THE SUCESS FACTORS IN THE ADOPTION OF ENTERPRISE RESOURCE PLANNING (ERP) FOR THE THAI AGRICULTURAL BUSINESS: A STUDY OF THAI RICE MILL BUSINESS

Chalett Vichinrojjarul

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ABSTRACT

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Enterprise Resource Planning (ERP) has been globally and long-lastingly using in the several industries, especially under Industry 4.0; the era of industrial revolution, which seriously concentrates on interconnectivity, automation, machine learning, and real-time data. Currently, several industries in Thailand have been persuaded by "Thailand 4.0 scheme" under the12th National Development Program as National Economic Development Program (12th NESDPs) that developing principles require disruptive changes in all industries by the science and technology deployments. Thai agricultural business, which is one of the backbone industries of Thai economy and accounted for approximately 20% of the population also requires the disruptive changes. However, the agricultural business as a whole is a large-scale business and comprises of high business varieties. In addition, an existing of ERP implementation paradigm is not yet available. For avoiding an analytical error caused by sizes and variety of the agricultural business, a single specific agricultural area needs to be chosen. The rice mill business, which is a traditional Thai agricultural business and has a rigid business network across the country is primarily taken into account as a delegate of Thai agricultural business for the study. Therefore, this study proposes to determine success factors for enabling use of the ERP in the rice mill business. Three antecedents; the Government Support (GOV), Business Process Re-Engineering (BPR) and ERP Training (TRA) will aim to discover influential impacts to toward four motivational constructs grounded form Technology Acceptance model (TAM); Perceived Ease of Use (PEOU), Perceived Usefulness (PU) and Intention to Use ERP (IU) and Behavioral Use of ERP (BU). Once, the success factors for enabling use of the ERP are successfully verified, this study could also address the ERP adoption paradigm, giving a

suggestion on how agricultural business should adjust themselves to make the ERP usable in their ERP adoption and providing a prerequisite recommendation for policy makers respectively.

A questionnaire survey is conducted by using only telephone interview to verify all proposed relationships among constructs. Data analysis tests the conceptual models by establish the validity tests of variables and all proposed hypothesis is tested by a deployment of statistic software program. Path analysis is primarily applied for a verification the model fit. For the study results, the rice mill business currently has no the ERP implementation experience, therefore the Behavioral Use of ERP can not be measured. According to a scarcity of the ERP experience, the Government Support is the most decisive actor to enabling an intention of the ERP program. The Government Support can lead the rice mill into having the Business Process Re-Engineering and conduction the ERP Training prior to create the Perceived Usefulness and the Intention to Use ERP program respectively. In addition, the Business Process Re-Engineering and conduction the ERP Training will not only influence the Intention to Use ERP program through the Perceived Usefulness, but those factors can also have a direct positive impact to the Intention to Use ERP program. Alternatively, ERP expert is highly required as alternative player assisting to achieve the ERP adoption for this business scenario.

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CHAPTER 1

INTRODUCTION

1.1 Background

Over the past few decades, technology has become an integral part of human activities, particularly the great leaps of development in both tangible and intangible technology, i.e. the Internet, websites, applications, televisions, mobile phones, etc. The dramatic and rapid advancement in technology undeniably caused it to become an inextricable part of human life, where capacity and access to technology are crucial for both public and private sectors to increase their performance. In the public sector, electronic governance (e-governance) can be a distinct example of using modern equipment and information systems to rework and enhance public services for citizens, contributing to higher utility with lower costs. In the private sector, several industries have adopted technologies to increase their business performance, especially by being able to make precise decisions with the help of database systems. Internet marketing and enterprise systems are concrete examples of how the use of technology is able to make a significant impact toward businesses by increasing the business performance with less cost. However, adopting technology is not always possible for all types of organizations, as this depends on each organization's innovativeness Frambach and Schillewaert (2002). Organization innovativeness is not the same as individual innovativeness because each individual is inspired by personal needs while an organization is satisfied with additional values that the organization is concerned instead (Frambach & Schillewaert, 2002). As a result, the success factors for technology adoption must be studied as an application for all types of organizations.

In the 21st century, business management has completely evolved from manual to information technology based on a result of several organizations, such as SMEs and corporations who have the intent to use a software platform to manipulate their

business operation and the organization instead. Enterprise Resource Planning (ERP) has been introduced as a logical system to be a new driver for intelligence business operation to increase the competitive capacity of the organization and to integrate all sub business units within the organization uniquely, optimizing business interlinks within all internal components. Additionally, the ERP ideally contributes to internalizing the externality in every single business. One of the concepts is what should be an organizational plan and self-adjustments required to comply with external demands by using the most optimal system within each organization and how each internal business function could optimize itself to react with another internal function. Additionally, this era is considered to be an era of Industry 4.0 named by German government (Hermann, Pentek, & Otto, 2016). This era would emphasize cyber-systems and real time computerization using business operations in order to optimize toward a greater value chain (Porter, 1991). As a result, an original business operation cannot be sustained without making adjustments in their individual planning from actual cost associated in every business operation from upstream to downstream, and how much income level is required to generate profit gain from inter-link activates within a business unit.

Using technology in business has been increasingly essential and most developing countries have effectively exploited the benefits of technology in every part of their business operation. However, the use of technology for creation of a Competitive advantage in developing counties is not yet ready. Use of Technology Acceptance Model and Unified Theory of Acceptance and Use of Technology (UTAUT) has been the essential approach to understand the interaction of humans toward technological usage (Venkatesh, 2000). Those approaches could explain possible attributes, such as perceived usefulness, perceived ease of use performance, and effort expectancy toward behavioral intention to use technology. A number of businesses in developing counties are required to bring technologies into their business operation in order to increase their competitive performance and minimize their business capital, otherwise the business could potentially get into difficulties due to rapid changes in customer behavior and labor cost.

1.2 Statement of the Problem and Significance of the Study

Several corporate and non-cooperate organizations in developing countries have struggled with change in economic trend, especially in the upcoming era of Industry 4.0. The Enterprise Resource Planning (ERP) is an alternative program considered the light in the dark to improve business efficiency by interlinking all units in each business organization together toward holistic business planning and operation. Generally, the ERP is utilized and efficiently implemented within the corporate firms or high standard organizations but is ineffectively applied with the SMEs scale. Nevertheless, SMEs have applied the ERP into their business in relatively low proportions and have encountered problems with regards to adoption of the ERP to use in their organization. In developing countries, medium and small business organizations have been in proportion of approximately 90-95% of total business units, but the SMEs made significantly low contribution to the national economy in comparison to large firms in the nation (White, 2015). A challenge is how the SMEs and other rural business units can adopt the ERP into their business operation for gaining competitive performance. However, a combination between the ERP system and the existing business operation of those SMEs and rural businesses are very difficult and cannot be conducted in a standard pattern. In addition, no scholar has identified a possible approach to persuade the SMEs and rural businesses to initiate the use of ERP in the case of developing countries. Particularly, the agricultural sector in developing countries is relatively lack of making competitive advantage and control their business process by standard business system. Focusing on Thailand, one of the largest world agricultural export countries, the Thai government initiated a core policy called the National Economic Development Program (NESDP) prior to 2005, focusing on increasing agricultural products for export and boosting economic growth. As a result, there were several negative aftermaths associated with the previous national policy, such as high degradation in natural resources, especially water and soil, unorganized use of land, the lack of concern in agricultural product development for making added values, and uncontrollable product prices (NESDB, 1961). Hence, the Thai NESDP later in the 21st century has been reformed to rectify its preceding mistakes by issuing a new

horizontal policy to support sustainable agricultural economy, smart farming, value-added creativity in agricultural business and using technology and information technology in creation of business innovation. Following those situations, there is a room of opportunities for the Thai agricultural businesses to transform their business effectively by utilizing of the ERP (NESDB, 1961). In addition, the current policy of Thailand has strongly emphasized the use of Industry 4.0 as a new tide of economic development that highly contributes to the possibility of deploying an information technology and system as part of business development (NESDB, 1961).

Additionally, several ERP software experts could afford to push into the SMEs and rural business market, but the impediment was that customization of the ERP package could not be fully exercised at the non-corporate organization and most ERP software was considered ineffective. Hence, the intention of this study is to identify the reasons why the ERP cannot be used as the business drivers for the agricultural business and what factors are required for the agricultural firms to conduct as a preparation for the ERP adoption and what software conditions are most suitable for the business, especially in the agricultural sector. Furthermore, concerning national policy, this study can be a recommendation on how to increase business operation by using an enterprise resource planning system to revolutionize agricultural business in the national policy associated with Industry 4.0.

1.3 The Objectives of the Study

Regarding challenges on the lack of intention to apply the ERP into the agricultural business in developing countries and the ineffectiveness of deploying the ERP into the agricultural organization, factors with regards to the intention of the ERP use must be studied and visualized from the perspective of an organization owner or representative in each agricultural business. This study also intends to suggest how agricultural business should adjust themselves to make the ERP usable in their business adoption. Additionally, the contribution regarding this study is also expected to be a light in the shade as an alternative way to increase operation performances and competitive advantages for the agricultural business in Thailand into the Industry 4.0 as per national development plan. On the business point of view, business

contribution could be foreseen in giving an overview of the possibility for the ERP software expert to design appropriate criteria for the ERP program which match the agricultural needs. Concerning national policy, this research could provide information and requirements of the ERP necessities in Thai agricultural business which are used as a prerequisite prior to policy assistance and recommendations.

1.4 Research Questions

The study is primarily conducted with the following questions.

1) What are the factors that influence the agricultural business to adopt the use of the ERP in their organization?

2) How can government policy leverage the agricultural business to start the adoption of the ERP use?

3) How can an agricultural business prepare their organizational structure of processes to accommodate the use of ERP at an early stage?

4) What criteria should an ERP software expert be concerned about, in order to capture the agricultural market?

1.5 The Scope of the Study

Thailand, one of the largest agricultural export countries, could be a case study to understand why the use of technology and system driving for business operation in the agricultural business, especially the rice mill sector, is considered to be a major driving mechanism in part of rice industry, which is the backbone of Thai economy. The study proposes to investigate the reasons and factors behind the inability to use technology and logical systems efficiently in the rice mill production to improve performance in every single activity in the enterprise resource planning. It is interesting to take the rice mill sector into consideration of the study because this sector has a wide range of technology and logical system dependencies on resource management and business operation within their business units. This study focuses on three main elements of the adoption of the ERP for the rice mill industry: namely, technology adoption element, internal operation, and external support. Those three

main elements could explain toward the use intention and the Behavioral Use of the ERP as outcomes of this study.

1.6 The Benefits of the Study

On the one hand, the contribution of this study is to yield benefits for the Thai agricultural business, especially in the rice mill sector, to be aware of the preparation requirements in making business success with the adoption of the ERP. Inclusively, the national direction of Thailand's 20-year outlook has proposed that the SMEs and rural entrepreneurs must be capable of reaching a stage of using innovation and creativity to fuel their competitive advantages whereby businesses must generate value added by deployment of the technology, the innovation and the new creativity (NESDB, 1961). In particular, the agricultural business must be the first priority to make alternative. The framework of the ERP could assist the rice mills in integrating business operation that could contribute to obtaining the most cost-efficient way.

On the other hand, the ERP software expert in the agricultural market and the government agency responsible for agricultural development policy could visualize why the adoption of the ERP in the agricultural sectors in Thailand is not yet efficient and analyze the condition of the software developing standpoint and the policy maker to make appropriate policy for promoting the ERP in agricultural business through policy development.

Finally, this research also proposes to account for modern business strategy by finding innovative opportunities to overcome problems, including the expectedly high labor cost in Thailand, the highly competitive market making lower business margins and the unsystematic business processes in the rice mill. As a result, the ERP adoption could be an alternative solution for Thai agricultural business, especially allowing the rice mills to survive and increase their operational performance.

1.7 Limitations

The Enterprise Resource Planning in Thailand is fully implemented in only large organizations and rarely applied to the agricultural business. Therefore, the assessment of the study could be limited, and there is no distinctive secondary data provided. Furthermore, differences in knowledge on how the enterprise resource planning could assist the enterprise or even what is fundamental for the enterprise resource planning among rice mill sample seems to be less controllable and could significantly impact to reliability of results.

Concerning the data, this research uses the rice mill as the representative data sample of Thai agricultural sector which cannot fully generalize the whole population. Additionally, the business characteristics of the Thai rice mill are mostly prone to family business rather than using a standard corporate pattern. Therefore, understanding and/or attitude toward what the ERP is and how the ERP is utilized could vary.

Economically, this research has mainly focused on non-financial influences in the ERP adoption. Consequently, the cost-benefit analysis and other financial factors on the ERP adoption are not accounted for.

CHAPTER 2

LITERATURE REVIEW

2.1 Agriculture Sector in the Thai Economy

2.1.1 Transition in Thai Agricultures

Agriculture was the prime engine of Thai economy from the time before 1980. Rice and rubber were the significant commercial international crops. So, a vast number of lands were used for large-scale public investments in infrastructure, including roads and primary irrigation to fuel a competitive advantage in the production of commercial commodities toward national exports. The robust growth in agricultural production during this agricultural boom resulted in a steep decline in the level of poverty in the countryside. However, by 1980, the primary source of agricultural expansion, the abundant supply of land, was vanished, as most of the available land had been cleared and occupied by investors. The reason behind the vanishing of land is that extreme and sustained growth of manufacturing, especially the transition to export-oriented industries, was the key element in the relative weakening of the agriculture role in Thai economy. In 1985, nonagricultural exports grew rapidly, and outpaced the agricultural exports by the 1988. Between 1985 and 1995, there was huge product variation in the agriculture, and the share of manufacturing exports extended significantly becoming the primary source of national export growth. Between 1970 and 1997, the percentage between agricultural and nonagricultural exports became upturned, the agricultural products creating only 27% of total exports by 1997 (Kasem & Thapa, 2012).

Since, Thailand's industrial boom started, agricultural wages rose considerably in contrast with lowering in prices of the agricultural products. Those reasons squeezed farm profits and discouraged investment in agriculture. Since then, a decline in the agricultural growth rate induced the rate of growth to the rest of the economy and increased labor migration off land origin, and therefore effected a contraction of

planted area. The loss of labor also became a stage for increasing agricultural machineries, which lessened employment opportunities in the agriculture. In figures as the Thai economy grew, the role of the agriculture sector contracted: from 36.1% of GDP in 1961 -1965, to 11.9% in 1991-1996, stabilizing at 10.6% in 1997 and 1998. Likewise, growth in the agriculture sector decreased from an average annual rate of 5.7% in 1960-1970, to an average of 0.3% in 1991-1996. This was in marked contrast to other sectors of the Thai economy (Kasem & Thapa, 2012).

In concern of poverty, once the agriculture sector was source of income and growth in the past, the florist in agricultural economy raised a better life and income level for Thai people, especially in rural area. Hence, the ups and downs of agriculture had a major influence on the level of poverty in the country. However, this impressive trend hides a crucial exclusion with respect to perceptions of the role of the agriculture sector by policymakers. For example, Thailand encountered a significant economic slowdown in the early 1980s, when the poverty rate essentially increased. However, the downturn economy in 1980 was supplemented by a reduction in total rural and urban migration, representing that conservatively, Thai people usually returned to agriculture as a source of income and worked in their tough situation. Hence, agriculture was considered an important element of the economy's safety net for the poor up to 19th century (Abonyi, 2005). Nevertheless, structural change of the Thai economy in the 20th century onward seemed to be unclear that agriculture would remain a safety net for the poor because of changes in social behavior and values in the young generation, who prefer and urban jobs over living in rural areas.

2.1.2 Key Policy Challenges for Thai Agricultures

There are many predominant social-economic factors related to the Thai agriculture sector.

Discrimination in resource allocation prior to the crisis: To facilitate more on the expansion of the industry rather than agriculturally (Abonyi, 2005).

Commercialization of Thai agriculture: The Thai agriculture sector intends to increasingly commercialize and benefit large specific companies. Hence, agricultural exports that that focus on quantity rather than quality sometimes result in standard and trade protection problems (Abonyi, 2005).

Degraded state of natural resources: Thailand never implemented environmental schemes during the period of economic booms that highly degraded/depleted resources. (Abonyi, 2005).

Shift to sustainable agricultural development: Thailand's natural resources have been severely degraded during the last economic growth periods. Deforestation, overuse of agricultural chemicals, and mismanagement of forest and water resources have left several problems, pushing the country to change back to sustainable and environmentally friendly development (Abonyi, 2005).

Land tenure and land reform: The basic resource for agricultural production is land and water. However, a number of farmers lost their lands to other investors and have to work on lands and resources that do not belong to themselves anymore (Abonyi, 2005).

Credit and cooperatives: In general, farmers had not been successful in organizing credit loan from cooperatives, they usually did not intend to use loan to enhance their quality of life through agricultural activates but used loans for other ways which did not yield further incomes (Abonyi, 2005).

Agricultural subsidies: The government subsidies in agricultural inputs and employment often come into only economic instigation rather long-term impact on agricultural production, land use, and the rate of mechanization (Abonyi, 2005).

Water as a scarce resource: Water resources are rather more important than land and has been the defining element of Thailand's social economic products. This necessity was reflected in the allocation of 60% of national agriculture budget to the Royal Irrigation Department for the construction and maintenance of irrigation projects (Abonyi, 2005).

Institutional reform and political change: The general institutional and political environment of agriculture have been considered important impacts. Historically, the powerful role of the central government was being redefined. Under the new constitution, and reflected in the 8th NESDP onward, Thailand's traditionally centralized "top down" approach to development was altered into a more pluralistic and decentralized system of authority (Abonyi, 2005).

2.1.3 Evolution of Thai National Policy in Agricultural Sector

Table1 below shows a summary of Thai agricultural policy as issued in accordance with Nation Development Program as National Economic Development Program (NESDP) in each period of time.

Table 2.1 Evolution of Thai Agricultural Policy

Planning period	Major agricultural development policies	Implications
1st/2nd NESDP (1961–1971)	• Accelerated agricultural growth through the promotion of Green Revolution technologies. • Provision of agricultural credit.	• Expansion of agricultural land. • Change from subsistence oriented to commercial agriculture. • Increased adoption of HYVs, farm mechanization and chemical inputs.
3rd/4th NESDP (1972–1981)	• Support for export of agricultural products. • Expansion of agricultural land • Provision of subsidized agricultural credit.	• Expansion of monoculture agriculture. • Growth of large commercial farming. • Infestation of paddy particularly with brown plant hopper. • Large scale deforestation.
5th/6th NESDP (1982–1991)	• Improvement in marketing efficiency and competitiveness in the world market. • Promotion of export based agro-industries.	• Changed from ‘extensive’ to ‘intensive’ agriculture. • Began to lose comparative advantage. • Decline in agricultural area. • Adverse effect of inorganic pesticides on farmers’ health.
7thNESDP (1992–1996)	• Attention towards sustainable agriculture. • Promotion of agro-industries. • Restructuring of agriculture to increase productivity and produce high value-added products.	• Increased production of high value fisheries and livestock products • Water, soil, and environmental degradation.

Planning period	Major agricultural development policies	Implications
8thNESDP (1997–2001)	• Promotion of sustainable farming practices. • Promotion of organic agriculture. • Promotion of the farming that utilizes both organic and inorganic inputs. • Promotion of agro-industries.	• Increased sustainable farming systems. • Increased use of organic inputs. • Increased production zoning and export.
9thNESDP (2002–2006	• Emphasis on food-safety through the adoption of Good Agricultural Practices (Yusuf, Gunasekaran, & Abthorpe).	• Increased farmers' awareness of the advantages of organic agriculture. • Adoption of GAP by farmers.
10thNESDP (2007–2008)	• Promotion of an organic agriculture. • Emphasis on food-safety. • Promotion of organic agriculture • Promotion of farmers' knowledge through the community learning center.	• Increasing area under farming. • Enhanced farmers' knowledge on local sustainable agricultural practices.
11thNESDP (2008–2016)	• Promotion of quality life in farmer level. • Promotion of competencies in production, management of agricultural product and food security. • Promotion of effectiveness, balances and sustainability in use of agricultural resource.	• Increase education level, income and standard work in farmers. • Increase product quality and sufficiency to all demand level, and improve value added into agricultural product. • Improve agricultural supplies and facilities to accommodate water resources, land quality and fishery.

Planning period	Major agricultural development policies	Implications
12nd NESDP (2016–2035)	• High promotion of innovation and technology. • Sustainable development and sufficiency. • Creation of smart farmers which cloud manage sustainably, effectively, optimistically and ecofriendly. • Promotion of competencies by integration in cluster coordination.	• Input the innovation and technology attitudes into farmers. • Supporting land use and public finance for farmers. • Encouraging the use of the philosophy sufficient economy in all levels of agricultural activities. • Instigation of area-base agriculture and cluster farming are expected to fully integrate whole supply chain. • Improving skills, especially on using technologies to reduce cost of agricultural production and create value added and make self-marketing.

Source: Abonyi (2005); Akkermans, Bogerd, Yücesan, and van Wassenhove (2003); NESDB (2016)

Thai agriculture has transformed in principles, since the deployment of the first NESDP in 1961. The development policy in agriculture was considered a key success factor in this development plan. Initially, the policy intends to emphasize increasing production through the promotion of Green Revolution technology until the year of 1997 that the country was in a severe economic crisis. The main goal of the agricultural scheme from first to the sixth NESDP focused on boosting the production of rice primarily for export. Several agricultural researches were therefore raised on export of agricultural products such as rice, coffee, paper, maize, jute and cotton (NESDB, 1961). Similarly, popularity grew for the expansion in the area for economic crops. In this regard, the government established Regional Agricultural Research Centers to encourage the production of export crops such as rice, rubber, maize, sorghum, banana, cotton and oil palm (NESDB, 1967). Important policy tools adopted to instigate agricultural production were the promotion of high yielding varieties (HYVs) of crops, use of modern agricultural machinery, inorganic fertilizers and pesticides. The government made provisions to extend credit to the farmers through the Bank of Agriculture and Agriculture Cooperatives (BAAC)as well so as to enable them to deploy modern agricultural technologies and create facilities required to produce export commodities. As a combined effect of such policy tools, Thailand's agriculture progressively reformed from a semi-subsistence, domestic market-oriented agriculture to an export-oriented, commercial agriculture. Therefore, the agriculture sector changed into the driving engine of Thai economic growth, with an annual growth rate of 5.7% during the 1960s and early 1970s (Poapongsakorn, Anuchitworawong, & Mathrsuraruk, 2006). The agricultural development scheme adopted during the 1980s and 1990s emphasized an improvement of production efficiency to meet higher incomes per unit of land and labor. Correspondingly, the scheme pushes an increase of marketing efficiency for sake of boosting the productivity and competitiveness of the agricultural products in the world market. During this period of time, the government encouraged the private sector to play an important role in the national economic restructuring program. As a result, the various schemes issued to support economic crops to change from an extensive to an intensive agriculture. Then, the government scheme resulted in providing several high-quality grains and seeds and inorganic fertilizers to empower all farmers to increase product

yields, and encouraged them to combine their scattered groups into agricultural cooperatives in order to improve negotiating power (NESDB, 1982). For an instigation of the country's export in the agricultural products, the government also introduced the promotion of agro-industries (NESDB, 2002). Therefore, Thailand was changed from an agricultural dominant country to an industrial dominant one. Even through this transitional period, the agricultural sector had continued growing at a fairly high rate.

Furthermore, the agricultural production growth touched the level growth incentive schemes, but agriculture started to lose their comparative advantages by in dropping in price of agricultural products in the 1980s. When the potential export crops stagnated and contributed to lower profitable, the dynamic of agricultural growth turned downwards during this period (Poapongsakorn et al., 2006), and since then, investment in agricultural development had declined respectively (UNDP, 2007). According to the using of excessive of chemical fertilizers and pesticides, the quality of soils and water resources gradually declined. In addition, the deterioration of resources spread across nationwide (NESDB, 2002). The high degree of exposure to pesticides resulted severely in health, and the extra cost burden, especially from the chemical fertilizers, also led to heavy indebtedness of the farmers (Sathirathai S & Pioolsravut, 2004).

