender	54	2	2	Female	59.3	59.3
Age	54	3	3	25 – 34 years	23	42.6
Education	54	6	6	Bachelor's degrees	30	55.6
Experience	54	1	1	<= 5 years	33	61.1
Firm size	54	1	1	S	51	94.4
Number of products	54	7	5	5	8	14.8
How many types do their sell?	54	1	1	1	30	55.6
How many channels do they use?	54	3	1	1	15	27.8
MK Mean	54	3	3	3	27	50.0
EM Mean	54	3	3	3	38	70.4
AK Mean	54	3	3	3	22	40.7
PB Mean	54	3.33	3.33	3.33	13	24.1
SI Mean	54	3.33	3	3	20	37.0
BI Mean	54	3.33	3	3	17	31.5
How many online channels do they use?	54	2	2	2	18	33.3
ST Readiness	54	3	3	3	39	72.2
ST Result	54	0	0	Fail	44	81.5
SY Readiness	54	3	3	3	37	68.5
SY Result	54	0	0	Fail	53	98.1
SS Readiness	54	3	3	3	54	100.0

C.4 Most popular answer of SMEs who have Staff & Skill readiness at third level (cont.)

SS3_SME's Character	N	Median	Mode			
			Value/Code	Meaning	Frequency	%
SS Result	54	0	0	Fail	54	100.0
BP Readiness	54	3	3	3	38	70.4
BP Result	54	0	0	Fail	54	100.0
IN Readiness	54	3	3	3	38	70.4
IN Result	54	1	1	Pass	43	79.6
MK Result	54	3	3	Neutral	40	74.1
EM Result	54	3	3	Neutral	38	70.4
AK Result	54	3	3	Neutral	37	68.5
PB Result	54	3	3	Neutral	29	53.7
SI Result	54	3	3	Neutral	31	57.4
BI Result	54	3	3	Neutral	25	46.3
Range_Number of products	54	1	1	1	34	63.0
Range_Number of product type	54	1	1	1	30	55.6
Range_Number of Sourcing & Supply channel	54	3	1	1	15	27.8
Range_Number of online channels	54	2	2	2	18	33.3
Type of product	111	-	-	Meat and meat products	13	11.7
Sourcing & Supply channel	149	-	-	Retail	32	20.1
Online channel	115	-	-	Facebook	50	40.3

C.5 Most popular answer of SMEs who have Business process readiness at third level

BP3_SME's Character	N	Median	Mode			
			Mode	Meaning	Frequency	%
Gender	62	2	2	Female	34	54.8
Age	62	3	3	25 – 34 years	21	33.9
Education	62	6	6	Bachelor's degrees	35	56.5

C.5 Most popular answer of SMEs who have Business process readiness at third level (cont.)

BP3_SME's Character	N	Median	Mode			
			Mode	Meaning	Frequency	%
Experience	62	1	1	<= 5 years	33	53.2
Firm size	62	1	1	S	59	95.2
Number of products	62	8	5	5	7	11.3
How many types do their sell?	62	2	1	1	27	43.5
How many channels do they use?	62	3	1	1	19	30.6
MK Mean	62	3	3	3	30	48.4
EM Mean	62	3	3	3	39	62.9
AK Mean	62	3	3	3	25	40.3
PB Mean	62	3.67	3.67	3.67	17	27.4
SI Mean	62	3.33	3	3	18	29.0
BI Mean	62	3.33	3	3	16	25.8
How many online channels do they use?	62	2	2	2	23	37.1
ST Readiness	62	3	3	3	36	58.1
ST Result	62	0	0	Fail	51	82.3
SY Readiness	62	3	3	3	34	54.8
SY Result	62	0	0	Fail	62	100.0
SS Readiness	62	3	3	3	38	61.3
SS Result	62	0	0	Fail	58	93.5
BP Readiness	62	3	3	3	62	100.0
BP Result	62	0	0	Fail	62	100.0
IN Readiness	62	3	3	3	38	61.3
IN Result	62	1	1	Pass	44	71.0
MK Result	62	3	3	Neutral	46	74.2
EM Result	62	3	3	Neutral	39	62.9
AK Result	62	3	3	Neutral	39	62.9
PB Result	62	4	4	Agree	28	45.2

C.5 Most popular answer of SMEs who have Business process readiness at third level (cont.)

BP3_SME's Character	N	Median	Mode			
			Mode	Meaning	Frequency	%
SI Result	62	3	3	Neutral	33	53.2
BI Result	62	3	3	Neutral	31	50.0
Range_Number of products	62	1	1	1	34	54.8
Range_Number of product type	62	2	1	1	27	43.5
Range_Number of Sourcing & Supply channel	62	3	1	1	19	30.6
Range_Number of online channels	62	2	2	2	23	37.1
Type of product	148	-	-	Meat and meat products	16	10.80
Sourcing & Supply channel	178	-	-	Wholesale	35	19.70
				Retail	35	19.70
Online channel	137	-		Facebook	56	40.90

C.6 Most popular answer of SMEs who have Information security readiness at third level

IN3_SME's Character	N	Median	Mode			
			Value/Code	Meaning	Frequency	%
Gender	57	2	2	Female	35	61.4
Age	57	3	3	25 – 34 years	21	36.8
Education	57	6	6	Bachelor's degrees	34	59.6
Experience	57	1	1	<= 5 years	29	50.9
Firm size	57	1	1	S	54	94.7
Number of products	57	7	1	1	8	14.0
How many types do their sell?	57	1	1	1	30	52.6
How many channels do they use?	57	3	1	1	16	28.1
MK Mean	57	3	3	3	25	43.9
EM Mean	57	3	3	3	42	73.7
AK Mean	57	3	3	3	21	36.8

C.6 Most popular answer of SMEs who have Information security readiness at third level (cont.)

IN3_SME's Character	N	Median	Mode			
			Value/Code	Meaning	Frequency	%
PB Mean	57	3.33	3.67	3.67	16	28.1
SI Mean	57	3.33	3	3	18	31.6
BI Mean	57	3.33	3	3	16	28.1
How many online channels do they use?	57	2	2	2	21	36.8
ST Readiness	57	3	3	3	34	59.6
ST Result	57	0	0	Fail	44	77.2
SY Readiness	57	3	3	3	31	54.4
SY Result	57	0	0	Fail	56	98.2
SS Readiness	57	3	3	3	38	66.7
SS Result	57	0	0	Fail	52	91.2
BP Readiness	57	3	3	3	38	66.7
BP Result	57	0	0	Fail	57	100.0
IN Readiness	57	3	3	3	57	100.0
IN Result	57	1	1	Pass	57	100.0
MK Result	57	3	3	Neutral	40	70.2
EM Result	57	3	3	Neutral	42	73.7
AK Result	57	3	3	Neutral	40	70.2
PB Result	57	3	3	Neutral	28	49.1
SI Result	57	3	3	Neutral	29	50.9
BI Result	57	3	3	Neutral	26	45.6
Range_Number of products	57	1	1	1-10	33	57.9
Range_Number of product type	57	1	1	1	30	52.6
Range_Number of Sourcing & Supply channel	57	3	1	1	16	28.1
Range_Number of online channels	57	2	2	2	21	36.8
Type of product	119	-	-	Foodstuffs intended for particular nutritional uses	14	11.8
Sourcing & Supply channel	170	-	-	Wholesale	36	21.2
Online channel	124	-	-	Facebook	51	41.1