In term of natural resources, an excessive ordination on economic growth schemes caused the deterioration of natural resources and dramatic decline the in national environment, such as poor air quality and high rate of deforestation. As a result, Thailand commenced implementing sustainable development since the 1990s. This was officially conducted in the context of sustainable development for the first time as a policy agenda in the seventh NESDP (1992–1996). The implementation of this scheme also corresponded with the adoption of an Agenda 21 by the Thai government at that time. The main objective of the seventh NESDP was intentionally to preserve a sustainable level of economic growth along with sustainable management in environmental and natural resources. In agriculture, the scheme required a raise to productivity with regard to create high value products in each specific location. Therefore, the Ministry of Agriculture and Cooperatives (MOAC) initiated support for the production of processed high value agricultural products, such

as fisheries and livestock products that contribute in higher economic benefit to farmers as well as identification of high in non-stabilizing in product pricing. Nevertheless, the government also issued the scheme of Restructuring of Agricultural Production System (RAPs), which change the agricultural plantation characteristics from a mono-plantation (one agricultural product oriented) to a higher diversified plantation toward the production of high value food products. In spite of the early initiatives, there was none-vital change in the agricultural development rule until the period of eighth NESDP (1997–2001) period. These conservative agricultural schemes still focused on increasing productivity of agri-processing and assisting to new agri-business operations for producing varieties of agricultural products.

In 1996–1997, the Thai economy experienced serious economic problems from pushing too much on economic growth policies, which led to failed and unproductive investments. This circumstance brought attention of Thai policymakers to reconsider feasibility of the growth-oriented policies and adjustment with regard to further agricultural development scheme to reshape national economic situation. Since then, the government schemes especially in the agricultural sector were motivated by the philosophy of a 'sufficiency economy' first mentioned by His Majesty the King Bhumibol Adulyadej the Great of Thailand in his national address disclosed in 1974 and repeated again in 1997 in the consequences of the national economic crisis in 1996–97. Intrinsically, the 'sufficiency economy' encourages moderation and reasonableness for self-immunity (Sathirathai S & Pioolsravut, 2004) and this royal approach also conforms to a principle of sustainable development. Main ideas of this philosophy comprised of three main pillars accordingly. 'Moderation' is defined as, not too much or too little as well as not being greedy or frustrating. This is a guide for finding an absolute balance between internal capabilities and external pressure, between the social needs at the grassroots and the imperatives of the global economy. 'Reasonableness' is defined as the foundation of reasonability, consisting of the causes, key elements and expected results of each action. 'Self-immunity' is defined as having resilience and ability to withstand expectancies, to deal with external changes and manipulate logically with unpredictable or uncontrollable circumstances (Hewison, 2008). The use of 'sufficiency economy' was mainly introduced by the sustainable development schemes in the eighth, ninth and tenth NESDPs. In the

agricultural sector, sustainable development was set to be achieved through three comprehensive strategies accordingly. The first is to ‘strengthen the farmers’ by the policy tools with regard to promotion of crop diversification campaign, reducing the use of chemical products and pesticides and making education and training support in the sustainable management of land and water usages. The second is to ‘strengthen of communities’, which concentrated on empowering the group of farmers and businesses in communities by the ‘One Tambon One Product’ (OTOP) program. For this scene, the government also made access of credit opportunities through the community for the farmer, using the source of funds for an investment and create additional. The third strategy is to enable higher business competencies in the agricultural sector to be more competitive in the international market by supporting of creating value-added in the agricultural products, as well as enhancing the product quality and standard, and using chemical substance agricultural practice in accordance with the international standards.

In the 21st century, the world consumption has trended towards healthy living and requires more food quality. In this regard, the Thai government made more modern national strategies to be compatible to global change in 11th NESDPs. This master plan emphasizes 3 distinct dimensions, which are smart farmer, promotion of competitive advantage in agricultural business, and sustainability of national agriculture (NESDB, 2008). This national road map in agricultural development expected to yield higher farmer’s performance and agricultural businesses that could cultivate valued agricultural products and make more economic value per unit of product by using good agricultural product standards and utilizing more technology and modern system management in their value chain in order to avoid risk in business cost coming from external and internal changes, such as high labor cost and lower in technological cost. Additionally, the sustainable economics initiated by His Majesty the King Bhumibol Adulyadej the Great of Thailand has been strongly influenced as the core development approach. This long-term strategy has been expected to have security of agricultural and natural resources toward higher human capital in the agricultural sector in creation of innovative agricultural products with high value added. Then, higher strategic and system management were required to be distributed to agricultural grassroots. However, because the agricultural workforce had a

relatively low education level in comparison to other sectors, this was also another challenge that the government and policy makers needed to take into account (NESDB, 2008). Interestingly, the agricultural strategy from government issued a crop zoning scheme to make systematic national framework in the 2012 to allocate varieties of agricultural product to match with geographical locations in the country and resources. This strategy was expected to solve the variation price and cost of agricultural products. As per those government support policies, Thai agriculture has seemingly been changed in pattern and attitude, but the agricultural mechanism as a whole still has been regulated by the mechanism of middlemen. Thai farmers or agricultural entrepreneur who perform business in an old fashion manner and none expecting of self-development could profit much from this system. As a result, the agricultural policies require new alternative reforms to revolve usual agricultural approach with significant social and economic changes. The 12th NESDP has issued recently in 2016 that this is the expectation of next 25 years for national outlook. The 12th NESDP was drafted during the military junta in early 2016, however, this development plan had mainly developed from 3 pillars which are expiation of national "Security", "Prosperity" and "Sustainability" (NESDB, 2016). This development intensively deploys the philosophy of sufficient economy initiated by His Majesty the King Bhumibol Adulyadej in all agricultural practices and also strives to embed uses of innovation and technology to differentiate from the classical agricultural practices. The sufficient economy philosophy from the 9th NESDPs was adjusted to accommodate change in the age of breakthrough digital and information technology. The policies emphasize integration of existing agricultural knowledge with all agricultural research to create new competencies in all agricultural dimensions (NESDB, 2016). Additionally, geographical indication of each area has been taken into account as a scheme to persuade farmers to cultivate various crops and livestock matching whatever condition and geographical location (NESDB, 2016).In this regard, the agricultural cooperative system was encouraged to assist farmers and agricultural business in geographic gathering for commencing area-based and cluster agricultures so as to increase commercial leverage. The significant policy made for those resolutions was initiating "the social enterprise strategy" to synergize power of public and private sectors to setup non-profit enterprise (called "Pracha Rat Ruk

Samakgi Limited") in each province of the country to assist grass root farmers and business in all dimensions such as finance, business marketing and innovative management (NESDB, 2016).

2.2 Enterprise Resource Planning

Enterprise resource planning (ERP) evolved from material requirements planning (MRP) and manufacturing resource planning (MRP), so as to accommodate an industrial requirement. Its name was given by the Gartner Group of Stamford located in Connecticut, USA in 1990. This company implemented its internal ERP system designed to empower its business operation. A corroboration between Siemens Company and SAP, a German based software company, initiated an implementation of the enterprise-wide ERP system in 1987. In 1988, Dow Chemical Company implemented its internal ERP system designed to empower its business operation on a global scale (Schaaf, 1999). Thereafter, the ERP market has grown worldwide and proposed to reach up to approximately $70 billion by 2004 (Chian-Son, 2005).
With the emergence of global value chains, ERP systems are expected to be a core and essential component for business enterprises that propose to have further connection of supply chain management systems to be extended ERP (EEP) systems which integrate inter-company and international collaborative operations across the entire industry processes instead of only inter-connections within only a company. Therefore, the usefulness of the post-implementation ERP systems has become an essential indicator for the business success. Nowadays, several organizations, including profit and nonprofit organizations, have recognized the necessity of the ERP, not just whether the ERP system is required, but rather with how could be able to make successful implementation in ERP system (Chian-Son, 2005).

In terms of meaning, the ERP was defined as a level of cross-functional integration in an organization or single database and platform of business applications (Davenport, 1998). The ERP is very essential to integrate together all business functions and locations, especially with respect to earlier generations of systems (Gattiker & Goodhue, 2002). The ERP implementation practically contains multiple

organization element and process model together (Jacobs & Whybark, 2000; Markus, Axline, Petrie, & Tanis, 2000).

The ERP system has been considered as a combination package providing support for fundamental activities of an organization such as manufacturing and logistics, finance and accounting, sales and marketing, and human resources. The ERP system has been designed to support many different parts of the organization for the sake of data and knowledge sharing, cost reduction, and improving management of business processes.

Concerning the failure for business operation, several ERP systems fail to be a key business driver (Stratman & Roth, 2002). Several ERP systems have experienced implementation difficulties because of workers' resistance. Al-Mashari and Zairi (2000) claimed that successful operation of the ERP causes by change strategy development and deployment, change management techniques, project management, organizational structure and resources, managerial style and ideology, communication and coordination, and Information system function characteristics. Use of change management strategies to overcome workers' resistance and enhance the infusion of the ERP in the workplace is another solution to reduce failure of the ERP adaptation. Although some studies tried to identify issues by identifying change management strategies that simplify the success of the ERP implementation, several ERP systems still face resistance (Adel, 2001).

According to C.-S. Yu and Tao (2009) several of the literature on the ERP system emphasized two major fields. The first one is evaluating the suitability of ERP systems' software, vendors, and consultants. The second one is that the Critical Success Factors in Enterprise Resource Planning (CSFs) affect ERP system's implementation success, such as ERP Teamwork & Composition, Top Management Support, Business Plan & Vision, Effective Communication, Project Management, Project Champion, Appropriate Business, and Legacy Systems. Table 2 below concluded the main factors and the degree of citation for each factor in literature in the ERP related to support idea of Shatat (2015); (C.-S. Yu & Tao, 2009).

Table 2.2 Conclusion of Main Factors and The Degree of Citation for Each Factor in Literature in The ERP Related

CSFs in literature	Degree of citation in literature	References
Top Management Support	High	Ang et al. (2002); Al-Mashari et al. (2003); Yusuf et al. (2004)
Project Management	High	Umble et al. (2003); Yusuf et al. (2004); Al-Mashari et al. (2003)
Business Process Reengineering	High	Umble et al. (2003); Yusuf et al. (2004); Al-Mashari et al. (2003)
User Training & Education	High	Mandal and Gunasekaran (2002); Umble et al. (2003); Sum et al. (1997)
User Involvement	High	Bingi et al. (1999); Burns and Turnipseed (1991)
Business Plan & Vision	Medium	Loh and Koh (2004); Somers and Nelson (2004)
Careful Package Selection	Medium	Wei and Wang (2004); Shehab et al., (2004)
Change Readiness & Culture	Medium	Hong and Kim (2002)
Clear Goals & Objectives	Medium	Umble et al. (2003); Yusuf et al. (2004)
Learning Competency	Medium	Zhang et al., (2002)
Minimal Customization	Medium	Somers and Nelsons (2001)
Monitoring & Evaluation of Performance	Medium	Holland et al. (1999)
Project Champion	Medium	Akkermans et al., (2000)
Strategic IT Planning	Medium	Somers and Nelson (2004);
Teamwork & Composition	Medium	Loh and Koh (2004); Remus (2006)
Vendor Support	Medium	Motwani et al. (2002); Yusuf et al. (2004)
Appropriate Business & IT Legacy Systems	Low	Holland et al. (1999)
Data Analysis & Conversion	Low	Zhang et al., (2002)
Education on new Business Processes	Low	Woo (2007)
Partnership with Vendor	Low	Somers and Nelsons (2001)

Comparing firms' performance with and without the ERP, firms that adopt ERP perform more productive and financially well and are listed in the stock exchange (Hitt, Wu, & Xiaoge, 2002). The firm's performance usually performs very well under adoption of the ERP (Anderson, Banker, & Ravindran, 2003). Gattiker and Goodhue (2002) states that most of American Production and Inventory Control Society (APICS) that the ERP is the key performer to transform a predecessor system of firm to be improved. In the 2001 survey of APICS members, IT groups and others with approximately 70% of respondents returned that the ERP systems were 'successful' or 'very successful'. But, 30% mentioned as 'neutral' or 'disappointing' (Mabert, Soni, & Venkataramanan, 2003). McAfee (2002) mentions after 10 months on longitudinal investigation of a company's archival data that the firm's performance declined under initial adaptation of ERP, but ultimately made a dramatic increase over existing performance when the ERP system was firmly in place.

The ERP effectiveness could be dependent by organization structure and the ERP is more deliverable in the organization with centralization process or with high standards (Gattiker & Goodhue, 2002, 2004).

2.2.1 ERP Systems and Business Processes

Association between the ERP business processes, and the obligations of ERP system are subjective to the organization's ERP package selection and structural decisions. All decisions are normally made at the organizational level in the organization. Conversely, the configuration process and related decisions on business processes should be the main focus. Understanding the level of organization that processes are executed is very essential in terms of local or subunit of the organization (subunit indicates individual functional areas, such as departments, or operating locations, such as manufacturing facilities (Gattiker & Goodhue, 2002, 2004).

From literatures of the organization implementing ERP, the capabilities of the ERP platform are limited to only allowed business processes. Since, the level of analysis changed to the individual subunits making up the organization instead, a decision hierarchy of organization becomes marginally more complex: At the subunit level, the ERP systems constrain business processes because NSO(1) (2016), they are

packaged software and (2) they are configured at the organization level(Gattiker & Goodhue, 2002).

2.2.2 Motivations for ERP-Driven Business Process Change

The ERP configuration process could affect how and how much the ERP will constrain existing business practices (named as legacy practices). Normally, a decision hierarchy is centralized to each department unit or corporate committees. Nevertheless, there four types of motivation regarding to whether process change is required to make fit to the ERP platform of the organization. Figure 2.1 presents the whole picture of the driver of process changes and ERP modification.

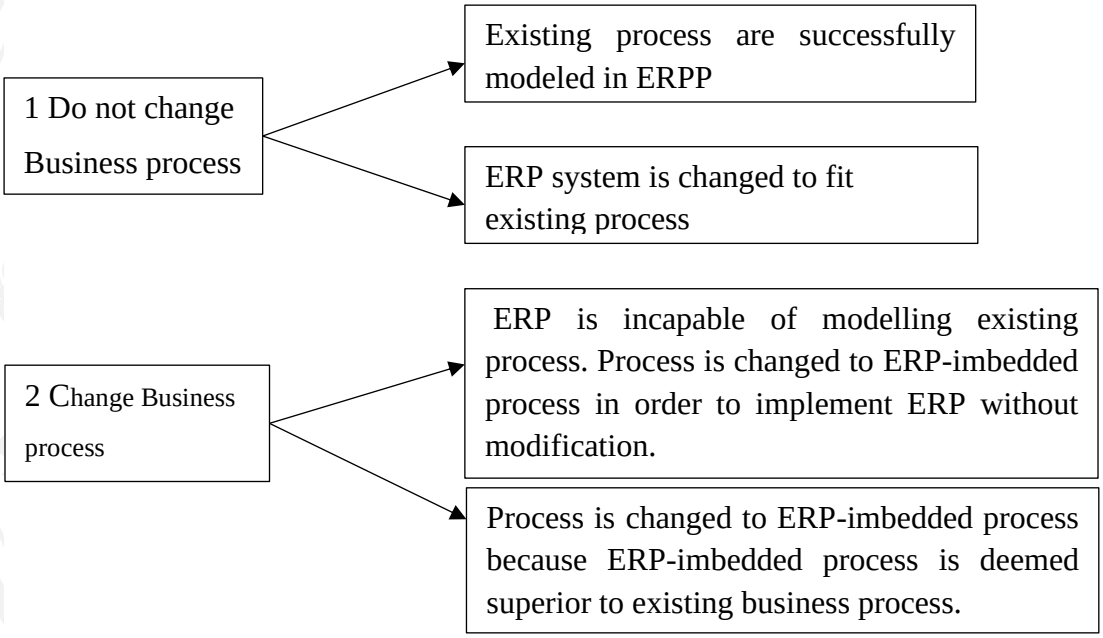

Figure 2.1 Driver of Process Change and ERP Modification
Source: Gattiker and Goodhue (2002)

Figure 2.1 shows feasibility of whether change is required as per various motivations with regard to a combination between ERP package and organization legacy practices. On one hand, in concern of no change needed in business process is caused by two motivations which are the organization subunit would have no imperative to change of their legacy business processes during the ERP implementation and the organization may change the ERP system to fit an existing

business practice. For the case when the ERP is changed to fit with the existing process, this may require intensive code modification. However, the ERP software developer prefers modification of existing business to match software setting instead (Soh, Kien, & Tay-Yap, 2000).

On the other hand, there are two kinds of motivation resulted in the changing of business process in essence that the ERP is incapable of modelling exiting process and the process is changed when the ERP-embedded process is far superior to the existing business process. Wallsten (2000) estimated that approximately 20% of the typical organization's existing processes is incapable to be modelled in SAP. In this situation, the ERP practitioner and experienced managers believed that these legacy practices were normally inefficient and preferred to have the process reengineered along with the adjustment of ERP-embedded processes to raise overall performance and establish a new standard (Connolly, 1999; Pereira, 1999).

2.2.3 ERP in Agricultural Sector

In the agricultural sector, operations management, inventory management, and supply chain management have all been applied to the agricultural producing process. As a result, the government and private sector tend to promote the implementation of the ERP in order to enhance operational efficiency of large-sized businesses. The ERP system manages production, logistics, finance, accounting, sales, purchasing and inventory into an integrated process. The ERP also supports the decision-making of new tasks by using shared information in existing work base (Jin Hyeung, Jung Rock, & Young Chan, 2015).

In a specific way, the ERP system can identify the best fit software package to the business specific process (especially in agricultural sector) (Laudon, 2010).

The utilization of ERP in agriculture has regularly been recognized as limited. The ERP systems perfectly match with the demands of efficient supply chains that have been categorized as unwavering business processes and low demand ambiguity. Conversely, because this industry usually has a high fluctuation rate in terms of supply and demand in production and logistics practices, an old-style ERP is not resilient enough in changes (Akkermans et al., 2003; Koch, 2007; Rettig, 2007). In difficulties presented, the ERP is incapable to capture in specific functionality because

the agriculture business was a small market for the ERP developer to push more innovative development of the specific task. However, this decade of information system and technology development has given rise to transformation of ERP; from ERP into ERPII process that progresses into web-based, open sourcing and componentized based on Service-Oriented Architecture (Boyd & Fishbein, 1937; Charles, 2005).

An adoption framework in an ERP system contains different actors, processes and elements, which comprise of distinct phases as follow. The model of Rogers (2003) identifies five stages of an adoption process:

1) A knowledge, which is the learning of the innovation's existence and becoming familiar with its function.

2) A persuasion, which is a formulation of a favorable or unfavorable attitude to an innovation.

3) A decision, which chooses to adopt or reject an innovation

4) An implementation, which puts an innovation into use.

5) A confirmation, which strengthens or reverses prior adoption.

2.2.4 The Development of the ERP System in Agriculture

In case of South Korea, an agricultural business has a number of the constraints in using of the ERP technology and the lack of understanding the venders of agricultural products. Since 2007, the Korean government has recognized the requirement of the ERP system in agriculture. As a result, the Korean government employed a policy for introducing the ERP system to one hundred agricultural organizations (Jin Hyeung et al., 2015). The ERP adoption processes have transformed from a personal system to a single integrated system. In the ERP adoption in businesses should be able to evolve from an individual process to a single integration process. The developmental periods of the ERP system in agriculture are presented as follows.

Firstly, the ERP system is fully implemented by optimization of a single agricultural unit of organization. But the system incurs relatively high initial installment, maintenance and repair costs (Jin Hyeung et al., 2015).

Secondly, an integrated version of ERP in agriculture has adopted by the firm level. Nevertheless, this version of the ERP is relatively ineffective because the firm requirements are incapable of delivering and making incremental upgrades (Jin Hyeung et al., 2015).

Thirdly, the agricultural ERP has been developed as a rental system. The ERP system services have developed in a larger and standardized way to capture the general needs of the organization. In the agricultural sector, some organizations deploy the rental type of ERP system partially because the generalized product is able to perform well on each specific agricultural function, such as accounting and tax management (Jin Hyeung et al., 2015).

Fourthly, the ERP system in agriculture has changed the production positioning to the system with an integrated standard system and expansion development. The ERP system relatively depends on the process that customizes specific agricultural purposes conducted. In addition, the ERP system has been designed to be more resilient and scalable through customization, that practice to be easily compatible with the business and features of an agricultural organization (Jin Hyeung et al., 2015).

In the Dutch horticultural sector, configuration of the ERP with the specific characteristics and requirements of each organization have been considered as a primary challenge to benefit from the ERP. The research outcome presented in detail that compatibility between specific ERP solutions with the organization's business processes implementation, is the challenge for success of the ERP adoption and implementation. Additionally, the implementation process of the ERP adaptation also has to include embedding standard ERP into each specific layer, a proper management of the orientation, selection and implementation processes (Pollux, Hall, Roebuck, & Guo, 2013).

Industrial agriculture has dramatically grown over the past decades. Farms and other agricultural organization have been readjusted further to gain a higher technological standard that are transformed to have a larger production base and to use technology more intensively. In the economy nowadays, the business arena has been intensively competitive and unpredictable, being capable to balance business operation has become a competitive advantage. Consequently, having a precise

information system with regards to flexibility, integration and incorporation for organization intelligence can lead upon future business decision making (Sørensen et al., 2010; Wolfert, Verdouw, Verloop, & Beulens, 2010).

2.2.5 Barriers for Adoption of ERP

The barrier cited most as a drawback in adopting the ERP is the alignment of ERP with the specific characteristics and requirements of the implementing organization. The most mentioned barriers are perception of a low compatibility of the ERP with the specific values, practices and beliefs of each organization. Unsurprisingly, agricultural business such as horticultural supply chains will always depend on improvisation, and consequently will lack a well-structured administrative organization in dealing with high dynamics. The requirement analysis always mentions a composition's lack of indications on how the ERP solution should be matched with the original process of the agricultural organization. In other words, the analysis shows that the agricultural sector does not intend to sufficiently evolve their program to fit together with the ERP process (Verdouw, Robbemond, & Wolfert, 2015).

For implementation stage, insufficient fitting of the evaluated ERP solutions with the business processes of horticultural organization has held significant contribution. In further consideration of implementation, the barrier of the ERP in Dutch agriculture is inherited by the original value in the organization, unique to the daily process in original way that may prevent the adoption of the ERP. However, there are many barriers during process of the ERP implementation, comprising of insufficient planning quality, ineffective schedules and ineffective arrangements using as implementation processes guideline. These barriers could result in a lack of accurate management accordingly (Verdouw et al., 2015).

With concern to the organization, insufficient ERP knowledge and understanding, process complexity and proper evaluation process of adopted process with the ERP have been considered drawbacks in view of the readiness of agricultural organizations. In addition, some concerns raise that if we proceed with a change process in the ERP, will the cost of adopting process is still higher than original business operation. The agricultural entrepreneurs always decide in a cost-effective

manner that sometimes means that the ERP is always the choice (Verdouw et al., 2015).

2.2.6 Important Drivers for Adoption of ERP

The long-term benefit is the most critical driver in the ERP adaptation, and the most mentioned benefit of the ERP adoption are better transparency, control and planning of the business processes which is an integration toward efficiency improvements. In addition, a proper deployment of strategic choice for the type of ERP solution; such as standard and customized software and compatibility with business processes of the agricultural organization are very important for the ERP to become a long-term benefit in reality because proper ERP selection with high implication with business operation yields whole process efficiency towards the quality of decision making in each layer of organization (Hsu, Lai, & Weng, 2008; Ngai, Law, & Wat, 2008).

To accelerate ERP adoption, top management must drive to enforce and make use of the ERP process intensively by influencing of strong entrepreneurial culture in agricultures. In this regard, a communication technique of theme in each agricultural firm is essential to an existing structural hierarchy in an original way and is accelerated with the ERP communication diffusion (Verdouw et al., 2015).

In terms of cooperation, a relationship between users in adopted organization and ERP suppliers are important to make the adoption process perform effectively, then the level of expertise for venders in process implantation and understanding of change in user characteristic toward the users' adoption of the ERP are determined to make the transition of a new system smoothly (Verdouw et al., 2015).

In term of trading, the cost of the implementing ERP system must be reasonable enough to visualize a possible benefit in terms of cost savings in order to determine whether or not to proceed (Verdouw et al., 2015).

2.2.7 Effect of the ERP System in Agriculture

In general, agricultural goods have been characterized by a distribution process. The accuracy with regard to harvesting yield per specific period is rarely predictable. Furthermore, product flow and inventory of agricultural goods are less manageable according to the limitations of standardization. Most farmers proceed with their day-to-day agricultural activities by feeling and experiences without standards, data collection and analyzing, so adopting an ERP system into their normal workflow could be a solution for efficient process management and lead to high accuracy in product forecast (Jin Hyeung et al., 2015). The effects of ERP in agriculture are explained accordingly.

Firstly, the ERP system leads to standardization toward optimized business processes in the business process (Jin Hyeung et al., 2015).

Secondly, the ERP system can contribute to higher accuracy of information, and centralized information toward real-time monitoring. Furthermore, the ERP system brings mutual information sharing by a central computer server. As a result, the ERP system incurs rapid and accurate decision-making by receiving accurate data in real time (Jin Hyeung et al., 2015).

Thirdly, the ERP can contribute to the accuracy of inventory management. Once the system is fully implemented, especially in the inventory and emerging of cost saving could be more distinct due to process optimization (Jin Hyeung et al., 2015).

Fourthly, adoption of the ERP system can yield an increase in operation efficiency and optimize control of mechanical equipment (or other agricultural equipment related) toward work orders. Additionally, the work data can be recorded real-time to ease of monitor and make reconfiguration for other specification changes.

Fifthly, operational efficiency can be dramatically enhanced. Time in the process cycle is monitored and readjusted to meet the fastest time to make processes flow efficiently from a mutual information sharing system of the ERP. In addition, time optimization improves product quality mutually by centralizing the real time information system (Jin Hyeung et al., 2015).

2.2.8 ERP in Agricultural Sector in Thailand

There are no distinct achievements of the ERP adaptation in Thailand's agricultural business yet. It is normally found in corporate organizations rather than agricultural businesses and smaller businesses. However, there are many possibilities for further adoption and change striving for a new agricultural business pattern where the ERP could potentially become a solution. According to the 12th NESDPs, Thailand has strongly strived to restructure for the Industry 4.0 policy in all national development aspects that emphasizes system optimization and use of integration of information. As a result, integration system with small business unit would be focused and this is identical to the ERP concept. In addition, the Thai government in this 21st century also subsidizes several startup campaigns to use information systems and creativity to refuel businesses performance, and intends to reshape traditional agricultural practices with new alternatives that originate from cluster integration and create agricultural competencies through an application of innovation and technology (NESDB, 2016).

According to Thai National Statistics Bureau (NSO), the average wages of the Thai people has gone up twice in a decade as per Figure 2.2 below (NSO(1), 2016). This would majorly impact future labor costs.

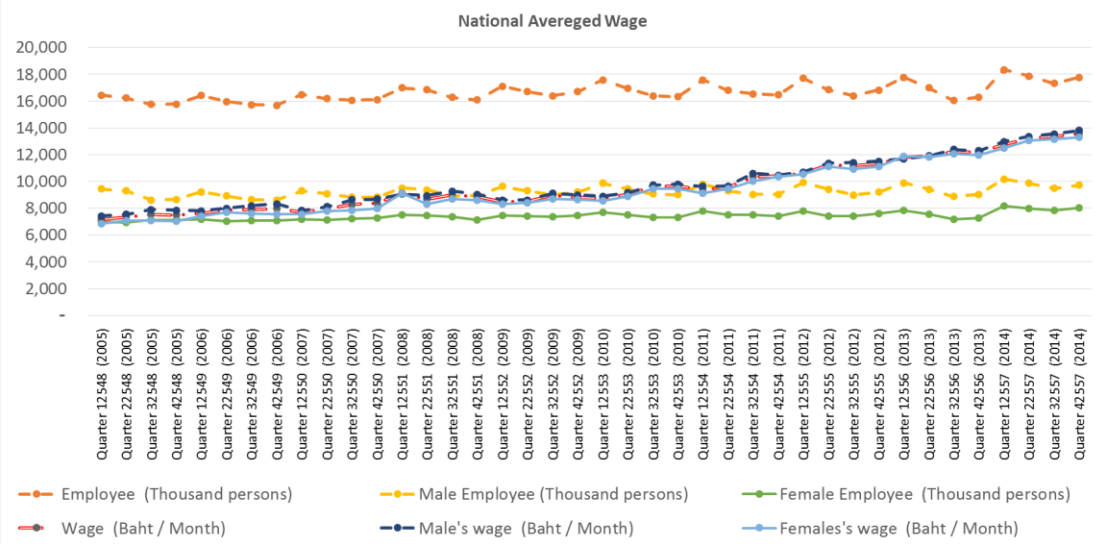

Figure 2.2 Averaged National Income

Source: NSO(1) (2016).

According to Thai National Statistics Bureau (NSO), use of information and communication technology of Thai people has gone up surprisingly over a decade as per Figure 2.3 below NSO(2) (2016). The use of mobile phones and the internet have dramatically increased, which implies that Thai are getting familiar with using information and have started to blend the use of technology into their life simultaneously.

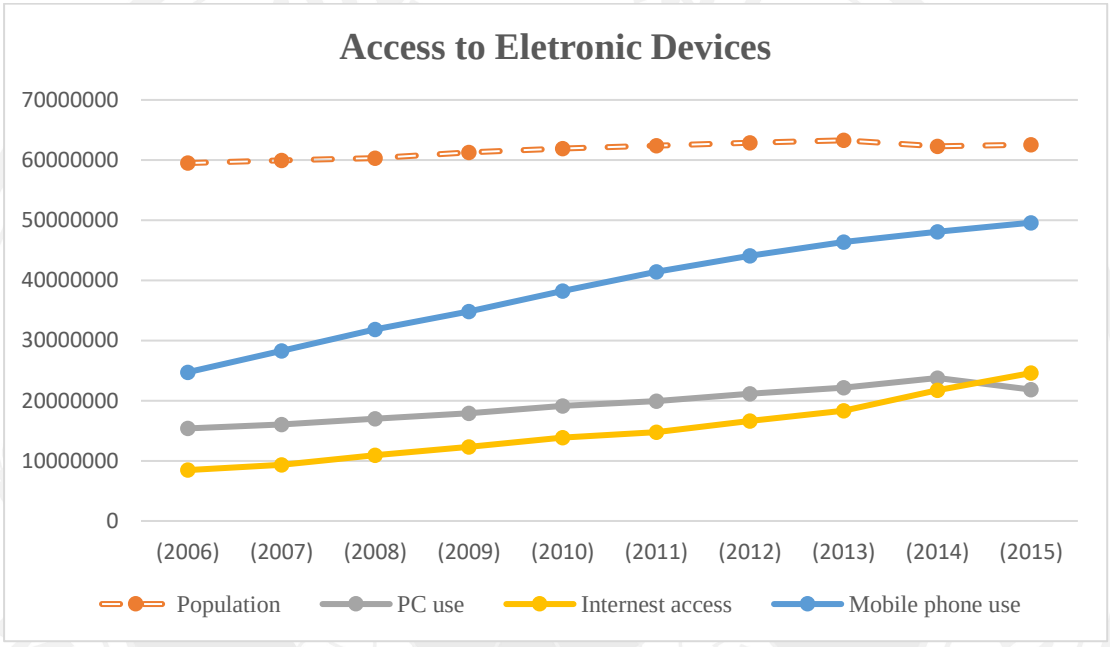

Figure 2.3 National Figures of Using of Information and Communication Technology
Source: NSO(2) (2016)

From those national figures, there is a gap in the expectation for finding potential use of the ERP in the agricultural sectors, especially SMEs or smaller size businesses to upgrade their working performances and competitive advantage with regard to integration of information inside the small to medium agricultural organizations.

In Thai research, the ERP has been studied in concert with other business sectors such as education and high-tech industry, the agricultural sector has rarely found the publication. There are some scholars that study the factors influencing the success of the ERP system of the agricultural business in Thailand. Those studies

focus on both the business management and technological deployment aspect. The scholars focus on the influenced factors of success in ERP usage which comprise of Top Management Support Business Process Re-Engineering, Education and Training, Information Quality, System Quality, Perceived Usefulness and User Satisfaction (Duangekanong, 2014).

2.3 Technology Adoption

Technology-specific tasks can be implemented in two different ways. One way is to use information technology through scenario changes and exploit the technology characteristics as much as possible. Another way is to receive advanced technology to retain being the technology liberated so as to develop from a technology to one another (William, Kent, & Dhruv, 1991).

Technology adaptation is defined as an information system as logic modification guided by information about individual technology primitives and the technology itself. The information about the technology primitive refers to size, driving capacity, technical units, delay, binary operation, and path dependency information between input and output. The information about the technology refers to estimation of size, estimation from the generic primitive of a specific information technology techniques is included during implementing of the target technology. This information must be applied by a transformation at the lowest technology dependency to an appropriate level of use (William et al., 1991).

In strategic management, specifically a concept of the resource-based view of the firm (RBV) have theoretically supported the role of organizational characteristics as influenced by innovation adoption. The RBV is a principle of competitive advantage that emphasizes the link between a firm's internal resources, strategy, behavior and performance (French, Raven, & Cartwright, 1959). Therefore, the RBV implies that the deployment of innovation is recognized to be cheaper and more attractive to some firms and organizations. In other words, the firms which intend to deploy technology adoption could appear to own the resources that contribute the comparative advantage in developing new processes or products (Lockett & Thompson, 2001).

There is a model proposed by (Rogers, 2003) explaining the theory of innovation adoption. This model focuses on the innovation-decision process that is "the process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to form an attitude toward the innovation, to decide to adopt or reject, to implement the new idea, and to confirm the decision" (Rogers, 2003). This model has been widely used in social science, especially in the adoption of technology in rural development. In addition, the Roger model has successfully performed matching innovation adoption of technology to both business organizations and individual consumers (Rogers, 2003).

In 1995, the Diffusion of innovation (DOI) was proposed by Rogers (1995) This time, the adoption of innovation was reconstructed as a process of information collection along with an uncertainty avoidance view to value technology (Rogers, 1995).However, this proposal is quite strongly supported by an individual's decision on using technology with regards to perception of the technology such as advantage, complexity, compatibility and trialability (Rogers, 1995). According to Agarwal and Prasad (1998), there are three main pillars that are strongly accepted as success factors with regard to the adoption of technology in many empirical studies of the DOI that comprise of relative advantage, compatibility and complexity. In contrary, some studies have stated that the adoption of technology regarding information systems is relatively suitable for organization hierarchies rather than consumers (Agarwal & Prasad, 1998).

According to the above literatures that are broader in scope of technology adaption, this research proposes to be deeply specific when considering the organization unit, then the adoption of technology is to be specific in the scope of the enterprise.

2.4 Technology Acceptance Model

The Technology Acceptance Model (TAM) by Viswanath. Venkatesh and Fred D. Davis (2000) was developed from the theory of reasoned action Ajzen and Fishbein (2000) which suggested that an individual's behavioral intention to use a system is influenced by two beliefs. These are perceived usefulness (PU) and

perceived ease of use (PEOU) (Viswanath. Venkatesh & Fred D. Davis, 2000). TAM, proposed by Davis (1989) is used to excellently predict individual computer acceptance behavior (Ajzen & Fishbein, 2000). In TAM, the actual behavior of an individual to adopt a technology-based product could be predicted by the perceived usefulness (PU) and perceived ease of use (PEOU) of that individual (Davis, 1989).

The perceived ease of use is defined as "the degree to which a person believes that using the system will be free of effort" (Davis, 1989).

The perceived ease of use also refers to the degree to which an individual could use the product effortlessly (Davis, Bagozzi, & Warshaw, 1989). The perceived usefulness is denoted as "the degree to which a person believes that using a particular system could raise their job performance" (Davis, 1989). The perceived usefulness is addressed as possible satisfaction by increasing job performance and motivation on an individual level (Robey & Farrow, 1982).

The perceived usefulness is also absolutely related with system usage (Higgins, Thompson, & Howell, 1991). In some situations, the perceived usefulness is possibly subjective to the perceived ease of use. The reason is that, once an easier system is applied, a user who perceives ease of use would feel convenient and start to believe the usefulness of the system (Robey & Farrow, 1982).

In comparison, the usefulness is somehow intensely associated with usage than the perceived ease of use (Davis, 1989). In associative cultures, the perceived usefulness is not influenced by an intention to use usage (Anandarajan, Igbaria, & Anakwe, 2002).

In terms of organization, once the business contains many groups of individuals, the usefulness of business-level of TAM could be addressed as the number of benefits available by the company in use of new technologies, which is intuitively assessed by a key decision person of the company. Also, the perceived ease of use is defined as the degree to which business could be able to effortlessly attempt with the new technologies. The effort in this framework is referred by financial investment, employee training time, maintenance costs (Davis, 1989). From an organizational behavior standpoint, a number of studies found that the organizational decision behavior has not the rational and irrational components of individual

decisions only, but also the collective perception regarding the concerns of multi-dimensional organizational stakeholders (Nelson & Quick, 2006).

Figure 2.4 below presents a relationship in the TAM model by proposed of Davis (1989).

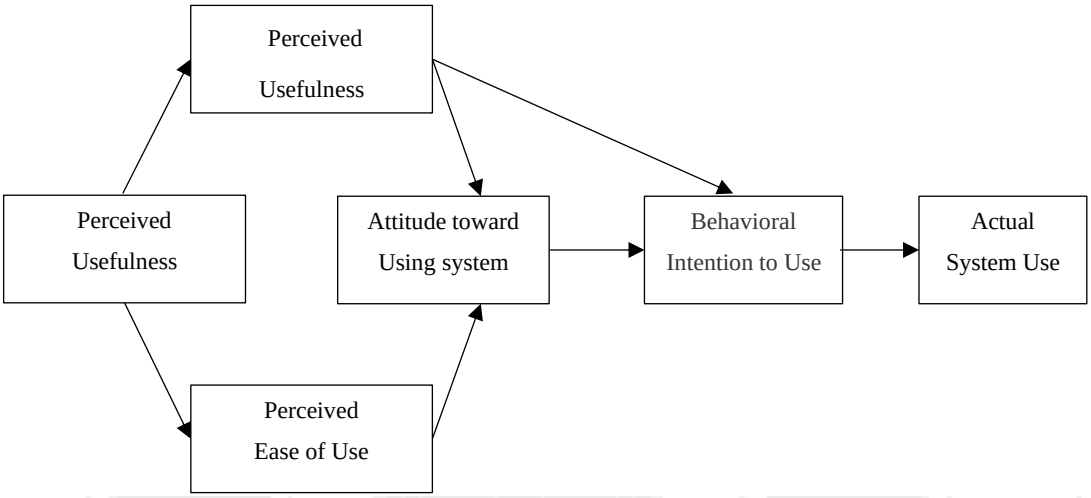

Figure 2.4 Technology Acceptance Model
Source: Davis (1989)

2.5 Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) model is a combination and adjustment of previous established models with relation to technology acceptance and usage that is raised by Viswanath and associated scholars (Venkatesh, Morris, Davis, & Davis, 2003). However, the UTAUT has been developed as an inclusive synthesis of prior technology acceptance research (Venkatesh et al., 2003). Intrinsically, the UTAUT model use theoretical framework based on the theory of reasoned action Fishbein and Ajzen (1977), the TAM Davis (1989), the motivational model Davis, Bagozzi, and Warshaw (1992), the theory of planned behavior (TPB) (Ajzen, 1991), a combination of the TAM and the TPB S. Taylor and P.A. Todd (1995) the model of PC utilization (MPCU) Thompson, Higgins, and Howell (1991) the innovation diffusion theory Rogers (1995), and the social cognitive theory Compeau and Higgins (1995). The UTAUT purpose is to create an explanation on the impact of the intention to use technology, which is

ideally comprised of performance expectancy, effort expectancy, and social influence and facilitating conditions. In addition, the UTAUT also attaches the moderating effect of four other factors such as gender, age, experience and voluntariness of usage to see more distinct changes (S. Taylor & P.A. Todd, 1995) . The UTAUT model configuration presented in Figure 2.5 below.

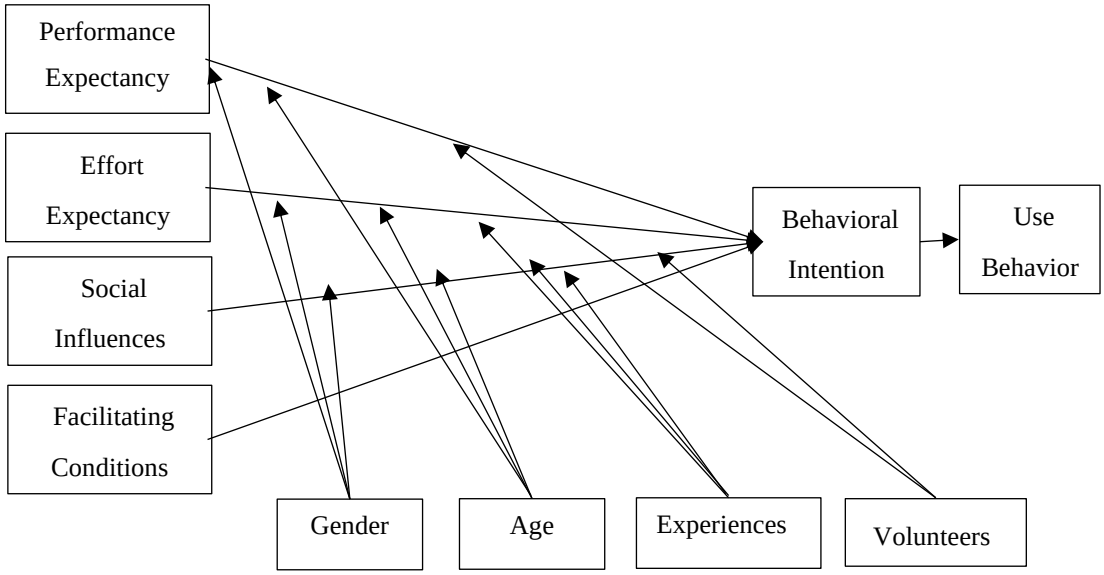

Figure 2.5 Unified Theory of Acceptance and Use of Technology (UTAUT) Model
Source: Venkatesh et al. (2003)

Regarding Venkatesh et al. (2003), the UTAUT has been created as a theory in monitoring IT use intentions and use behavior. In addition, there are 8 major concepts and theories behind establishing the UTAUT model.

Firstly, The TRA has been considered to be one of the most important and influential theories explaining human behavior. Furthermore, the TRA is initiated by attitudes towards behavior and subjective norms that are its core construct.

Secondly, the TAM has been established in the forecasting of IT acceptance and use in the workstation and has been accepted widely for types of technologies and users. The Perceived usefulness and the perceived ease of use are the core ideas in the TAM.

Thirdly, the motivation theory is deployed to recognize new technology acceptance and use by influences of extrinsic and intrinsic motivations (Davis et al., 1992).

Fourthly, the extended of the TPB included the parameter of perceived behavioral control has been successfully made to better explain the acceptance and use of various technologies of individual level (Harrison, Mykytyn, & and Riemenschneider, 1997; Mathieson, 1991; Shirley. Taylor & Peter A. Todd, 1995).

Fifthly, Cross combination in the C-TAM-TPB is renovated for prediction of the TPB with the TAM's perceived usefulness.

Sixthly, Theory of human behavior, offered the Model of Personal Computing Utilization (MPCU) to predict Personal Computing use. The MPCU contains six concepts which are job fit, complexity, long-term consequences, use influence, social factors, and facilitating conditions (Thompson et al., 1991; Triandis, 1977).

Seventhly, the innovation diffusion theory has redeveloped the properties of innovation explaining by a set of constructs for discovering individual technology acceptance. These constructs comprise of relative advantage, ease of use, the image, visibility, compatibility, the demonstrability of results, and the voluntariness of use (Moore & Benbasat, 1991).

Lastly, the social cognitive theory is applied and made further adjustment applied into the context of computer use. The model contains five key constructs. These are expected performance, outcome expectations, self-efficacy, impact, and anxiety (Compeau & Higgins, 1995).

The original UTAUT model has core components with providing their definitions and roles accordingly.

Performance expectancy is defined as "the degree to which an individual believes that using the system will help him or her to attain gains in job performance (Venkatesh et al., 2003). Initial ideas of this construct are perceived usefulness, extrinsic motivation, the job fit, relative advantage, and outcome expectations. The Perceived usefulness is claimed from the TAM and means "the degree to which an individual believes that system in place could increase job performance (Venkatesh et al., 2003). The extrinsic motivation is referred from the motivational model and used as "the perception that users intend to complete an activity, since they perceived to be reach valued outcomes that are distinct from the normal way in doing activity, such as pay and promotions" (Venkatesh et al., 2003). The job fit is referred from the MPCU and is defined as "how the capabilities of work system improve an individual's job

performance" (Venkatesh et al., 2003). Expected outcomes caused by the social cognitive theory and are discriminated into the level of performance and personal outcomes. The performance outcomes are dependable specifically with job-related outcomes, while the personal outcomes indicate an individual esteem and sense of accomplishment. Furthermore, The UTAUT model suggests that other control variables such as gender and age are moderated with the relationship between the performance expectancy and the behavioral intentions (Jin Hyeung et al., 2015).

Effort expectancy is defined as the "degree of ease associated with the use of the system" (Venkatesh et al., 2003). Fundamental ideas of this construct comprise of the perceived ease of use, complexity, and the ease of use. The perceived ease of use comes from the TAM and means as 'the degree to which a person believes that using a particular system would be free of effort". The complexity is referred from the MPCU and means as "the degree to which an innovation is perceived as relatively difficult to understand and use". The Ease of use is referred from the innovation diffusion theory and means as "the degree to which an innovation is perceived as being difficult to use". The UTAUT model recommends that gender, age, and experience moderated the relationship between the effort expectancy and the behavioral intentions (Jin Hyeung et al., 2015).

Social influence is defined as "the degree to which an individual perceives that importance of others believe could persuade using the new system" (Venkatesh et al., 2003). Fundamental ideas of this construct comprise of subjective norms, social factors, and image. The Subjective norms are usually involved in nearly all of the theories upon establishing of the UTAUT (Ajzen, 1991; Davis, 1989; Fishbein & Ajzen, 1977; Mathieson, 1991; S. Taylor & P.A. Todd, 1995) and means as "the person's perception that the importance interpersonal relationship should or should not perform the behavior in question". The social factors are referred from the MPCU and mean as "the individual's internalization of the reference group's subjective culture, and specific interpersonal agreements that the individual has made with others, in each specific social situation". The image is a factor in the innovation diffusion theory and means "the degree to which use of an innovation is perceived to enhance one's image or status in a single social system" (Venkatesh et al., 2003).

The UTAUT model recommends that gender, age, experience, and voluntariness moderate the relationship between social influence and behavioral intentions (Jin Hyeung et al., 2015).

Facilitating condition is recognized as the variable link to a direct effect on the system usage and means “the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system” (Venkatesh et al., 2003). Basis ideas of this construct is comprised of perceived behavioral control, the facilitating conditions, and compatibility. The meaning of the perceived behavioral control is based on the TRA and the TPB. The Perceived behavioral control “produces perceptions of internal and external constraints on behavior and included self-efficacy, resource facilitating, and technology facilitating condition” (Venkatesh et al., 2003). The Facilitating condition is referred from the MPCU and is “factor in the working environment that observer’s convenient to easy into use that includes the setting up of computer support and associated IT and non-IT facilities” (Venkatesh et al., 2003). The compatibility is referred from the innovation diffusion theory and means “the degree to which an innovation is perceived as being consistent with existing values, needs, and experiences of potential adopters” (Venkatesh et al., 2003). The UTAUT model recommends that age and experience moderate the relationship between facilitating condition and behavioral intention (Jin Hyeung et al., 2015).

Behavioral intention is recognized to have a direct effect on actual use of an individual in the technology. Basis ideas of this construct is referred from the TRA and means “a measure of the strength of one’s intention to perform a specified behavior” (Davis, 1989). Davis (1989) used this construct in management information systems through his TAM, modified of the TRA designed specifically for specific perspective of the information systems. Davis (1989) maintained the TRA’s operationalization of the behavioral intentions in the TAM. Even though there was no definition of the behavioral intentions in their initial development of the UTAUT model, they contended that they measured the behavioral intentions by using elements from Davis et al. (1989) that have been broadly accepted in most of the previous studies of individual acceptance (Venkatesh et al., 2003).

Use behavior also is recognized as incoming from the TRA. In the TAM approach, a generality of the TRA for explaining a scope of human behaviors have been applicable for examining the causes of computer use behavior as a special case Davis et al. (1989). The use behavior also is not clearly addressed in the development phase of the UTAUT model, even though it is measured through system logs. Hence, the system logs provided are used as a logical alternative and could be a favorite method for measuring use behavior in research of information systems (Venkatesh et al., 2003).

2.5.1 New Version of UTAUT or UTAUT2

Since the first publication, the UTAUT has been utilized as a standard model and has been claimed into the study in consent of diversity of technologies in both organizational and non-organizational matters. The UTAUT was initially established to describe employee technology acceptance and intention of use, but the theory has been criticized on how it can be extended to other contexts, especially the context of consumer technologies, which is nominated as a high profit growth industry covering the largest number of technological devices, applications, and services targeted at the consumers (Kwateng, Atiemo, & Appiah, 2019).

There are many applications and imitations of with full and partial of the model in organizational settings that have contributed to stimulate the generalizability (Derrick, Linying, & Chris, 2007). There are 3 general types of the UTAUT extensions or integrations.

The first type is an observation of the UTAUT in new contexts, such as new technologies (e.g., collaborative technology, health information systems; (Limayem & Cheung, 2007), new user populations Yi, Jackson, Park, and Probst (2006) and new cultural settings B. Gupta, Dasgupta, and Gupta (2008).

The second type is the adding of new parameters in order to widen the scope of the internal mechanisms outlined in the original UTAUT (Chan, Gong, Xu, & Thong, 2008; Sun, Bhattacherjee, & Ma, 2009).

The third type is the addition of external factors in the UTAUT variables (Derrick et al., 2007; Yi et al., 2006).

Extensive imitations, applications, and extensions or combinations of the UTAUT have contributed to broaden in the approach for the technological adoption and spread of many theoretical limitations of the theory. Nevertheless, assessment of this work revealed that most scholars only deploy some concepts of UTAUT and are mostly ignored by moderators (Al-Gahtani, Hubona, & Wang, 2007; Esteva Armida, 2008). Apart from exploring a utility of the UTAUT in different circumstances, there is a chance for the systematic investigation and indication of the salient factors that would apply to a consumer technology use context. According to the construction on previous extensions to the UTAUT, the objective of the research is to place all attention to the "consumer use perspective" and develop as new version of the UTAUT called the UTAUT2 (Venkatesh, Thong, & Xu, 2012).

In addition to the original UTAUT model, the UTAUT2 was reconstructed by adding three essential factors as in Figure 2.6 below that further contribute into concern of the consumers. The new constructs are Hedonic Motivation, Price Value (PV) and Habit (Al-Gahtani et al., 2007). They are used to predict the behavioral intention and the use behavior as new core principles (Venkatesh et al., 2012).

From a theoretical standpoint, three additional factors the UTAUT2 gave a better explain technology acceptance of consumers by improving the variance in behavioral intention by 18% and technology use by 12% (Venkatesh et al., 2012).

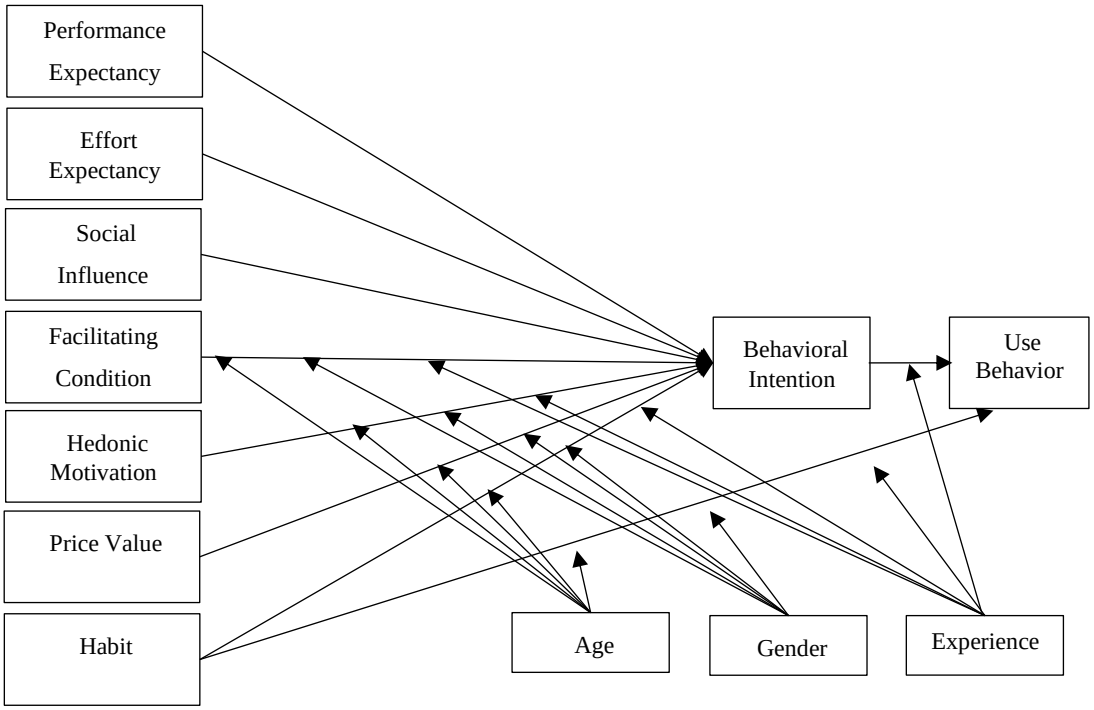

Figure 2.6 The Unified Theory of Acceptance and Use of Technology 2 (UTAUT 2)
Source: Venkatesh et al. (2012).

Hedonic Motivation is defined as feeling good or pleasure resulting from using a technology (Brown, 2005). The hedonic motivation persuades people's intentions to explore a technology, but the effects differ across stages of technology adoption. Online shopping is a good example (Magni, Susan Taylor, & Venkatesh, 2010). Additionally, HM assumes a vital role in predicting the intentions for technology use (Venkatesh et al., 2012). Yang (2010) claimed that the hedonic aspect is a critical element in terms of consumer use of mobile shopping services. The HM performance expectancy is gained through the joy of using mobile shopping features, as well as communicating with other shopping members or sellers through a services platform (Yang, 2010). Technically, using partial least squares of regression analysis techniques explain that the HM may not positively influence the intention to use in some situations, such as the intention to use classroom technology based on a survey conducted on instructors in Southeastern University in the US (Lewis, Fretwell, Ryan, & Parham, 2013).

Price Value is defined as the trade-off between the cost paid for using the technology and perceiving of benefits received (Dodds, Monroe, & Grewal, 1991). The PV in consumer decision making regarding technology use is regarded as an important factor that influences the behavioral intention (Venkatesh et al., 2012). Besides, the PV has a power factor over the consumer use of mobile services in the case of quantitative postal survey to customers of Telia Sonera's mobile services in Finland (Munnukka Minna, 2004). In the case of China regarding the cost that affects the intention to adopt in mobile commerce among users in China, the result showed that the cost of downloading applications related inversely with the influence of adoption intentions. Or, in other words, the intention to use a mobile application increases with the cheaper cost (Chong, 2013). In the case of south east Asia, the PV also negatively influences the intention to use mobile commerce in Malaysian users (Toh Tsu, Govindan, Alain Yee-Loong, Keng-Boon, & Seetharam, 2009).

Habit is defined as a degree, which individuals react to execute behaviors intuitionally (Limayem & Cheung, 2007). The habit could explicitly and implicitly affect the behavioral intention to use technology and increasing in experience lead to change in the habit toward technology (Limayem & Cheung, 2007). At the University of Shanghai, China, students examined the application, "Tao Bao" and found that habit influences use behavior and intention (Pahnila, Siponen, & Zheng, 2011). Furthermore, the HT positively influences the intention to use in the case of classroom technology in the US by a survey conducted on instructors in Southeastern University (Lewis et al., 2013).

2.6 Hypothesis Development

2.6.1 Government Support

Government support has been a powerful factor in driving the economy, which normally comes in the form of policy and special privilege. This factor is considered as an externality apart from organizational concerns, and it can significantly affect the acceptance of technology, especially in developing countries (Jin Hyeung et al., 2015). Government actions in developing countries are seemingly reliable up toa point, but information technology is an important concern that is currently receiving an incremental resource through spontaneous government programs (Besley & Burgess, 2002). Furthermore, more training opportunities and technology support are normally granted and awarded to redeem support policy (Besley & Burgess, 2002). A number of small entrepreneurs could receive advantages because of government support and normally appear in two forms accordingly.

First is to help small businesses in the community by supporting information and business incubation so that they can operate with good standards that are only limited to some small communities.

Second is to subsidize small businesses with an investment of resources or fund and give tax privileges into the programs to benefit those businesses (Besley & Burgess, 2002).

To some extent, government support seems to be an external support which is an external factor influencing the ERP adaption. However, the main purpose of this study also considers that government support has played a role as top management support out of the organization. Attewell (1992); Davenport (2000); (Markus et al., 2000) claim that external support such as venders and consultants is vitally required for the ERP adoption for all organizations which do not have the expertise. According to Markus et al. (2000) and Wang and Chen (2006), skilled providers of ERP systems (such as the external support) also provide a wealth of experience for guiding and nurturing the adopting organization. Attewell (1992) and Thong, Yap, and Raman (1996) suggested that the external support is substantial to organizations at the stage of implementing or adopting new technologies. Thong, Yap, and Raman (1996) found that once the level of external support is increasing, the success level of the

adopted IT systems will also be increased. Gable, Sedera, and Chan (2003) and Wang and Chen (2006) found that external support strongly correlates to ERP success. In opposition, the adoption of ERP for organization staff may not be efficient when the external support is not engaged or relatively low. Consequently, the benefits from the acquired system might not exist.

In terms of trust, the trust of the government is a perception with regard to combination and capability of government official agencies to provide the service. Beccerra and Gupta (1999); Jarvenpaa, Tractinsky, and Saarinen (1999); M. K. Lee and Turban (2001); Mayer, Davis, and Schoorman (1995); McKnight, Choudhury, and Kacmar (2002) suggested that trust in governmental agency makes a robust impact on the adoption of a technology. So, people must believe in expertise and technical resources that are owned by governmental agencies, before government initiatives are to be issued. Safe and self-customizing with the government service or support could give rise to trust and acceptance of the adaptation on technology. However, the lack of promises and honesty from government officials lead to a decline of trust and increase disagreements of support initiatives instead (Bélanger & Carter, 2008).

In an e-commerce study, the trust of government is often concerned by consumer perceptions toward an organization's reputation. Reputation is defined as the range to which customers trust in the organization and perceive care from the organization (Doney & Cannon, 1997; Jarvenpaa et al., 1999). Highly reputable firms are perceived to have high trust from customers by acting opportunistically Bradley (2008); Chiles and McMackin (1996); De Ruyter, Wetzels, and Kleijnen (2001). According to that evidence, people normally believe that the government as a "big brother" with abundant presence of power as per constitution. As a result, technology adoption could be efficient in people and organization, once government officials can ensure that the purpose of support will bring benefits without hidden agenda (Bélanger & Carter, 2008).

In terms of characteristics of the government support, the government has played a role as chairman of the state or county manager. As per this definition, we could find some congruence between government and management, because they are in counterpart roles but in different consideration (county and firm level). The

management support is defined as level to which top management recognizes the importance of system utility and details with regards to all activities (Ragu-Nathan, Apigian, Ragu-Nathan, & Tu, 2004). Q. Hu, Liang, Saraf, and Xue (2007) discovered a distinct linkage between the system facility and the intention to use among the government support. Wang and Chen (2006) claimed that system training, government support, and organization support are significant for starting the use of personal computers as per study in field of medical information systems in Tzu-chi hospital in Taiwan. Bingi, Sharma, and Godla (1999) claimed that top management support is not only to fund the ERP system, but also encourage all managerial staffs to provide full promise to all work steps and ensure that all process flow operates effectively. Management support is influential in building up a user's perception on system usefulness (Urbach, Smolnik, & Riempp, 2010) Besides, studies from (Bradley, 2008; Nwankpa & Roumani, 2014); Rajan and Baral (2015) proposed that management support is important and will initiate a user's opinions of how useful the system is. Nwankpa and Roumani (2014) mentioned that management interference in giving education affects users' perception of the ERP's usefulness. Urbach et al. (2010) claimed that management support is vital to inspire system usage. To support Urbach et al. (2010) studies from (Bradley, 2008; Pan & Jang, 2008); Rajan and Baral (2015) found that management encouragement strongly produces a high rate of ERP system usage. According to mentioned above, we review and combine implication of the management support with the government support and conclude that the government support will have influence on organization training toward the ERP system. Hence, we hypothesize that government support will have a direct, positive effect on the business process re-engineering of the ERP system.

Hypothesis 1: The Government Support will have a direct, positive effect on the Training of the ERP system.

Hypothesis 2: The Government Support will have a direct, positive effect on the Business Process Re-Engineering of the ERP system.

2.6.2 Training

The training concept is defined as the level of easiness in user training for system use, application of the new process or content, and navigating through subjects with regard to daily work (Ruivo, Oliveira, & Neto, 2014). The training is denoted as the process of providing management and employees with the logic and overall structure of the ERP system (Yusuf, Gunasekaran, & Abthorpe, 2004). The Enterprise resource planning system is tremendously difficult and requires concrete training. Consequently, training is considered to be a significant factor for successful ERP adoption and implementation (Bingi et al., 1999). Without the availability of training, a failure in conducting of ERP system could be easily happen (Somers & Nelson, 2001). Training reduces employees' anxiety and pressure about the use of the ERP system and gives rise to well understanding with the benefits of the system in their work scopes (D. H. Lee, Lee, Olson, & Hwan Chung, 2010). Training can inspire user beliefs toward the systems, and training programs also give rise to user confidence for use ability of the system (Gist, 1987). Training is utilized as a manager device to distribute useful and relevant information on the ERP system and how the system matches with the existing and proposed system of the organization (Amoako-Gyampah & Salam, 2004).

Training is also a very important element in a successful operation and preservation of the ERP system. Primarily, users must know how the right flow of information process assists the whole organization as well as their own tasks (Bingi et al., 1999). Several ERP studies also demonstrated that there is a linkage of the direct influence between training and perceived ERP usefulness (Bradley, 2008; Rajan & Baral, 2015; Youngberg, Olsen, & Hauser, 2009). Additionally, a good training program acknowledges people toward easiness of the system use (Ruivo et al., 2014). In this implication, Amoako-Gyampah and Salam (2004) claimed that there is a strong relationship between the user training and perceive ease of use of the ERP.

However, there is no district implication between training and the intention of the ERP use. Training was a strongly regarded component of ERP adoption but in the case that external expertise is provided to transform organization to start using the ERP system, the customized training on both ERP knowledge and new specific job duties are unavoidably required to draw user attention (Muscatello & Chen, 2008).

In addition, Muscatello, Small, and Chen (2003) strongly supported that on-going education programs yield better interest for access to new resources for larger firms that use outside consulting help.

On the other hand, in terms of competitive advantage, training could also result in the implementation success which could be weakly related with use intension (Amoako-Gyampah & Salam, 2004; Bueno & Salmeron, 2008). Additionally, training has directly influenced user satisfaction and contributed to a longer-term organizational performance development as well (Dezdar & Ainin, 2011). Furthermore, the effective training programs contribute to an organization's value. Similarly, organizational knowledge is developed and transferred across the organization to bring about tangible organizational outcomes organizational outcomes. Those outcomes could be shown in terms of financial performance, business performance, and organizational effectiveness (Liu, 2011). Jones, Kalmi, and Kauhanen (2011) found some confirmations to support a relationship, such as bigger initial training for staff and surge in sales recovery after ERP implementations. Having skilled and knowledgeable staff improved organizational competencies and yield benefits to grow with unique resources and competencies that could also create distinct benefits. This implication is in accordance with the resource-based view (RBV) of the organization (Khandekar & Sharma, 2005; Tharenou, Saks, & Moore, 2007). A great organized training program could be used to get rid of knowledge barriers associated with the ERP systems that is vital to accomplishing post-implementation of the ERP (Robey & Farrow, 1982). Ram and Corkindale (2014) found that effective training could lead to effective system use and improved performance. Ram and Corkindale (2014) also mentioned that the creation of capabilities obtained from their empirical studies, could support the existence of a relationship between training and usage behavior.

The importance of training was echoed by most of our respondents. As expected, based on current Bradford and Florin (2003); O'Leary (2000) mentioned that making great preparations of the ERP user (being capable to deliver expected sequences) would result in a suddenly positive effect in the business operation. In addition, the training could also increase user familiarity and number of the ERP users. In relationship with Bradford and Florin (2003); O'Leary (2000); Ruivo et al.

(2014) conducted a test to confirm the existence of a linkage between training and use behavior. Their results show that the firm conducting quality training has a higher possibility to use the ERP. According to the finding from Bradford and Florin (2003); Muscatello and Chen (2008); Muscatello et al. (2003); Ruivo et al. (2014) their studies implied that the training had a direct impact on use intention and use behavioral of the ERP system. Hence, we hypothesize that training will have a direct, positive effect on the Behavioral Use the ERP system.

Hypothesis 3: The Training of the ERP system will have a direct, positive effect on Business Process Re-Engineering for using the ERP system.

Hypothesis 4: The Training of the ERP system will have a direct, positive effect on the Perceived Ease of Use of the ERP system.

Hypothesis 5: The Training of the ERP system will have a direct, positive effect on the Perceived Usefulness of the ERP system.

Hypothesis 6: The Training of the ERP system will have a direct, positive effect on the Intention to Use of the ERP system.

2.6.3 Business Process Re-Engineering

The Business Process Re-Engineering (BPR) concept was initiated from Hammer (1990) and claimed that “Reengineering works don’t automate and obliterate”. Manganelli and Klein (1994) identified BPR as fast and drastic business tool for a strategic redesign, making value-added with the business processes, and the work systems, policies, and organizational configurations so as to enhance the workflows and productivity within an organization. Hammer and Champy (2009) defined BPR as a fundamental reconsideration and radical reform of business processes to achieve significant improvements in critical, up-to-date assessment of performance, such as cost, quality, service, and speed.

In creation of reengineering, business process modelling has been verified as a crucial tactic for adjusting business processes and, particularly at the process engineering and re-engineering stages. The modelling should be proposed for performance assessment along with the actual company budget for the processes prior to the ERP system is established to support (Hlupic & Robinson, 1998). Beginning from the business process design, process modelling could be deployed to create a

process simulation by including historical information on the sequence and time of activities, and utilities and resource availability (Quiescenti, Bruccoleri, La Commare, Noto La Diega, & Perrone, 2006). Giaglis and Paul (1996); L.-T. Hu and Bentler (1995); Paul, Giaglis, and Hlupic (1999); Tumay (1995) have confirmed finding with regard to the uses of modelling to estimate of these alternatives accordingly

1) Improving business capabilities to reach in-depth understanding of in-house process performance and adjust for appropriate resource allocation (Quiescenti et al., 2006).

2) Making comprehensive analysis toward finding of risks for major modifications to existing processes or putting new processes in place (Quiescenti et al., 2006).

3) Combination of a random nature of the business processes and the random behavior of business resources (Irani, Hlupic, Baldwin, & Love, 2000).

4) Having a better understanding of the crucial elements in resource management and raising reliability in terms of the decision making (Dennis, King, Hind, & Robinson, 2000).

In concern of business process reengineering and competitive advantage, Ettlie, Perotti, Joseph, and Cotteleer (2005); Velcu (2010) found that BPR directly affects an ERP's success, increasing performance, and raise an internal process efficiency. Normally, BPR is exploited for restructuring of non-valued actions, minimizing the complexity of the business processes and removing wasteful processes (Shang & Seddon, 2007). Devaraj and Kohli (2000) found from study that effectively steering a BPR could lead to a gain in business performance in areas of finance, customer service and continual organizational growth. BPR needs an elastic organization design. The rigid substructure of the organization should be altered to simplify collaboration of all departments by using cross-functional coordination instead of a singular work unit in isolated departments (Attaran, 2004). Altinkemer, Chaturvedi, and Kondareddy (1998) concluded that change of business process has a relationship with productivity gains in term of sales per employee.

The ERP systems are intentionally created to enhance the industry performance. All the work processes must be changed to meet a standard ERP model

of company setting. As per standard concerning proposed by Zhang, Lee, Zhang, and Banerjee (2003), of the are four concerns of the BPR accordingly:

1) Company's willingness to reengineering
2) Company's readiness for change
3) Company's capability of reengineering
4) Communication

These concerns imply that the more willing a company is to change, the more successful the adoption could be Schein (2010). Grover, Jeong, Kettinger, and Teng (1995) claimed that the time, capital, and the sustainability of leadership are important parameters for conducting the process reengineering. In addition, communication is also a basis in achieving successful implementation and the adoption for an essential redesign of the organization's existing culture, structure, and process. In one study, organization staff was not given enough information about the purposes of the BPR, they did not feel confident about their assigned workflow, which delayed the BPR (Moosbruker & Loftin, 1998).

Using of information systems such as the ERP leads organizations to reach higher business viability through profitability and productivity, especially when operation is headed or attended by business process redesign (Devaraj & Kohli, 2000; Grover, Teng, & Jeong, 1998; Shang & Seddon, 2007). Ram and Corkindale (2014) hypothesized that redesigning business processes could increase the chances of ERP adoption and project success, leading to efficient usage of the system leading to post-implementation performance, and give an opportunity for achieving a competitive advantage. However, the finding from Ram and Corkindale (2014) did not conclude as hypothesized. Their conclusion was that the role of the BPR is limited to activities leading to implementation outcomes, instead of post implementation. Additionally, the BPR completed before or during the implementation process, and therefore, impacts will be from adoption phase to implementation phase only. As a result, the competitive advantage is not be distinctly reached by association of business process reengineering along with the ERP system (Ram & Corkindale, 2014).

For a relationship between business processes reengineering and information technology, enterprises have to dynamically reengineer and develop business processes to deal with the new constraints emerging as challenges (Chan et al., 2008).

A business process could be recognized as a product that flows through the system (Gunasekaran & Nath, 1997). A process-oriented approach delivers the chance to properly reengineer or lessen the number of tasks in the process, often with assistance of the IT Hammer and Champy (2009). The IT has played an important role in achieving the reengineering initiative. An information flow could be eased by IT adoption to improve an integration in many areas (Gunasekaran & Nath, 1997). In normal corporate characteristics, older staff often have problems in the implementation of the BPR. Sometimes, effective decision making regularly requires longer time, accuracy, and related information, so information flow between vertical hierarchy toward decisions and operating strategies are key elements of making successful implementation of the BPR. Finally, the IT could help to strengthen communication between corporate functions, empower work hierarchy, and hereafter raise the process reengineering (Jin Hyeung et al., 2015). The ERP systems are designed as support elements of the business process improvements by its nature, for improving information quality, decision making, and giving higher of company's performance (Ghosh & Skibniewski, 2010). The application of the ERP systems along with adjustment of the business operations lead to long term organizational benefits (Wanzenböck, Scherngell, & Fischer, 2013). An organization using BPR supported by the IT could reduce costs. Redesign of implementing process could contribute to work on existing job with less efforts or number of people and restructuring the work sequences with less cost associated. A company that intends to reduce its cost structure or enhancing its productivity, could place its attention on BPR projects with the aim of upgrading operational efficiency (Ramirez, Melville, & Lawler, 2010). Johansson, McHugh, Pendlebury, and Wheeler (1993) suggested that a robust integration of the IT and the BPR increase the rate of a company's productivity. IT adoption has been an important factor regarding communication efficiency between business departments, optimize business processes, and reduce the costs of operation in the workflow. In addition, the IT is not only developed for computerizing business processes, but also for reshaping an original way of doing business (Jin Hyeung et al., 2015). Jin Hyeung et al. (2015) conducted an empirical test of the relationship between IT investing and the BPR and found that investment in IT has influenced to have business reengineering in the organization.

From the abovementioned discussions, there is a possibility to assume that thinking of business reengineering can significantly affect ERP usage behavioral or in other words, Business Process Re-Engineering will have a direct, positive effect on use intention and Behavioral Use in an ERP system. However, distinct literatures in the relationship between the BPR and the use behavioral are mostly unclear and need quantitative support to approve.

Hypothesis 7: The Business Process Re-Engineering will have a direct, positive effect on the Perceived Ease of Use of the ERP system.

Hypothesis 8: The Business Process Re-Engineering will have a direct, positive effect on the Perceived Usefulness of the ERP system.

Hypothesis 9: The Business Process Re-Engineering will have a direct, positive effect on the Intention to Use of the ERP system.

2.6.4 Perceived Ease of Use

PEOU is also defined as “the degree to which a person believes that using a particular system would be free of effort” (Radner & Rothschild, 1975). In this regard, Radner and Rothschild (1975) defined the relevant meaning with regards to the PEOU accordingly. Ease is defined as “freedom from difficulty or great effort” and effort is defined as “a finite resource that person may allocate to the various activities for which they are responsible. PEOU is one of the prediction parameters under the TAM approach and is defined as the level of an individual’s belief regarding using a particular technology would be relatively effortless (Davis, 1989). PEOU is defined as the degree of effort inserted on a specific technology and also inversely corelates to the perception of complexity (Robinson & Wilson, 2001; Rogers, 2010). In general, the TAM is intentionally designed to capture the PEOU and the PU for the individual scales (King & He, 2006; Ma & Liu, 2004; Yousafzai, Foxall, & Pallister, 2007).

In education context, teacher will consider the PEOU as parameter to accommodate a teaching process. Watson (2006) mentioned that teaching abilities and proficiencies in computer with ICT related influence the ease of use. Study on secondary school by Keong, Horani, and Daniel (2005) discovered that the teachers who obtained a computer skill, accepted the ease of use has resulted in the adoption of technology in the teaching process. Another research about secondary school teacher

in Turkey conducted by Askar, Usluel, and Mumcu (2006) found that instructors' proficiency in the ICT resulted in greater preparation of teaching materials. In addition, other research in theme of using the ICT toward the diffusion of knowledges could be summarized that the teacher or instructor must find each technology suitable and easy before they start using, especially for the ICT and computer related (Bauer & Kenton, 2005; Buabeng-Andoh, 2012; Haskell et al., 2007; Wozney, Venkatesh, & Abrami, 2006). Davis (1989) claimed that users in the education industry, especially the teacher precepted that using of the computer was very useful, but complexity of process implementation could draw back technology benefit on what computer could perform. In area of e-learning study, all of system users were more likely to use the system when they perceived it as easy and useful (ŠUmak, HeričKo, & PušNik, 2011). Jedeskog and Nissen (2004) suggested from using TAM for education that once the teacher felt that it was easy and convenient to deploy computer technology, the intention to use will be very high. Nevertheless, a less accessible and a complex task of the computer technology would lower the use intention of the teacher

In mobile learning and computer-based assessment, the PEOU is termed as the degree of the easiness to business to deploy a new technology (Briz-Ponce & Juanes-Méndez, 2015; Carlsson, Liu, & Li, 2010; Fürnkranz, Hüllermeier, Cheng, & Park, 2012; Mac Callum & Jeffrey, 2014).The effort would be the same as the PEOU in this matter of the mobile leaning study which could include investment, training time, technology switching barriers, maintenance costs (Grewal, Comer, & Mehta, 2001; S. Hong & Ho, 2005; Huang, Zhu, & Siew, 2006; Stockdale & Standing, 2004).

Chang (2006); Hernández, Jiménez, and Martín (2008) claimed from their online auction application study in relation to a similar study by Moon & Kim (2001) and core application from Davis (1989) that the PEOU will have a direct positive effect on the PU.

According to research in the e-market sector, Grewal et al. (2001) claimed as per his results of relationship between the IT capability and probability of form's participation in an e-market place that the PEOU must be concerned prior to firm decision to participate in an electronic B2B market, where as the facilitating condition could make crucial influences on the firm's decision whether or not to adopt a chance for the e-market. A concept in deployment of the TAM for level of technology

adoption in business organization was carried out by many scholars such as Amoako-Gyampah and Salam (2004); Zain, Rose, Abdullah, and Masrom (2005) found from research on executive staffs in Malaysian industrial sector that the PEOU was not resulted in PU at the firm level. However, Amoako-Gyampah and Salam (2004) claimed against previous propose from the study on the US companies focusing on enterprise ERP adoption that the PEOU highly influenced the PU at the organization level. This study gap is seemingly challenged for our TAM research to propose support finding as well.

Wallace and Sheetz (2014) suggested that the innovation will be effectively adopted, once it could be less complex, easier, and free from frustration. Programs or software must be created and designed to be use-friendly and easily understand (simple) (Kafura & Reddy, 1987). There are many scholars who found that simple and very straightforward elements were the key for an easy used program (Gopal, Bostrom, & Chin, 1992; D. T. Hall & Fenton, 1997; Pfleeger, 1993). In addition, a successfully adopted program must be created to be effortless and not incur any additional burdens (Gattiker & Goodhue, 2002).

There are many scholars claimed that the PEOU is less important than the PU on an effect toward the technology adoption. Users agree to adopt a new function once it is capable to perform and the ease of use is not always an attention, while an adopted function has not been distinctively useful. Even if the adopted function is designed as a simple and free of complexity, the PU is far more important than the PEOU in a case of humanity research (Branscomb & Thomas, 1984; Sears & Shneiderman, 1991). According to all claimed those scholars, the PEOU will not indirectly result in the use attention and need the PU to be mediated.

Davis (1989) claimed from widely accepted TAM principles that the PEOU will have a direct effect to the PU and the usage. However, original TAM's scholar will be more concrete on strong relationship between PEOU to PU, but the correlation between the PEOU and Use characteristics was only implied.

As a result, we hypothesize and refer from pervious scholar without theoretical discrepancies that the perceived ease of use could be most prominent for the perceived usefulness. In other words, the perceived ease of use will have a direct, positive effect on the perceived usefulness of the ERP system.

Hypothesis 10: The Perceived Ease of the ERP system Use will have a direct, positive effect on the Perceive Usefulness of the ERP system.

In more modern research, the PEOU has been variously transformed into other newer theories. One of the popular constructs being transformed from PEOU is the effort expectancy in the UTAUT theory (Venkatesh et al., 2003).

The effort expectancy is conceptualized from the different models accordingly. The effort expectancy is the perceived ease of use in the TAM/TAM2, complexity in the MPCU, and ease of use in the IDT. The effort expectancy concept is substantial in both voluntary and mandatory usage perspectives; however, those are only at the first time period and become less salient over time and continued use (Bem & Allen, 1974; Bozionelos, 1996; Davis, 1989; Higgins et al., 1991; Szajna, 1996; Venkatesh et al., 2003), Effort-oriented constructs are expected to be more salient in the early stages of a new behavior, when a process represents obstructions to be overcome, and later become overshadowed by instrumentality concerns Bem and Allen (1974); Bozionelos (1996); (Davis, 1989); Szajna (1996); Venkatesh et al. (2003) recommend that the effort expectancy is more outstanding in women than in men. (Lynott & McCandless, 2000; Motowidlo, 1982; Wong, Kettlewell, & Sproule, 1985) mentioned that differences in gender could be motivated by cognitions regarding gender roles. Higher age has been subjected to a difficulty in operation of more complex tasks and efficient coping with information on assigned responsibilities (Plude & Hoyer, 1986), especially once the software system has adopted. Some previous scholars identified that the effort expectancy could be stronger factors of individuals' intention for females and for older people (Venkatesh et al., 2003). Levy and Davis (1988); Venkatesh et al. (2003), claimed that the effort expectancy was estimated to have closer characteristic to the performance expectancy, hence we assumed that the gender, age, and experience could also contribute toward changes in the intention to use.

2.6.5 Perceived Usefulness

Davis (1989) defined the PU as the level of which a user believes that a specific system could increase his or her performance. The PU is defined in a more modern meaning as the individual assessment or expectation of the user toward using the product or service could give rise to benefits related to job performance (Hernández et al., 2008). The PU also could be defined in a technology application as a personal impression interacted with the system, technology and website being designed for as specific goal (Chang, 2008). Similarly, The PU is defined that the users are instigated to accept an application because it is really outperformed (Branscomb & Thomas, 1984; Sears & Shneiderman, 1991). Additionally, the PU is defined as the level of which individuals trust or believes in using a particular system will raise their job performance. In addition, this could be also explained to what extent by the word "use": "capable of being used advantageously". In an organizational context, organization crews are persuaded to release their performance by giving promotions, bonuses, and rewards (Pfeffer, 1982; Schein, 1965; Vroom, 1964)

. The PU could also consider a scope under the relative advantage, which is a key indication of the IDT. The relative advantage was clarified that once real and potential users perceived the technology worthiness; they would quickly diffuse the use (Rogers, 2010).

There are many scholars who claimed that the PU is more important than the PEOU on an effect toward the technology adoption. Furthermore, the users are persuaded to trust a useful system, even if it seems difficult to use. As a result, the PU is far more important than the PEOU in a sense of humanity research (Branscomb & Thomas, 1984; Sears & Shneiderman, 1991). From those findings, several scholars implied that the use intension with related technology is significantly caused by the PU rather than the PEOU.

According to the TAM principles, a system comprised of the high PU values will be potentially enable a positive correlation of the use-performance (Davis, 1989; Lederer, Maupin, Sena, & Zhuang, 2000).

A research in education preparation suggested that an innovation perception of the teacher is highly important to successfully adopt the learning of technology

(Watson, 2006). In support for the previous study, Bennett and Bennett (2003); Bhattacherjee (2001) claimed that the users will deploy technology if they definitely trust and acknowledge that they will receive more benefit by using it. However, those scholars also addressed some impediments for the adoption of ICT technology for all teacher's views, which was composed of a reluctance to change and an insufficiency of instructional facilities or financial readiness. In the education technology study, the PU was defined as a possibility of deploying computer technology that will enhance the job performance for a teaching scenario. Deciding whether or not to use a computer technology has depended on the individual intuition of the teacher, who considers teaching performance that allow students to achieve each specific learning goal. On the other hand, the teacher also takes the role of a class moderator in the case of self-learning in class. The teacher must keep monitoring for change in the learning progress of the student. As a result, computer technology has been considered useful from a teaching standpoint, once this technology gained significant support and increased better progress for all students in a tangible manner (Mahmood, Hall, & Swanberg, 2001; Venkatesh, 2000). In the e-learning study, (ŠUmak et al., 2011) claimed that system users are prone to use the system that is effortless and useful. In addition, several mobile learning studies found that the PU will have a direct influence on the intention of use (Briz-Ponce & Juanes-Méndez, 2015; Carlsson et al., 2010; Fürnkranz et al., 2012; Mac Callum & Jeffrey, 2014).

A recent TAM experiment by Kozar, Lee, and Larsen (2003) concluded that the PU and the use intention are highly statistically correlated. Supporting this distinct relationship, Carlsson et al. (2010); Cheng, Sheen, and Lou (2006); Davis (1989); Igbaria (1993); Liaw, Huang, and Chen (2007) claimed that the PU has a positive influence on the behavioral use. Davis (1989) claimed that the PU is highly positively corelated to self-reported use as per his TAM experiment. Additionally, the PU has claimed to have a higher direct effect toward self-reported use, when compared to the PEOU (Metcalfe, 1994; Venkatesh & Davis, 1994)

In a computing system in business operation system study, the PU has found as an initial reason for start using a new system (Hernández et al., 2008). Malhotra and Galletta (1999) claimed that the PU is accepted to measure the behavioral intention.

For the E-market study, the PU in the firm adaptation could be considered in the form of cost reduction, revenue creation, transaction efficiency, increased competitiveness, expanded trading scope, and error reduction in trading processes (Bakos, 1991; Daniel, Siong, Chay, Lee, & White, 2004; Fürnkranz et al., 2012; Gottschalk & Foss Abrahamsen, 2002). According to the B2B e-market study in Germany, Holzmüller and Schlüchter (2002) found that the e-market adoption was significantly influenced by the PU by its application, such as increasing their competitiveness.

As a result, we hypothesize and refer from previous scholars with theoretical supports and experimental research that the perceived usefulness could be most prominent for the intention to use, or in other words, the perceived usefulness will have a direct, positive effect on the intention to use of the ERP system.

Hypothesis 11: The Perceive Usefulness of the ERP system will have a direct, positive effect on the Intention to Use of the ERP system.

In the more modern research, the PU has been transformed into various newer theories. One of the popular constructs being transformed from PU is the performance expectancy in the UTAUT theory (Venkatesh et al., 2003).

The performance expectancy is defined from the different models accordingly, the performance expectancy is perceived usefulness in the TAM/TAM2 and C-TAM-TPB, extrinsic motivation in the MM, job-fit in the MPCU, relative advantage in the IDT, and outcome expectations in the SCT. Some scholars also recognized the performance expectancy as usefulness and extrinsic motivation (Davis, 1989), usefulness and job-fit (Higgins et al., 1991), and relative advantage (Davis, 1989; Moore & Benbasat, 1991) usefulness and outcome expectations (Compeau, Higgins, & Huff, 1999; Davis, 1989), and job-fit and outcome expectations (Compeau et al., 1999; Davis, 1989). The performance expectancy concept is the most concrete predictor of the use intention and considers all points of measurement, both voluntary and mandatory, to be important as per prior model tests (Compeau et al., 1999; Davis, 1989; Higgins et al., 1991; S. Taylor & P.A. Todd, 1995; Venkatesh et al., 2003). Conversely, according to the theoretical point of view, there is evidence to expect that a relationship between the performance expectancy and the intention to use could be moderated by gender and age. In addition, findings on gender differences presented

that men tend to be highly task-oriented and then, per the performance expectancy, which focuses on task achievement, is possible to be mainly salient to men (Gifford, 1980). The gender schema theory recommended that differences stem from gender roles and socialization processes incurred by birth rather than biological gender (Bem & Allen, 1974; Kirchmeyer, 2002; Lubinski, Tellegen, & Butcher, 1983; Lynott & McCandless, 2000; Motowidlo, 1982), have exposed that the gender roles are related to a level of psychological basis, but subject to change over time (Ashmore & Sewell, 1998; Eichinger, Heifetz, & Ingraham, 1991; Helson & Moane, 1987; Lubinski et al., 1983).

Apart from gender and age being hypothesized as moderators, D. T. Hall and Mansfield (1975) suggested that younger people would give more importance to extrinsic rewards. Differences in the gender and age are subject to change in technology adoption perspectives (Venkatesh et al., 2003). In concern of gender and age effects, Levy and Davis (1988) recommended that researching of gender differences could be imperfectly described without considering age. As a result, we hypothesize that there is some level of influence of the performance expectancy and intention to use that are explained through age, gender, and experiences. In other words, the performance expectancy will have a direct, positive effect on intention to use of the ERP system, with moderation by age, gender, and experiences.

2.6.6 Behavioral Intention

The BI is intrinsically recognized as a factor affecting an individual's usage of a given technology. This element originated from concept of the TRA referred as "a measure of the strength of one's intention to perform a specified behavior" (Davis, 1989). Davis (1989). applied TRA element into information systems through the TAM, later an adaptation of the TRA established, especially for sake of information systems. (Venkatesh et al., 2003) defined no specific definition of the BI in the UTAUT model, but the UTAUT utilizes the behavioral intentions by using constructs from Davis (1989) that have been widely adopted several studies of individual acceptance (Venkatesh et al., 2003).

In terms of impact of the ERP usage, the ERP usage has no definite meaning, and this meaning is varied in many empirical studies. Tao, Cheng, and Sun (2009) claimed that IT usage models do not result in the outcomes of usage. However, Tao et

al. (2009) argued that without the study of the outcomes, there is no confirmation whether IT investments could be successful or not. Ein-Dor and Segev (1978), found that the usage is strongly related with other constructs, such as profitability, application to problems in organization, quality of decision making, performance, and satisfaction. Furthermore, people will use a system with high attention, once it satisfies some of those constructs. Occasionally, users tend to use a system when it improves their task performance or decision precision. Otherwise, they are likely to avoid using the system unless the usage is obligated (Rahat, 2005). The adoption of the ERP system is subject to broad efforts even on both technological and business aspects of the implementation, and IT experts and non-IT empirical studies (Al-Mashari, 2002). The influences and the outcomes of the usage of the ERP, must be examined from different angles, particularly with a concept of how human factors influence success and how users could improve the ERP's performance distinctly (Botta-Genoulaz, Millet, & Grabot, 2005). Therefore, prior to knowing the factors effecting technology acceptance, an inspection of the impact whether to accept or reject a technology from a personal or social system perspective is very essential (Rogers, 1995). Some researchers have presented linkages between the user acceptance and personal effects, and the use acceptance and organizational effects, but there is no systematic examination of the impact of technology regarding employee job characteristics (Venkatesh et al., 2003). The TAM principles theorized that a user's intention is the most decisive indicator in the prediction of the usage behavior. As per an original rule, the BI is cooperatively determined by the user's attitude and the PU of the system (Davis, 1989).

2.6.7 Behavioral Use

In terms of intention to use ERP system or use behavior, Amoako-Gyampah and Salam (2004) mentioned that Behavioral Use is an expectation of end-users to deploy of new technologies. Viswanath Venkatesh and Fred D Davis (2000) discovered that there is a solid relationship between behavioral intention and actual behavior. As per this implication, the end users with a high perception of usefulness will use the ERP when they trust that it is associated with user performance (Ramayah, Kurnia, & Chiun, 2012). Amoako-Gyampah and Salam (2004) also found that usage will be compulsory, once behavioral intention of using technology is

suitable. As a result, when the ERP usage is less compulsory, the end-users who have less intention to use could cut down the rate of the system usage. In addition, the compulsory use could deliver the necessity of use desired to complete at the lowest level of the job tasks, and any usage away from that could be voluntary (Seymour, Makanya, & Berrangé, 2007).

As per the associated literature reviewed, there is a distinct relationship between the intention to use and the use behavior of the ERP. Therefore, we hypothesize that the intention to use will have a direct, positive effect on the Behavioral Use of ERP.

Hypothesis 12: The Intention to Use of the ERP system will have a direct, positive effect on the Behavioral Use of the ERP system.

2.7 Research Conceptual Framework

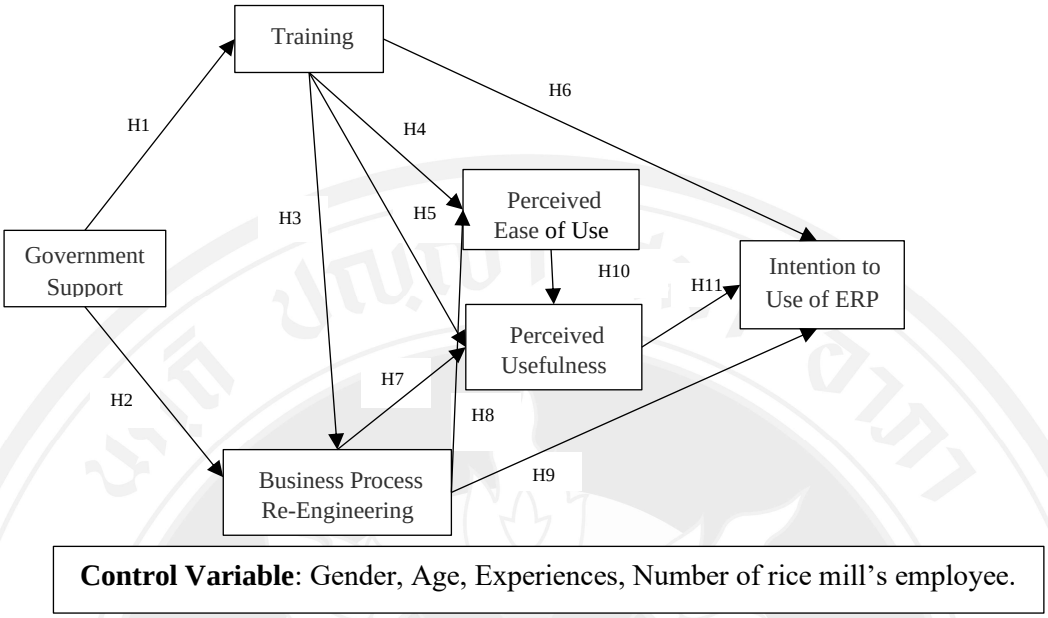

Figure 2.7 Entire Conceptual Framework for Never Adopted Use of the ERP

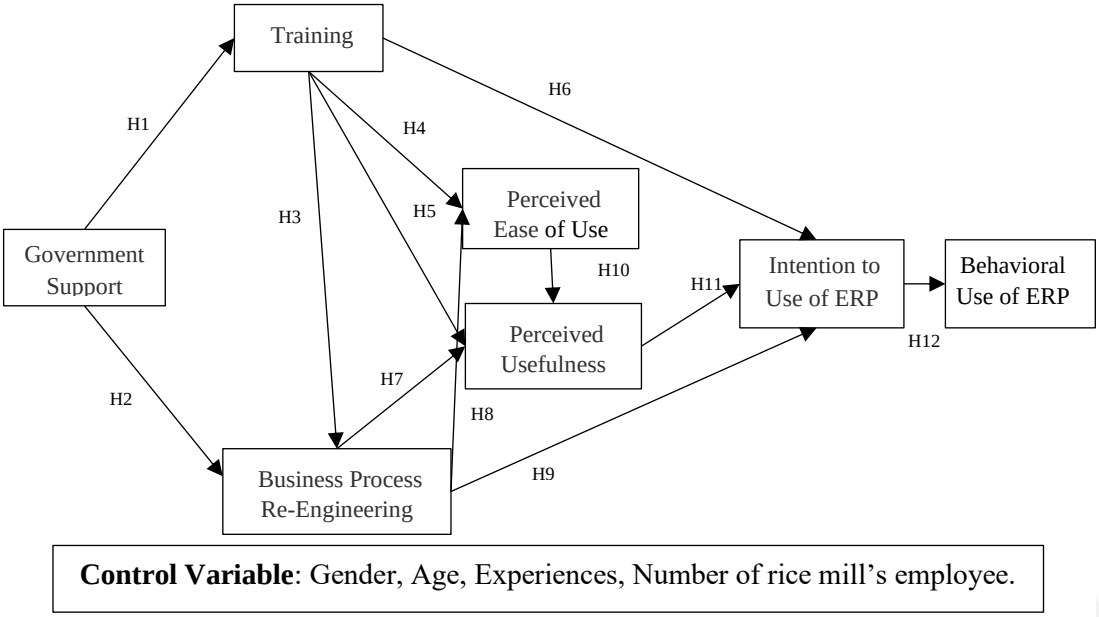

Figure 2.8 Entire Conceptual Framework for Being Adopted the ERP Already

2.8 Summary of Hypothesis Explanation

Table 2.3 Summary of Hypothesis Explanation

Hypothesis	Description of Relationship
H1: Hypothesis 1	The Government Support will have a direct, positive effect on the Training of the ERP.
H2: Hypothesis 2	The Government Support will have a direct, positive effect on the Business Process Re-Engineering of the ERP system.
H3: Hypothesis 3	The Training of the ERP will have a direct, positive effect on the Business Process Re-Engineering for using the ERP system.
H4: Hypothesis 4	The Training of the ERP will have a direct, positive effect on the Perceived Ease of Use of the ERP system.
H5: Hypothesis 5	The Training of the ERP will have a direct, positive effect on the Perceived Usefulness of the ERP system.
H6: Hypothesis 6	The Training of the ERP will have a direct, positive effect on the Intention to Use of the ERP system.
H7: Hypothesis 7	The Business Process Re-Engineering will have a direct, positive effect on the Perceived Ease of Use of the ERP system.
H8: Hypothesis 8	The Business Process Re-Engineering will have a direct, positive effect on the Perceived Usefulness of the ERP system.
H9: Hypothesis 9	The Business Process Re-Engineering will have a direct, positive effect on the Intention to Use of the ERP system.
H10: Hypothesis 10	The Perceived Ease of Use will have a direct, positive effect on the Perceived Usefulness of the ERP system.
H11: Hypothesis 11	The Perceived Usefulness will have a direct, positive effect on the Intention to Use of the ERP system.
H12: Hypothesis 12	The Intention to Use of the ERP system will have a direct, positive effect on the Behavior Use of the ERP system.

CHAPTER 3

METHODOLOGY

This empirical study proposes to explore possible success factors in the ERP adoption of the Thai agricultural business. Empirical research mainly deploys the TAM as the main principal along with three possible constructs: GOV, BPR and TRA in prediction of the ERP adoption. The TAM has been recognized as an optimal indicator for this research context because the application of this approach is effortlessly compatible with external constructs and widely suitable for theorizing a new assembly (Ong & Lai, 2006; Pituch & Lee, 2006; Sánchez & Hueros, 2010).

3.1 Instrument Development

This research is conducted by a quantitative approach. It is designed to use questionnaires via telephone interviews as the main method. In this regard, the questionnaire preparation, appropriate interview techniques, and recording methods to secure interviewed context are required.

The measurement approach of this study focuses on three main concepts, which are critical concerns in the ERP adoption, including the core of the Business Process Re-Engineering (BPR), the Training (TRA), and the Government Support (GOV) along with the Technology Acceptance Modelling concept by Davis (1989). Those constructs are embedded as a fundamental component of the survey questionnaires and are also in accordance with the aforementioned literatures and hypothesizes. All items are measured using a five-point Likert-type scale ranging from “strongly disagree” (1) to “strongly agree” (5) in the questionnaire (Likert, 1932). Additionally, in-depth interview techniques along with open-ended questions are additionally used to capture all suggestions, drawbacks, and attitudes for the ERP adoption in addition to improve an understanding of the rice mill business (Miles, 2014).

The list of items used in the survey questionnaires of each construct is presented accordingly. Each construct will be described in two parts, which are the quantitative questions and open-ended questions respectively.

Government Support (GOV): On the quantitative questions, the GOV was deployed with 4 questions by adjusting the original statement to suit the ERP adoption for the rice mill context. This set of GOV questions used 1 question from a combination of Bélanger and Carter (2008); Carlsson et al. (2010), 1 question from Carlsson et al. (2010) and 2 questions by combining Hung, Chang, and Yu (2006); Ifinedo (2008); Nah, Islam, and Tan (2007).

On the open-ended questions, 3 open-ended questions were used by readjusting the context from Bradley (2008); Hung et al. (2006); Ifinedo (2008); Nah et al. (2007).

Training (TRA): On the quantitative questions, the TRA was deployed with 3 questions which were very straightforward, and all question statements were slightly changed to suit the ERP context. The set of TRA questions used 3 questions from Muscatello and Chen (2008); Rajan and Baral (2015) that were identical in the contexts.

On the open-ended questions, 3 questions based on Bradley (2008); Muscatello and Chen (2008); Rajan and Baral (2015) were updated to suit the ERP context and deployed as an attitude measurement.

Business Process Re-Engineering (BPR): The BPR was deployed with 3 quantitative questions, and question statements were also simplified and adjusted to suit the ERP context. The set of BPR questions used 1 question from Zhang et al. (2003), 1 question from Ram, Wu, and Tagg (2014), and 1 question from a combination of K.-K. Hong and Kim (2002); Muscatello and Chen (2008).

On the open-ended questions, there were also 3 questions from (Bradley, 2008; K.-K. Hong & Kim, 2002; Muscatello & Chen, 2008; Ram et al., 2014) deployed in an attitude measurement.

Perceived ease of use (PEOU): The PEOU used 4 quantitative questions from Davis (1989); Venkatesh et al. (2003) by modernizing the questions to suit with the rice mill organization.

Perceived usefulness (PU): The PU used 4 quantitative questions from Davis (1989); Venkatesh et al. (2003) by making the context suit with the rice mill organization.

Intention to Use (IU): The IU deployed 3 quantitative questions from Davis (1989); Venkatesh et al. (2003) by re-questioning the context to be compatible with the rice mill organization.

Behavioral Use (BU): The UI deployed 3 quantitative questions from Davis (1989); Venkatesh et al. (2003) by updating the context to be compatible with the rice mill organization.

The Table 3.1 demonstrated all original questions being deployed as main measurement for this study. All original open-ended questions will demonstrate in the Appendix3.

Table 3.1 Original Questions of Quantitative Measure

Construct	Original Questions	Citation
GOV	• Were helped by government to participate in international trade fairs in the local area. • State government agencies can be trusted to carry out online transactions faithfully. •	Bélanger & Carter (2008) and Liu et al (2010)
	• Received favorable treatment from government for exports.	Liu etal (2010)
	• The CEO, CIO, or COO is/was actively supporting this ERP implementation. • The popular press depicted a positive sentiment for using online tax filing and payment system. • Top management supports the adoption and use of our ERP system.	Nah, Islam, & Tan, (2007) Hung, Chang, & Yu (2006) and Ifinedo (2008)
	• The CEO, CIO, or COO is/was actively supporting this ERP implementation. • The popular press depicted a positive sentiment for using online tax filing and payment system. • Top management supports the adoption and use of our ERP system.	Nah, Islam, & Tan, (2007) Hung, Chang, & Yu (2006) and Ifinedo (2008) *use same set of question as above
TRA	• My level of understanding was substantially improved after going through the training program • Employees are tracked to ensure they have received the appropriate ERP training.	Rajan & Baral (2015) and Muscatello & Chen (2008)
	• The training gave me confidence in the ERP system. • ERP training and education is ongoing and available to refresh users' skills	Rajan & Baral (2015) and Muscatello & Chen (2008)
	• The trainers were knowledgeable and aided me in my understanding of the ERP system. • Consultants are used to supplement training when internal expertise does not exist.	Rajan & Baral (2015) and Muscatello &

Construct	Original Questions	Citation
		Chen (2008)
BPR	• Spent lots of time in redesigning business processes before configuring the ERP software.	Ram, Wu, & Tagg (2014)
	• When adopting an ERP system, there is a need to recognize the unique Asian context in that the embedded business models typically reflect Western practices.	Zhang, Lee, Zhang, & Banerjee (2003)
	• Significant time and efforts have been required to standardize our organizational process to align with the ERP.	K.-K. Hong & Kim (2002) and Muscatello & Chen (2008)
PEOU	• People who influence my behavior think that I should use the system. • It would be easy for me to become skilled at using the system. • I have the resources necessary to use the system. • Learning to operate the system is easy for me.	Davies (1989) and Venkatesh, Morris, Davis, & Davis (2003)
PU	Using the system enables me to accomplish tasks more quickly. • Using the system increases my productivity. • If I use the system, I will increase my chances of getting a raise.	Davies (1989) and Venkatesh, Morris, Davis, & Davis (2003)
IU	• I intend to use the system in the next <n> months. • I predict I will use the system in the next <n> months. • If I use the system, I will increase my chances of getting a raise	Davies (1989) and Venkatesh, Morris, Davis, & Davis (2003)

3.2 Content Validity of a Pretest

For the questionnaire development, all questions from selected literatures are re-adjusted to the context of the Thai rice mill industry and translated into Thai for the final version of the questionnaire respectively. A pilot testing and back transition are also performed to ensure a concrete questionnaire before proceeding with the survey distribution. In a pre-pilot study, 5 rice mills were subjected for a face-to-face interview to test conciseness and all question meanings of the questionnaires after the back translation. Thereafter, a revision of the questionnaire was raised to capture all comments, which were mostly to simplify all technical terms and to use basic questions instead. At the final stage of the pilot test, 30 telephone interviews were collected and tested in reliability analysis and distribution of the data. This initial pilot analysis claimed that the questionnaire is relatively reliable as a tool for continuing the further interview.

3.3 Control Variable

There are variables other than the mentioned constructs, which can influence the adoption of the ERP in this research scenario. Those variables are determined to be the control variables in this ERP adoption study in order to rationalize all experiential dimensions. The mentioned control variables consist of gender, age, experience, and number of rice mill's employees.

3.4 Data Collection and General Characteristics

The data collection general characteristics will be divided and clarified into two sections: planed data collection and actual data collection.

3.4.1 Planed Data Collection and Characteristics

This study proposes to identify the success factors in the ERP adoption for the Thai agricultural business. However, this data set is too broad and varied. As a result, the total population of this study will focus on all rice mills in Thailand instead. The rice mill dataset is obtained from the database of the Agricultural Marketing Co-

operative Limited (AMC), which is the organization under the Bank for Agriculture and Agricultural Cooperatives (BAAC), a state enterprise organization under the authority of Thai Ministry of Finance and the database from the Thai rice mills association. The total number of rice mills across the country as per data from BAAC is 1,681 (BAAC, 2017). The number of rice mills and the rice milling capacity separated by geographical location is shown in Table 3.2, using geographical criteria of the Thai field corps defined by the Office of Agricultural Economics, Ministry of Agriculture and Cooperatives of Thailand (OAE, 2017)(OAE, 2017).

Table 3.2 The Number of Rice Mills and Capacity by Geographical Region

Geographical region	**Number of medium rice mill**	**Number of large rice mill**	**Total number of rice mill**	**Rice milling capacity (Tons/day)**
North-Eastern Thailand	85	371	456	49,354
Northern Thailand	139	284	423	44,815
Middle Thailand	214	491	705	76,720
Southern Thailand	88	9	97	1,686
Total	***526***	***1,155***	***1,681***	***172,575***

Source: BAAC (2017); OAE (2017).

As per large number of populations, this research minimizes the whole population to a sampling frame of 1,681 rice mills by using the criteria of rice productivity and quality along with intensity of rice mills in each region. As a result, the rice mills in the middle and the north eastern regions of Thailand are selected because they contribute potential growth to the national income and is considered the agricultural backbone of the country for several decades. Those areas also comprise of the largest square acres in rice paddies, the number of total rice mills, and yielding

quantity of rice product. Additionally, the data from the AMC also presented the proportion between large and medium sizes of the rice mills as presented in Table 5.

Regarding the criteria in defining the size of the rice mills ruled by the milling capacity, a medium sized rice mill has a milling capacity between 5 to 20 tons/day, and a large sized rice mill has a milling capacity of more than 20 tons/day (BAAC, 2017). The proportions of the medium rice mill and the large rice mill to total rice mills nationwide are 31% and 69%, derived from Table 4 respectively.

As per figures in Table 5, a planned sample is selected by judgement and probability sampling techniques accordingly (Creswell & Clark, 2017; Penrod, Preston, Cain, & Starks, 2003; Rea, Venkatesh, Morris, Davis, & Davis, 1997). This study deploys rice mill production capacity as judgement. Therefore, the total number of 1,161 rice mills from the middle and the north eastern regions is selected by judgement sampling techniques as per mentioned reasons (Creswell & Clark, 2017). Nevertheless, the sample is relatively large for data collection, then the target sample is expected to be lower than 70% of the initial planed sample (1,161 rice mills), which is finally 812 rice mills for a feasible data collection. The probability sampling techniques could allow to evenly select 70% from the medium rice mills and large rice mills accordingly, from the list which combines both the middle and the north eastern regions without provinces constraint (Penrod et al., 2003).

The data collection would use cross-sectional research techniques in the first place for the sake of questionnaire distribution (Derue, Nahrgang, Hollenbeck, & Workman, 2012).

3.4.2 Actual Data Collection and Characteristics

In the data collection process, the researcher encountered data error from the BAAC. 85% of contacts from the BAAC list were unreachable and/or provided no updates. In addition, all planned respondents were reachable only by telephone interview. To solve this problem, the data source from the Thai rice mills association was officially deployed instead because the available rice mill lists were reachable and reliable. In addition, 850 available respondents from the Thai rice mills association were more updated than the list of the BAAC and all of rice mill names were included in the list of BAAC (BAAC, 2017). The final figure of interviewed

respondents was only 205. Additionally, the sampling pattern was unavoidably changed to the convenient sampling method instead because the whole population of the Thai rice mill is relatively scattered and less accessible. Therefore, making a telephone interview for all available rice mills and complete interviews as many as possible was the most optimal solution of the interviews. All 205 respondents were obtained by conveniently interviewed sessions and contribute to a data with no hidden bias.

On the other hands, the constrains of this data collection also resulted in the sufficient required samples by the sampling theory (Yamane, 1967). Once using the total samples from the Thai rice mills association, which were 850 samples, to calculate in the Yamane's simplified sample size formula. The 205 respondents were accepted as about $\pm 7\%$ in a level of precision (e) and required sample is 165, which were 850 samples, to calculate in the Yamane's simplified sample size formula. However, the 205 respondents were not accepted as about $\pm 5\%$ in the level of precision (e) and required sample is 272. As a result, this study is considered as a moderate level of precision instead. However, this study sampling did not fall out of a category of 93% confidence as per the Yamane formula, which is still in the range of sufficient reliability.

3.5 Data Analysis

According to model's complexity, the Path Analysis, which is a subset of Structural Equation Modeling deployed as an analytical technique for data analysis and an implication of the Path Analysis allows simultaneous analysis of all relationships and combining multiple regressions with factor analysis in picture of statistical fit (Mathieu & Taylor, 2006; Tabachnick, Fidell, & Ullman, 2007). In a two-stage analytical procedure, confirmatory and exploratory factor analysis, the exploratory factor analysis is conducted on the IBM SPSS22 software package using Maximum Likelihood Estimation, while confirmatory factor analysis is internally undertaken on the IBM AMOS 22 along with the path analysis of the structural relationships (Gerbing & Anderson, 1988).

3.6 Normality Test

(Thode, 2002) claimed that “normality is one of the most common assumptions made in the development and use of statistical procedures”. The dependence of most parametric statistical methods on the normality assumption presents the importance of normality tests in statistical analysis. Inferences from parametric statistical analysis could be invalid when the normality assumption is tested as unaccepted. Therefore, before proceeding on each statistical analysis, it is important to test the normality assumption. The easiest way to assess normality is to deploy graphical methods. The normal quantile-quantile plot (Q-Q plot) is one of the most effective and widely used as diagnostic tool for normality test of (Ogunleye, Oyejola, & Obisesan, 2018). In addition, the numerical methods are comprised of skewness and kurtosis coefficients used when normality test is deployed for formal hypothesis testing procedure to ascertain whether particular data follows a normal distribution or not (Ogunleye et al., 2018). The normality test of this study will deploy this numerical method as a principle of analysis.

3.7 Construct Validity and Reliability Assessment

Cronbach and Meehl (1955) defined the construct validation as a testing of the validity as of, the specified theoretical tools in a measure's assumed meaning and those scholars treated the validity testing as a deductive process. Garner and McGill (1956) claimed that the construct validity also required to articulate specific theories to describe relationships among measures in order to evaluate the performance of measures thought to represent their validity. Construct validity requires Unidimensionality, Reliability and Validity (O'Leary-Kelly & Vokurka, 1998).

The unidimensional component is defined as a set of empirical indicators that relate to only one construct (O'Leary-Kelly & Vokurka, 1998). A variable is a unidimensional measure, once it is a matter of logical and empirical necessary but a multi-dimensional measure consisting of indicators, which related more than one construct is not accepted as a variable and is also subjected to neither theory (Bagozzi & Yi, 2012). Unidimensionality directly relates to a single trait or a construct

underlying a set of measures or indicators (Gerbing & Anderson, 1988). Unidimensionality is a set of items making an instrument and a basic assumption of measurement theory is only started from measuring a single construct (Hattie, 1985). In statistical measures, unidimensionality has been estimated by Confirmatory Factor Analysis (Pedhazur & Schmelkin, 2013).

For a validity measurement, the convergent validity and discriminant validity are widely deployed to validate a measurement of construct.

Firstly, the convergent validity, is verified by associations among "independent measurement procedures" created to reflect the similarity of constructs (Campbell & Fiske, 1959).

Secondly, the discriminant validity indicates that a new measure of a construct must be substantially less correlated with measures of conceptually unrelated constructs than with other indicators of that construct. The discriminant validity requires the contrast of relationships of measures of constructs in the same conceptual domains (Campbell & Fiske, 1959). Composite Reliability (CR), Average Variance Extracted (AVE), Maximum Shared Variance (MSV), and Average Shared Variance (ASV) are indicators being related to indicated validity of both of the convergent and discriminant validity (Hair, Black, Babin, & Anderson, 2010)

For a reliability measurement, Cronbach's alpha is a well-known acceptance of the reliability measurement (Carmines & Zeller, 1979; Pedhazur & Schmelkin, 2013). There are several controversies in the Cronbach's alpha in its universal stability and several scholars have searched for an alternative theory (Bernardi, 1994; Christmann & Van Aelst, 2006; Green, Lissitz, & Mulaik, 1977). A criteria acceptance of the Cronbach's Alpha value is that of 0.6-0.7 specifies the least acceptable level of reliability, and 0.8 or greater show a well-accepted level but a value higher than 0.95 is not principally good, because this is an indication of redundancy (Hulin, Netemeyer, & Cudeck, 2001).

CHAPTER 4

RESULTS OF THE STUDY AND HYPOTHESIS TESTING

This chapter comprises of five subtopics accordingly. The first is Demographics characteristics that describe individual and business characteristics of the rice mill respondents. The second is Normality test. The third is Reliability test and Exploratory Factor Analysis. The fourth is Convergent validity. The fifth is Confirmatory Factor Analysis to verify significant fits of all models. The last topic is Explanation of hypothesis testing that delivers the finding results along with additional literatures associated with modification of some model testing.

4.1 Demographics Characteristics

A total of 850 rice mill respondents was expected for the telephone interview; however, 76% could not be reached and the majority did not show a willingness in disclosing financial details. In addition, each telephone interview could not be completed in one session. In the end, 205 rice mill respondents were successfully interviewed via telephone. Figures of returned respondents have met the acceptance criteria as per the rule of sampling by Hair et al. (2010) and sample size by (Comrey & Lee, 2013).

The demographics characteristics of all the responded rice mills are demonstrated in Table 4.1 divided into individual and rice mill profiles accordingly.

Characteristics of the Respondents

Table 4.1 Demographic Characteristics of the Respondents

Characteristics	**Frequency**	**Percentages (%)**
Individual Profile		
Ages		
• Less than 20-year-old	2	1
• 21-30-year-old	13	6.3
• 31-40-year-old	71	34.6
• 41-50-year-old	45	22
• 51-60-year-old	54	26.3
• More than 60-year-old	20	9.8
Genders		
• Male	149	72.7
• Female	56	27.3
Level of Education (with the highest completes)		
• Lower than high school	8	3.9
• High School	37	18
• Vocational	25	12.2
• Bachelor's Degree	101	49.3
• Master's Degree	33	16.1
• Doctoral Degree	1	0.5
Position		
• Business Owner	88	42.9
• Business Heir	45	22
• Manager	24	11.7
• Supervisor	24	11.7
• Normal Staff	24	11.7
Work experience		
• less than 1 year	2	1
• 1-5 years	22	10.7
• 5-10 years	53	25.9
• 11-20 years	82	40
• 21-30 years	20	9.8
• 31-40 years	26	12.7
ERP Knowledge Check (5 questions)	***Points***	
• Minimum score	0	
• Maximum score	5	
• Averaged score	1.41	
• Std. deviation	1.05	
Score details	***Frequency***	***Percentages (%)***
• 0 point	41	20.00

Characteristics	Frequency	Percentages (%)
• 1 point	74	36.10
• 2 points	63	30.73
• 3 points	22	10.73
• 4 points	2	0.98
• 5 points	3	1.46
Rice mill Profile		
Generation of business		
• Establisher	97	47.3
• 2nd generation (Descendants)	78	38.0
• 3rd generation (Grand children	28	13.7
• 4th generation (Great-grandchildren)	1	0.5
• Others	1	0.5
Manpower		
• Less than 10 (People)	62	30.2
• 11-50 (People)	129	62.9
• 51-100 (People)	9	4.4
• 101-200 (People)	5	2.4
• More than 201 (People)	0	0.0
Business years		
• Less than 1 year	8	3.9
• 1-5 years	8	3.9
• 5-10 years	17	8.3
• 11-20 years	66	32.2
• 21-30 years	33	16.1
• 31-40 years	54	26.3
• 41-50 years	19	9.3
• More than 50 years	0	0.0
Geographical locations		
• Northern region	59	28.8
• North-Eastern region	28	13.7
• Central region	55	26.8
• Eastern region	15	7.3
• Western region	48	23.4
• **Total**	205	100.0

Regarding the details of the individual profile, males represent 72.7% of the respondents and females 27.3%. The age groups of the respondents are classified as 36.8% for the more than 50 years old and above range; 22% for the 41-50 years old range; 34% for the 31-40 years old range; and 7.3% for the lower than 30 years old range. The education level of the respondents was mostly in the bachelor's degree

(49.3 percent), 21.9% in the basic education, 16.1% in the master's degree, 12.2% in the vocational education, and only 0.5% in the doctoral degree. The survey was completed by various management levels accordingly, 42.9% by actual founders, 22% by business descendants, 35.1% by general manager and rice mill staff. Those individuals' rice mill experience was mostly 11-20 years (40 percent) and 5-10 years (25 percent), and the longest work experiences (more than 21 years) accounted for 22.5% and the shortest work experiences (less than 5 years) accounted for 11.7%. The ERP knowledge check score is significantly low at an average score 1.41 out of 5 and 1 out of 5 lasted as a majority at 36.1% and 20% has no mark. In addition, the ERP knowledge check score with 2 points and below accounted for 86.83%.

According to the individual profile, most of the rice mill delegated respondents is male with an age greater than 50 years, with a bachelor's degree, 11-20 years of work experience, and under the rice mill owner status. Importantly, the test score for the ERP knowledge check is significantly low which distinctly implies that no one had ERP implementation experience.

For rice mill organization details, most of the rice mills belonged to the first business generation (47.3 percent) and this industry is still primarily family owned as per additional figure of 38% managed by second business generation and 13% managed by third generation of the family. The business experience was the most at the range of greater than 20 years (51.6 percent), followed by the ranges of 10-20 years, 5-10 years and less than 5 years that accounted for 32.2%, 8.3%, and 7.8% respectively. The rice mill workforce was significantly interesting because there were only two tangible groups, which were the range of less than 10 people (30.2 percent) and the range of 11-50 people (62.9 percent). Nevertheless, only 6.8% required the manpower of higher than 100 people that separated into the range of 51-100 people (4.4 percent) and the range of 101-200 people (2.4 percent). The majority of respondents were acquired from the northern region, central region and western region at 28.8%, 26.8%, and 23.4% respectively. None of the respondents in the southern region existed in this data collection. Surprisingly, all of rice mill representatives being interviewed had no ERP experience. As the result, this empirical scenario implies that all respondents are not capable of the Behavioral Use of the ERP

and that the rice mill industry had significantly low or no experience in the use of ERP.

4.2 Normality Test

The normal distribution of data was validated by two numerical coefficients comprised of skewness and kurtosis coefficients. Skewness is a measure of the asymmetry of the probability distribution of a random variable about its mean. Skewness can also address the amount and direction of skew (departure from horizontal symmetry) by the presenting of positive or negative direction from datum. Kurtosis refers to the outliers of the distribution of data. Once, data that has higher outliers, the kurtosis will be high. Whereas data without outliers will have a lower kurtosis. The normality test was performed on an IBM SPSS22 under the Explore function of the Descriptive statistics. In addition, all tested constructs were accepted with acceptable limits of both skewness and kurtosis coefficients. Coefficients of skewness and kurtosis between -2 and +2 are considered acceptable to prove normal univariate distribution (George, 2000). All normality test details of all constructs; GOV, BPR, TRA, PEOU and INT are illustrated in Appendix A.

4.3 Reliability test and Exploratory Factor Analysis

The test of reliability was also performed on the IBM SPSS22 software package under the Reliability test function of the Scale. The Cronbach's alpha results being tested mostly exceeded acceptable value of 0.7 (Gravetter & Forzano, 2018; Hair, 2019) as per demonstrated in Table 4.2. There was only the Cronbach's Alpha estimator of 6.698 from PEOU that was slightly less than 0.7, but this estimator is still acceptable. However, the PEOU was unavoidably removed due to a convergent validity issue being explained in the following section (Hulin et al., 2001). Appendix B presents a Cronbach's alpha coefficient and factor loading with PEOU included.

Table 4.2 Cronbach's Alpha Coefficient and Factor Loading

Constructs	Items	Factor loading				α
Government Support (GOV)	GOV1	0.655				0.793
	GOV2	0.655				
	GOV3	0.643				
Training (TRA)	TRA1		0.894			0.812
	TRA2		0.820			
	TRA3		0.548			
Business Process Re-Engineering (BPR)	BPR1			0.342		0.762
	BPR2			0.652		
	BPR3			1.000		
Perceived Usefulness (PU)	PU1				0.608	0.716
	PU2				0.870	
	PU3				0.563	
Intention to Use (IU)	IU1					0.607	0.772
	IU2					0.853	
	IU3					0.743	

The Exploratory Factor Analysis (EFA) was also performed on an IBM SPSS22 under the Factory analysis function of the Dimension reduction. For EFA, Table 4.2 demonstrates the results of this EFA factor analysis. The factor analysis was implemented under Maximum Likelihood (ML) with a function of ProMax rotation. The ML principle is to find the model parameter estimates that can maximize the difference between the sample and model-implied variance-covariance matrices. Generally, there are several software programs (such as Amos) used or an initial set of parameter estimates and recurrently improves these estimates in an effort to minimize the difference between the sample and model-implied variance-covariance matrices. ML has several requirements in rendering an appropriate estimator: (1) the sample size must be appropriate; (2) the indicators of the factors must be measured on appropriate and same scales; and (3) the indicators must be normal distribution. Non-normality in ML could lead to biased standard errors and proper fit in statistics. In a case that non-normality is severely symmetric, ML will result in incorrect parameter estimates such as the assumption that a linear model is invalid (L.-T. Hu & Bentler, 1995). Regarding factor loading, there is not an exact criterion of factor loading.

However, several scholars have proposed various possible figures, and that “0.3” is agreed upon as the lowest acceptable figure factor loading by several scholars (Carmines & Zeller, 1979; Hair, 2019; Pedhazur & Schmelkin, 2013). This empirical study has EFA tested for 4 factors; GOV, TRA, PU and BPR as presented in Table 4.2 (PEOU was removed due to a convergent validity issue explained in the following section). All factors are grouped correctly as per proposed hypotheses and all loading factors are accepted with minimum loading factors of which greater than 0.3 (Hair, 2019). However, the factor loadings are not perfectly gathered at the initial EFA testing, the lowest loading is removed from GOV to maintain the required loading patterns and to satisfy the convergent validity that will be explained in the following session. For KMO and Bartlett’ test, all samples have met an acceptable limit (of which KMO is greater than 0.5 and Bartlett’ test has a significant level <0.05) at 0.832 and is significant at 0.000 level (Hair, Black, Babin, Anderson, & Tatham, 2006; Kaiser, 1974). Five constructs, which are GOV, TR, BPR, PU and IU in EFA can explain the 70.727 percent of variance.

4.4 Convergent Validity

Convergent validity theoretically deploys Average Variance Extracted (AVE) and Composite Reliability (CR) as indications of measurement. Average Variance Extracted (AVE) and Composite Reliability (CR) are calculated to measure the correlation level of different items between similar measuring constructs. Both AVE and CR are normally used for testing convergent validity and deploy all factor loadings from EFA. The AVE and CR are theoretically accepted at values of 0.5 and 0.7 respectively (Fornell & Larcker, 1981; Hair, 2019). The reliability and convergent validity test results of this study is presented in Table 4.3. There are two constructs, PEOU and PU, that have AVE and CR lower than an acceptable criterion, and one construct, BPR, that has only AVE lower than an acceptable criterion. The other three constructs; GOV, TRA and INT are perfectly accepted. Even though, the AVE ranges below the recommended level of 0.5 could also be adequate, once the CR of the constructs is well above the recommended level (0.7) and the internal reliability of the measurement items is acceptable (Fornell & Larcker, 1981). PEOU and PU are not

able to tolerate the lowest acceptable criteria as recently mentioned. As a result, the PEOU, which has lowest AVE and CR is removed to maintain the validity.

Table 4.3 Summary of Convergent Validity and Reliability Test with PEOU Included

Construct	Item Lebel	Facto Loading	α	Average Variance Extracted (AVE)	Composite Reliability (CR)
Government Support (GOV)	GOV1	0.827	0.798	0.534	0.819
	GOV2	0.766			
	GOV3	0.691			
	GOV4	0.622			
Training (TRA)	TRA1	0.892	0.812	0.568	0.790
	TRA2	0.807			
	TRA3	0.506			
Business Process Re-Engineering (BPR)	BPR1	0.397	0.762	0.494	0.727
	BPR2	0.694			
	BPR3	0.917			
Perceived Ease of Use (PEOU)	PEOU1	0.482	0.698	0.283	0.609
	PEOU2	0.463			
	PEOU3	0.574			
	PEOU4	0.596			
Perceived Usefulness (PU)	PU1	0.553	0.716	0.373	0.638
	PU2	0.694			
	PU3	0.575			
Intention to Use (IU)	IU1	0.607	0.772	0.549	0.782
	IU2	0.853			
	IU3	0.743			

The result of the summary of convergent validity and reliability test after removing PEOU is presented in Appendix B. Even though PEOU is withdrawn, there is still AVE issue of the PU; AVE=0.4985, CR=0.742. Therefore, all constructs are readjusted to refine all the AVE and CR by removing the lowest factor loading from the GOV; GOV4. Table 4.4 presents the summary of convergent validity and reliability test. All constructs currently have none of unexcepted AVE and CR and the convergent validity is rigidly approved.

Table 4.4 Summary of Convergent Validity and Reliability Test

Construct	Item Lebel	Factor Loading	α	Average Variance Extracted (AVE)	Composite Reliability (CR)
Government Support (GOV)	GOV1	0.655	0.793	0.599	0.811
	GOV2	0.655			
	GOV3	0.643			
Training (TRA)	TRA1	0.894	0.812	0.590	0.806
	TRA2	0.820			
	TRA3	0.548			
Business Process Re-Engineering (BPR)	BPR1	0.342	0.762	0.533	0.745
	BPR2	0.652			
	BPR3	1.000			
Perceived Usefulness (PU)	PU1	0.608	0.716	0.575	0.729
	PU2	0.870			
	PU3	0.563			
Intention to Use (IU)	IU1	0.607	0.772	0.549	0.782
	IU2	0.853			
	IU3	0.743			

Most importantly, the researcher decided to exclude PEOU for the analysis to maintain a rigidity of the convergent validity and reliability test. Therefore, the convergent validity of the five constructs; GOV, TRA, BPR, PU and IU were strongly accepted by the convergent validity to further analytical testing.

4.5 Confirmatory Factor Analysis to Verify Significant Fits of All Models

According to hypothesis testing, there were three models proposed for this study comprising of Proposed model, Modified model, and Model with control variables. Therefore, this session will include the significant indication of Confirmatory Factor Analysis (CFA) and present CFA in those three models respectively.

For the CFA, prior to performing all hypothesis testing, CFA was tested with all conceptual models being perform in SEM by IBM AMOS 22 software package. A significant benefit of CFA in the construct validity is the capability of direct comparison among construct relationships in proposed models (Whitely, 1983). The CFA approach was involved in specifying model constructs in which responses to any item can be understood as reflecting additive effects of trait variance, method variance, and measurement error (Marsh & Grayson, 1995; Reichardt & Coleman, 1995; Widaman, 1985).

CFA is not intentionally designed for an implementation of the scale development to examine the latent structure of each particular testing instrument. However, CFA is capable to justify the number of underlying dimensions of the instrument (factors) and the pattern of item relationships (factor loadings). Once the latent structure is multifactorial (having than two factors), a pattern of the factor loading will designate number of factors and pattern of item-factor relationships. In addition, CFA is considered to be a powerful analytical tool for other aspects of psychometric evaluation (Raykov, 2001).

For SEM fit index determination, Covariance-Based SEM must initially satisfy the fitness of measurement models; absolute incremental and parsimonious fit in addition to a model the reliability and validity (Afthanorhan, 2013; Hair, 2010). The absolute fit comprises of chi-square (X^2), Root Mean Square Error Approximation (RMSEA) and Goodness Fit Index (GFI) (Hair, 2010).

The incremental comprises of Adjusted Good of Fit (AGFI), Comparative Fit Index (CFI), Tucker Lewis Index (TLI), and Normed Fit Index (NFI) (Hair, 2010). Parsimonious fit comprises of chi-square over degree of freedom (X^2/Df) (Hair, 2010). All of the fitness indexes are selected to suit an optimal criterion and are

closely related to previous literatures supported by our study. In addition, the size of the sample must be highly considered in the analysis of the structural equation modeling because many of the fit indices are statically affected by sample size. Kline (2011) suggested that a minimum sample size to use in SEM is at least 10 times the number of parameters that can be estimated in the model. Chou and Bentler (1995) suggested that a minimum sample size for SEM is at least 150. Study from Celik and Yesilyurt (2013) recommended that the sample size for SEM could be between 200-500, but at least 200. The final empirical samples for this research of 205 satisfy all mentioned minimum requirements for CB-SEM.

A summary of all necessary indices by Schermelleh-Engel, Moosbrugger, and Müller (2003) used in this CFA of this study is presented in Table 4.5. The description of each fit measure is presented accordingly.

Table 4.5 Recommendation for Model Fit

Fit Measure	Good Fit	Acceptable Fit
X^2	$0 \leq X^2 \leq 2df$	$2df < X^2 \leq 3\ df$
p value	$0.5 < p \leq 1.00$	$0.0 \leq p \leq 0.05$
X^2/df	$0 \leq X^2/df \leq 2$	$2 < X^2/df \leq 3$
RMSEA	$0 \leq RMSEA \leq 0.05$	$0.5 < RMSEA \leq 0.08$
p value to test of close fit (RMSEA<0.05)	$0.1 < p \leq 1.00$	$0.05 \leq p \leq 0.10$
Confidence interval (CI)	*close to RMSEA, left boundary of CI = 0.00*	*close to RMSEA*
SRMR	$0 \leq SRMR \leq 0.05$	$0.5 < SRMR \leq 0.10$
NFI	$0.95 \leq NFI \leq 1.00$a	$0.90 < NFI \leq 0.95$
NNFI	$0.97 \leq NNFI \leq 1.00$b	$0.95 < NNFI \leq 0.97$c
CFI	$0.97 \leq CFI \leq 1.00$	$0.95 < CFI \leq 0.97$c
GFI	$0.95 \leq GFI \leq 1.00$	$0.90 < GFI \leq 0.95$
AGFI	$0.90 \leq AGFI \leq 1.00$, close to GFI	$0.85 < AGFI \leq 0.90$, close to GFI
AIC	smaller than AIC from comparison model	
CAIC	smaller than CAIC from comparison model	
ECVI	smaller than ECVI from comparison model	

Note: AGFI=Adjusted Goodness-of Fit-Index, AIC = Akaike Information Criterion, CAIC = Consistent AIC, CFI = Comparative Fit Index, ECVI = Expected Cross Validation Index, GFI = Goodness-of-Fit Index, NFI = Non-normed Fit Index, RMSEA = Root Mean Square Error of Approximation, SRMR = Standardized Root Mean Square Residual.

[a]NFI may not reach 1.0 even if the specific model is correct, especially in smaller samples (Bentler,1990). [b]As NNFI is not normed, values can sometimes be outsides the 0-1 range. [c]NNFI and CFI values of 0.97 seem to be more realistic than the often-reported cutoff criterion of 0.95 for a good model fit.

Source: Schermelleh-Engel et al. (2003)

Chi-square test (CMIN) presents a compatibility between the hypothesized model and the actual model, and this index is most useful for SEM. In a measuring of

fit values, CMIN is rated with DF which is the degree of freedom. CMIN/DF ratio is accepted at below 3 for the model's overall fit (Civelek, 2018). In addition, the model must not be at significant (P>0.005) to reward accepted fit.

Goodness-of-Fit-Index (GFI) is a measure of the degree of variance and covariance explained by the model and this index depends on sample size. In addition, the GFI is possibly inaccurate once a sample size is low (Tanaka & Huba, 1984). The GFI implies a test of how much better the model fits as compared to no model (Jöreskog & Sörbom, 1993). A concept of GFI is apparently analogous to coefficient of determination (Mulaik et al., 1989). The GFI criteria of acceptance is above 0.90 (Bayram, 2010). In addition, a GFI above 0.90 shows that covariance is calculated among the observed variables. Additionally, other scholars have assigned a rule of thumb for this index, accordingly, stating that 0.95 is an indication of good fit relative to the baseline model, while values greater than 0.90 is an indication of an acceptable fit (Lei & Lomax, 2005; Marsh, Hau, & Grayson, 2005).

Adjusted Goodness-of-Fit Index from (AGFI) was developed by Jöreskog and Sörbom (1993). The AGFI is directly escalated from the GFI and calculated by the degree of freedom and principally affected by sample size. Once the sample size rises, the value of the AGFI also instantaneously rises. In addition, the AGFI is adjusted to suit model complexity for a bias improvement. Additionally, the AGFI is also regulated for the model's degrees of freedom relative to the number of observed variables. The AGFI is accepted as a good fit at values over 0.90 (Bayram, 2010).

Comparative Fit Index (CFI) is an index that compares a model saturation with the independent model. In addition, CFI is the fit index which is based on independent models. CFI values range from 0 to 1, values above 0.90 are accepted at a good fit (Schermelleh-Engel et al., 2003). There are various rules of thumb for this index agreed by other scholars, where 0.97 indicates a good fit relative to the independence model, but a value greater than 0.95 is only recognized as an acceptable fit. CFI is widely accepted as one of the fit indices that are less affected by size of samples (Bentler, 1990; Bollen, 1990; L.-T. Hu & Bentler, 1999).

Tucker and Lewis Index (TLI) was proposed by Tucker and Lewis (1973) and developed into Non-normed Fit Index (NNFI). TLI or NNFI highly emphasizes the degrees of freedom of the specified model as well as the degrees of freedom of the

independence model. With regard to TLI, complex models are penalized by a downward adjustment, while more parsimonious models are rewarded by an increase in the fit index (Tucker & Lewis, 1973). A distinct benefit of the TLI is that it is less affected by sample size (Bentler, 1990; Bollen, 1990; L.-T. Hu & Bentler, 1999). An acceptable criterion of TLI, values of greater 0.97 is indicated of good fit and values greater than 0.95 is indicated as acceptable fit (Tucker & Lewis, 1973).

NFI (Normed Fit Index) is based on independent model regarding a rate of change between independent and target model (Schumacker & Lomax, 1996). A drawback of the NFI is that the sample size is highly sensitive (Bearden, Sharma, & Teel, 1982). An acceptable criterion of NFI, a value greater than 0.90 is accepted as acceptable fit and a greater than 0.95 is accepted as a good fit (Marsh et al., 2005; Schumacker & Lomax, 1996). The NFI values could not reach this acceptable limit, especially in small samples, even though the specified model is correct (Bentler, 1990).

The Standardized Root Mean Square Residual index (SRMR) or Root Mean Square Residual index (RMR) is an overall badness-of-fit measuring based on the fitted residuals (Jöreskog & Sörbom, 1993). A perfect fit value is zero, however the designated boundary for a good fit and an acceptable fit are not rigidly concluded because of sample size dependency and sensitivity to mis-specified models (L.-T. Hu & Bentler, 1999). An acceptable criterion of the RMR is just less than 0.05 for a good fit and less than 0.1 for an acceptable fit (L.-T. Hu & Bentler, 1999).

Root Mean Square Error of Approximation (RMSEA) is a measure of fit comparing the mean differences for each expected degree of freedom that could possibly happen in the population. This RMSEA is severely affected by sample size. Therefore, this measure index is highly sensitive to evaluate whether the model fits approximately well in the population (Kaplan, 2000). The null hypothesis of exact fit is substituted by the null hypothesis of "close fit" instead (Browne, Cudeck, Bollen, & Long, 1993). An acceptable criterion of the RMSEAR is 0.05 or less for the indication of good fit and ranges between 0.05 and 0.08 for acceptable fit (Byrne, 2010).

The CFA estimation for this study was performed with the IBM AMOS22 software package, of which entails a “fitting function”, a mathematical process to minimize the discrepancies among the sample and model-implied variance-covariance

matrices. In detail, one of the fitting functions which is widely used in CFA and SEM research applications is maximum likelihood (ML). The fundamental principle of ML estimation is to find the model parameter estimates that maximize the probability of the observing variable. CFA and SEM criteria, scale validation is judged by global goodness of fit indexes as presented in Table 10. According to the empirical models of this study, CFA of 3 models; proposed model, modified model and model with control variables are performed respectively.

4.5.1 Proposed Model

The model fit evaluation of the proposed model is accessed from Chi-square/Df (X^2/Df), standardized root means square residual (SRMR), root mean square error of approximation (RMSEA), Tucker-Lewis's index (TLI), and the comparative fit index (CFI). The proposed model presents a number of critical fit-indexes accordingly X^2/DF =2.0224; GFI =0.9922; AGFI =0.9416; CFI =0.9931; TLI = 0.9657; NFI =0.9893; SRMR = 0.0287; RMSEA = 0.0708; PCLOSE = 0.2674; measuring values are not significant at the 0.05 level (0.0696); Chi-square = 4.0448, Degree of freedom = 2, and probability level=0.0696. Hence, all of estimation indexes rigidly passed the Goodness of fit criteria. Table 4.6 illustrates the Confirmatory Factor Analysis Results of The Proposed Model

Table 4.6 Confirmatory Factor Analysis Results of The Proposed Model

	Acceptable criteria	**Proposed model**
X^2/Df	< 3	*2.0224**
Significant	$p > 0.05$	*0.1323**
GFI	≥ 0.95	*0.9922**
AGFI	≥ 0.90	*0.9416**
RMR	< 0.05	*0.0287**
CFI	≥ 0.90	*0.9931**
TLI	≥ 0.90	*0.9657**
NFI	≥ 0.90	*0.9869**
RMSEA	<0.08	*0.0708**
PCLOSE	$p > 0.05$	*0.2674**

Note: *value is accepted

4.5.2 Modified Model

According to Table 4.7, the modified empirical model has partially met the fit criteria of acquired goodness-of-fit indexes, rules of thumb by Schermelleh-Engel et al. (2003). The modified model presents a number of critical fit-indexes accordingly X^2/DF =3.2914; GFI =0.9936; AGFI =0.9046; CFI =0.9923; TLI = 0.9232; NFI =0.9893; RMR = 0.0257; RMSEA = 0.106; PCLOSE = 0.1414; measuring values are not significant at the 0.05 level (0.0696); Chi-square = 3.2914, Degree of freedom = 1, and probability level=0.0696. As per those fit indexes, the research model indicates the mostly best fit, and almost satisfies all the goodness-of-fit indexes. There are only X^2/Df (3.2914) and RMSEA (0.106) that exceeds the criteria of acceptance. Therefore, this modified model is still not accepted as model fitted.

Table 4.7 Confirmatory Factor Analysis Results of The Proposed Model

	Acceptable criteria	**Modified model**
X^2/Df	< 3	***3.2914***
Significant	$p > 0.05$	*0.0696**
GFI	≥ 0.95	*0.9936**
AGFI	≥ 0.90	*0.9046**
RMR	< 0.05	*0.0257**
CFI	≥ 0.90	*0.9923**
TLI	≥ 0.90	*0.9232**
NFI	≥ 0.90	*0.9893**
RMSEA	<0.08	***0.106***
PCLOSE	$p > 0.05$	*0.1414**

Note: *value is accepted

4.5.3 Model with Control Variables

According to Table 4.8, the modified empirical with adding aforementioned four control variable's model has entirely met the fit criteria of acquired goodness-of-fit indexes, rules of thumb by Schermelleh-Engel et al. (2003). This model presents a number of critical fit-indexes accordingly X^2/DF = 1.6224; GFI =0.9724; AGFI

=0.9089; CFI =0.9773; TLI =0.9375; NFI =0.9471; RMR = 0.0362; RMSEA = 0.0561; PCLOSE = 0.3524; measuring values are significant at the 0.05 level (0.039); Chi-square = 32.8471, Degree of freedom =20 and probability level=0. 0351. As per those fit indexes, this model with control variables indicates the best fit and satisfies nearly all the goodness-of-fit indices except significant values (0.0351).

Table 4.8 Modified Model Fit Results with Control Variables

	Acceptable criteria	**Model with control variables**
X²/Df	< 3	*1.6424**
Significant	*p* > 0.05	***0.0351***
GFI	≥ 0.95	*0.9724**
AGFI	≥ 0.90	*0.9089**
RMR	< 0.05	*0.0362**
CFI	≥ 0.90	*0.9773**
TLI	≥ 0.90	*0.9375**
NFI	≥ 0.90	*0.9471**
RMSEA	<0.08	*0.0561**
PCLOSE	*p* > 0.05	*0.3524**

Note: *value is accepted

According to the Table 4.9, the proposed model has none of fit indices below acceptable criteria. The modified model still has RMSEA, X^2/Df below the acceptable values and the model with control variables still has issues in the value of significant level.

Table 4.9 Summary of Different Model Fit Results

	Acceptable criteria	**Proposed model**	**Modified model**	**Model with control variables**
X^2/Df	< 3	*2.0224**	***3.2914***	*1.6424**
Significant	p > 0.05	*0.1323**	*0.0696**	***0.0351***
GFI	≥ 0.95	*0.9922**	*0.9936**	*0.9724**
AGFI	≥ 0.90	*0.9416**	*0.9046**	*0.9089**
RMR	< 0.05	*0.0287**	*0.0257**	*0.0362**
CFI	≥ 0.90	*0.9931**	*0.9923**	*0.9773**
TLI	≥ 0.90	*0.9657**	*0.9232**	*0.9375**
NFI	≥ 0.90	*0.9869**	*0.9893*	*0.9471**
RMSEA	<0.08	*0.0708**	***0.106***	*0.0561**
PCLOSE	p > 0.05	*0.2674**	*0.1414**	*0.3524**

Note: *value is accepted

4.6 Explanation of Hypothesis Testing

There were three models; Proposed model, Modified model and Model with control variables that require hypothesis testing after the CFA was verified. Therefore, this session will include the hypothetical measurement, analytical implementation of and present hypothesis testing results of those three models respectively.

The hypothetical testing was performed by a path analysis in the IBM AMOS software package version 22. The implementation process in path analysis, which is on the SEM application, is mainly on aforementioned detail in methodology part especially in the maximum likelihood (ML) being developed for path analysis and covariance structure model. An implication of the path analysis is to recognize only observed variables and is incapable of measuring the latent variables and error terms. The path analysis is similar to multiple regression because an analysis is completed with observed variables. The dependent variable could have more than one in the path analysis, and a variable could be both a dependent and an independent variable. The path analysis in SEM could have more than one regression model which can be examined at the same time, and the same as the indirect and direct effects. By meaning, the direct effect is the effect exclusively caused between independent and dependent variables whereas the indirect effect is from the interference of a variable which mediates between independent and dependent variables (Raykov & Marcoulides, 2006). This variable is named as the mediator variable (Raykov & Marcoulides, 2006). In addition, the sum of the direct effect and the indirect effect of a variable on another variable is named the total effect (Raykov & Marcoulides, 2006).

For Covariance-Based SEM(CB-SEM), CB-SEM theoretically involves ML procedure so as to minimize the difference between the observed variables and estimated covariance matrices, but this SEM is not maximizing explained variance of the endogenous constructs as Variance-Based SEM (PLS-SM) (Hair, Ringle, & Sarstedt, 2011). CB-SEM is more appropriate for the confirmatory factor analysis in comparison to PLS-SM, which is more suitable for exploratory work in finding and evaluating causal relationships (Hair et al., 2011).

Maximum Likelihood (ML) is mostly used for a fitting function for structural equation models. ML is the default estimator for various SEM. This method principally estimates for the parameters, of which maximizes the likelihood that the empirical covariance matrix is taken from a population for the model-implied covariance matrix (Bollen & Davis, 2009). The ML estimator normally predicts that all variables in the model are multivariate normal and positively related, which suggests that matrices are nonsingular (Bollen & Davis, 2009). For a limitation, ML estimation is the robust assumption of an only multivariate normality, violations of distributional assumptions could potentially bring about serious misleading results (Chou & Bentler, 1995; P. J. Curran, West, & Finch, 1996; Muthén & Muthén, 2002). Bootstrapping in ML is an alternative for small samples (Tibshirani & Efron, 1993). Therefore, this research hypothetically deployed the ML using the principal measurement approach. The results of the three models under implication of ML in the path analysis are presented accordingly.

4.6.1 Proposed Model

As per those indices in the CFA session, all of the fit indices are theoretically accepted as fitted for SEM. Those empirical results imply that the proposed model for this research does not require further readjustment to satisfy an overall better fit.

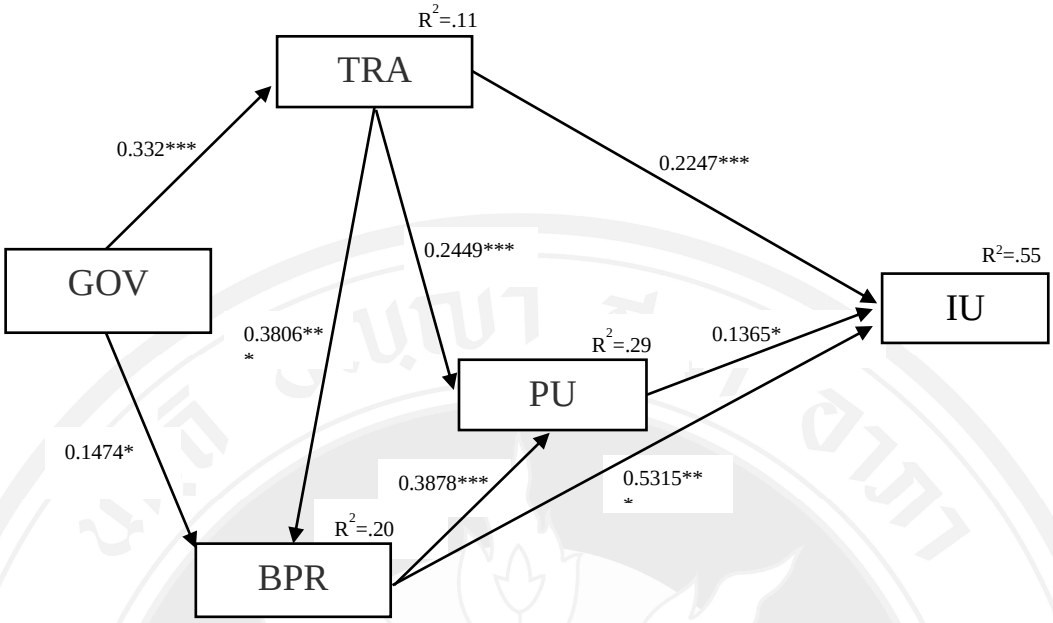

Figure 4.1 Proposed Path Model Results

Note: *p= 0.05 level, **p= 0.01 level and ***p=0.001; **GOV**: Government support**, BPR**: Business Process Re-Engineering**, TRA**: Training**, PU**: Perceived Usefulness **and IU**: Intention to Use.

The path analysis results with regards to all proposed studies segregated each linkage for our hypotheses are demonstrated in Figure 4.1. This figure represents the whole study of ERP adoption in rice mill samples in terms of SEM path diagram that all constructs correlate to each other by standardized coefficient and also explained by coefficient of determination (R^2). This path model explanation is divided into two sections: extension part of TAM and original part of TAM (Davis, 1989).

In the extension part of TAM, the Government Support (GOV) has the standardized coefficient to the Training (TRA) =0.332 and this path relationship is at significant level of 0.001. GOV has the standardized coefficient to the Business Process Re-Engineering (BPR) =0.1474 and this path relationship is at significant level of 0.05. TRA has the standardized coefficient to the BPR =0.3806 and the path relationship is at significant level of 0.001. TRA has the standardized coefficient to PU=0.2449 and the path relationship is at significant level of 0.001. TRA has the

standardized coefficient to the Intention to Use of ERP (IU) =0.2247 and the path relationship is at significant level of 0.001. BPR has the standardized coefficient to the Perceive Usefulness (PU) =0.3878 and the path relationship is at significant level of 0.001. BPR has the standardized coefficient to IU =0.5315 and the path relationship is at significant level of 0.001. In terms of the coefficient of determination, variance explaining each relationship is presented accordingly. The GOV is able to explain 11% (R^2 =0.11) of variance in TRA. GOV and TRA is able to explain 20% (R^2 =0.20) of variance in BPR.TRA and BPR is able to explain 29% (R^2 =0.29) of variance in PU. The proposed independent variables TRA, BPR and PU is able to explain 55% (R^2 =0.55) of variance in IU.

In the original part of TAM, PU has the standardized coefficient to IU =0.1365 and this path relationship is at significant level of 0.05.

For the proposed hypothetical testing as resulted in Table 4.10, there is only one hypothesis (H12) that could not be tested due to none of respondents having used the ERP program, and three hypotheses (H4, H7 and H10) are removed due to the Averaged Variance Extracted (AVE) being less than the acceptable limits. Eight hypotheses are empirically accepted as SEM performing, six hypotheses (H1, H3, H5, H6, H8 and H9) are significant at 0.001 level and two hypotheses (H2 and H11) are significant at level 0.05. None of the tested hypotheses are subjected to rejection.

The insight of each hypothetical explanation is described accordingly.

Hypothesis 1 The Government Support will have a direct, positive effect on the Training of the ERP system. The Government Support (GOV) is found to have positive β of 0.332 associated with the training of the ERP system (TRA) and significant at 0.001 level (p =0.000). Therefore, hypothesis 1 is accepted.

Hypothesis 2: The Government Support will have a direct, positive effect on the Business Process RE-Engineering of the ERP system. The Government Support (GOV) is found to have positive β of 0.1471 associated with the Business Process Re-Engineering of the ERP system (BPR) and significant at 0.05 level (p =0.0261). Therefore, hypothesis 2 is accepted.

Hypothesis 3: Training of the ERP system will have a direct, positive effect on the Business Process Re-engineering for using the ERP system. The Training of the ERP system (TRA) is found to have positive β of 0.3806 associated with the Business

Process Re-Engineering for using the ERP system (BPR) and significant at 0.001 level (p =0.000). Therefore, hypothesis 3 is accepted.

Hypothesis 4: Training of the ERP system will have a direct, positive effect on the Perceived Ease of Use of the ERP system. The hypothesis could not be verified due to an Averaged Variance Extracted (AVE) issue because the AVE of PEOU is not accepted by the minimum acceptance. Therefore, hypothesis 4 is not valid.

Hypothesis 5: Training of the ERP will have a direct, positive effect on the Perceived Usefulness of the ERP system. Training of the ERP (TRA) is found to have positive β of 0.2449 associated with the Perceived Usefulness of the ERP system (PU) and significant at 0.001 level (p =0.000). Therefore, hypothesis 5 is accepted.

Hypothesis 6: The Training of the ERP will have a direct, positive effect on the Intention to Use of the ERP system. Training of the ERP (TRA) is found to have positive β of 0.2247 associated with the Intention to Use of the ERP system of the ERP system (IU) and significant at 0.001 level (p =0.000). Therefore, hypothesis 6 is accepted.

Hypothesis 7: The Business Process Re-Engineering will have a direct, positive effect on the Perceived Ease of Use of the ERP system. The hypothesis could not be verified due to an Averaged Variance Extracted (AVE) issue because the AVE of PEOU is not accepted by the minimum acceptance. Therefore, hypothesis 7 is not valid.

Hypothesis 8: The Business Process Re-Engineering will have a direct, positive effect the Perceived Usefulness of the ERP system. The Business Process Re-Engineering (BPR) is found to have positive β of 0.3878 associated with the Perceived Usefulness of the ERP system (PU) and significant at 0.001 level (p =0.000). Therefore, hypothesis 10 is accepted.

Hypothesis 9: The Business Process Re-Engineering will have a direct, positive effect on the Intention to Use of the ERP system The Business Process Re-Engineering (BPR) is found to have positive β of 0.5315 associated with the Intention to Use of the ERP system (IU) and significant at 0.001 level (p =0.000). Therefore, hypothesis 9 is accepted.

Hypothesis 10: The Perceived Ease of Use of the ERP system will have a direct, positive effect on the Perceive Usefulness of the ERP system. The hypothesis

could not be verified due to an Averaged Variance Extracted (AVE) issue because the AVE of PEOU is not accepted by the minimum acceptance. Therefore, hypothesis 10 is not valid.

Hypothesis 11: The Perceive Usefulness of the ERP system will have a direct, positive effect on the Intention to Use of the ERP system. The Perceive Usefulness of the ERP system (PU) is found to have positive β of 0.1365 associated with the Intention to Use of the ERP system (IU) of the ERP system and significant at 0.05 level (p =0.0144). Therefore, Hypothesis 11 is accepted.

Hypothesis 12: The Intention to Use of the ERP system ***will have a direct, positive effect on the Behavior Use of the ERP system.*** The hypothesis could not be verified because none of the rice mills were experienced with ERP implementation. Therefore, hypothesis 12 is not valid.

A summary of the proposed hypothetical development is presented in Table 4.10.

Table 4.10 Summary of Hypothetical Development for Proposed Model

Hypothesis	Hypothesis	Expected effect	β	Sig.	Results
H1	The Government Support will have a direct, positive effect on the Training of the ERP system.	+	0.3320	**0.0000**	***Accepted***
H2	The Government Support will have a direct, positive effect on the Business Process RE-Engineering of the ERP system.	+	0.1474	**0.0261**	***Accepted***
H3	The Training of the ERP will have a direct, positive effect on the Business Process Re-Engineering of the ERP system.	+	0.3806	**0.0000**	***Accepted***
H4	The Training of the ERP will have a direct, positive effect on the Perceived Ease of Use of the ERP system.	+	N/A	N/A	**No test**
H5	The Training of the ERP will have a direct, positive effect on the Perceived Usefulness of the ERP system.	+	0.2449	**0.0000**	***Accepted***
H6	The Training of the ERP will have a direct, positive effect on the Intention to Use of the ERP system.	+	0.2247	**0.0000**	***Accepted***
H7	The Business Process Re-Engineering will have a direct, positive effect on the Perceive Ease of Use the ERP system.	+	N/A	N/A	**No test**
H8	The Business Process Re-Engineering will have a direct, positive effect the Perceived Usefulness of the ERP system.	+	0.3878	**0.0000**	***Accepted***
H9	The Business Process Re-Engineering will have a direct, positive effect on the Intention to Use of the ERP system.	+	0.5315	**0.0000**	***Accepted***
H10	The Perceived Ease of Use will have a direct, positive effect on the Perceived Usefulness of the ERP system	+	N/A	N/A	**No test**
H11	The Perceived Usefulness will have a direct, positive effect on the Intention to Use of the ERP system.	+	0.1365	**0.0144**	***Accepted***
H12	The Intention to Use of the ERP system will have a direct, positive effect on the Behavior Use of the ERP system.	+	N/A	N/A	**No test**

4.6.2 Modified Model

As per those indices in the CFA session under the modified model, there are two indices; X^2/Df and RMSEA that are not theoretically accepted as fitted for SEM. Those empirical results implied that the modified model does not satisfy an overall significant fit.

Even so the structural equation model results of this initial proposed model are statically rigid and almost all hypotheses are accepted. This model must be modified further to investigate an alternative relationship. As a result, some new relationships and hypotheses of the proposed model are readjusted and optimized to improve on this initial proposed model and statistical indices. In this adjustment, an extra relationship between GOV and IU is inserted with the initial model referred to as "modified model". Therefore, this session intentionally included significant literature of a relationship between the government support and the use intention of ERP prior to demonstrate the hypothesis testing results.

1) Relationship between the Government Support and the Intention to Use of ERP

The relationship between the Government Support and the Intention to Use of ERP with regard to the ERP adoption and implementation is not explicitly found with clear literature. However, the government impact of enabling technology use is found as shown by the following evidence:

For the developing world that has been successful in upgrading of their technological competence, implementing active government policies are a key to success, and China and East Asian are the distinct instances (Altenburg, Schmitz, & Stamm, 2008; Lall, 1992). In addition, upgrading technology in developing countries is seemingly impossible without any public policy assistance. Nevertheless, there are also instances of inefficient innovation policies, such as in Latin America (Di Maio, 2009).

In the advanced world, especially European countries, government support programs have differently related to new investment in R&D of private companies, the companies are self-dependable and the public subsidy programs are marginally important (Aerts & Czarnitzki, 2004; Aerts & Schmidt, 2008; Ali-Yrkkö, 2005;

Czarnitzki & Lopes-Bento, 2013; González & Pazó, 2008; Hottenrott & Lopes-Bento, 2014; Hussinger, 2008; Lach & Schankerman, 2008).

Government support can come in several forms to suit various business scenarios. (OTA, 1995) found that Tax privilege, especially Research and Development (R&D) tax credits given to US context of R&D instigation is not quite related to a fundamental business. This could play an important role for only some business types, such as the telecommunication and information technology industry. A tangible benefit is only solving of a financial liquidity problem instead (OTA, 1995). In French manufacturing, government funding has not made any significant contributions at an investment level below 20% of R&D cost, but this funding positively affects the firm's R&D productivity (B. H. Hall & Mairesse, 1995).David, Hall, and Toole (2000) concluded that different forms of support, such as the R&D tax credits, subsidies and government contracts give different outcomes to expenses of the R&D by company recipients. The tax credits are prone to service for short-term projects with more sustainable paybacks. Knowledge subsidies and assisting contracts outlaying on basic research cannot replace private R&D funding except that the quality of support is highly beyond the private capability. An impact of government funding can depend on current political and economic situations. Public funding is seemingly complementary to private financing, once all political and economic stability is low and vice versa (OECD, 1998). Busom (2000) suggested that the financial subsidies toward the R&D instigation does not account Spanish corporations. However, this study implies that small firms are relatively prone to be funded rather than the large companies, and that locally owned companies are willing to be assisted rather than foreign-owned ones. In France, (Lhuillery & Pfister, 2009) an empirical study suggested that R&D has influenced both local and international companies in term of expense and performance. The government's direct knowledge supporting the R&D and innovation for private companies are normally preceded by public laboratories and university research (Cohen, Nelson, & Walsh, 2002). The influence of knowledge support is increased by the quality of research institutes and laboratories as measured by published papers and reports, public conferences and meetings, informal information exchange and consulting relationships (Cohen et al., 2002). In addition, communication channels are much more important than other

educational matters and facilities (Cohen et al., 2002). Interestingly, start-ups are more likely make use of the governmental research sources than SMEs in the US (Cohen et al., 2002).

These governments can support firms through tax preference, loans that stimulate innovation, subsidies on innovation activities, and government funding programs (Beugelsdijk & Cornet, 2002; Guan & Yam, 2015; Romijn & Albaladejo, 2002; Souitaris, 2002; Wallsten, 2000). Guan and Yam (2015) empirically explored the effects of Chinese government financial incentives on firms' innovation performance and found that these special loans and tax credits positively relate to the innovation of a firm, whereas the direct governmental subsidy has negative effects to the innovation of a firm. Doh and Kim (2014) found that government support has a positive relationship with industrial innovation for SMEs in South Korea. Radas, Anić, Tafro, and Wagner (2015) found that direct subsidies and tax incentives are efficient ways to enhance the R&D strength of SMEs. Study of South Korea's biotechnology industry from (Kang & Park, 2012) found that government R&D contributions have a positive affect towards promoting innovation output for SMEs. Park (2015) empirically examined the competence of government subsidies and found that there are differences in government subsidies outcomes amongst universities, laboratories and companies. Görg and Strobl (2007); Wallsten (2000) concluded that government contributions are not totally related to the R&D expenditure, and also incur a negative effect on the innovation of a company. (Y. Yu, Dong, Shen, Khalifa, & Hao, 2013) concluded that the effect of government contributions toward an innovative competence has a negative effect on innovation at the local level. Wallsten (2000) measured SEM analysis of public R&D funding and R&D expenditure of US companies and found that government contributions will not have an effect on R&D expenditure, and R&D activities. Lach (2002), who conducted an empirical study of Israeli companies, argued that government financial contributions could not really replace or support a company's expenditure. However, this study from Lach (2002) also found that there is a positive effect on the private R&D investing of the SMEs and instead of large corporations. Government support could possibly have an effect on companies for investment of the R&D and innovative adjustments, in case of inspiring companies to innovate more intensively and to transform their original

innovations (Cozzarin, 2006). Once the original innovations are already in place, the companies are more likely to have an encouraging impact of innovation toward the company's performance (Cozzarin, 2006). Hussinger (2008) empirically verified an effect of the public financial grant using samples of German manufacturing and found that financing of R&D in private companies and company's productivity has significantly increased, once the public financial grant and support of patents exist in the public services. González and Pazó (2008) suggested that the effects of government contributions and financial subsidies onto private company's adoption of R&D depend on the level of technology familiarity. Herrera and Sanchez-Gonzalez (2013) performed an empirical study of the R&D subsidy effects on innovation activities and suggested that R&D subsidies have different effects on innovation activities and can only contribute up to a certain point, because the innovation of companies can range from absences of innovation to advanced technology. Several scholars performed empirical testing of behavioral additionality of public support toward company characteristics and concluded that behavioral additionality of governmental support is not yet definite and rigidly dependable to the company and industry characteristics (Luukkonen, 2000; Radas et al., 2015; Wanzenböck et al., 2013).

An evolutionary approach in the economics of innovation has proposed three concepts, which are the technology capabilities of firms (Lall, 1992; Pavitt, 1990), organizational learning (Lundvall, 2007) and the system of innovation (Edquist, 2011) in support of government assistance for innovating corporations. A better technology policy must allow organization learning for all generations prior to raise a competitive advantage. Intrinsically, the purpose of technology schemes is to facilitate and optimize existing workflow by enhancing technology competences, to improve system to system collaboration and to prevent poor/incorrect adoption of technology (Lundvall & Borrás, 2005; Metcalfe, 1994).

According to those reviews and criticism of the relationship between Government Support and the Intention to Use of ERP. The researcher proposes Hypothesis 13 (H13): "The Government Support will have a direct, positive effect on the Intention to Use of the ERP system". This relationship is proven to have a possibility of existence but there is not clear solid theoretical support for this positive

relationship because several scholars have highly implied that the effect of government support differs by national context, politics, economics, industry, and type of company.

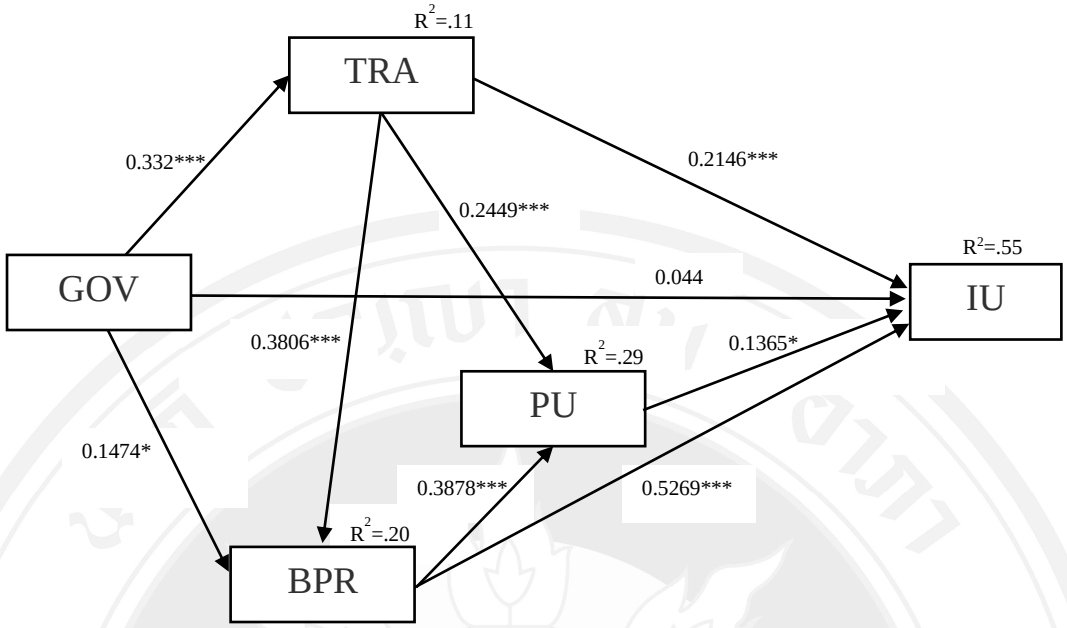

Figure 4.2 Modified Path Model Results

Note: *p= 0.05 level, **p= 0.01 level and ***p=0.001; **GOV**: Government support**,** **BPR**: Business Process Re-Engineering**,** **TRA**: Training**,** **PU**: Perceived Usefulness and **IU**: Intention to Use.

The final path diagram concluding with revised hypotheses are demonstrated in Figure 4.2. This figure represents the final results of this study of ERP adoption that all constructs correlate to each other by standardized path coefficient and also is explained by the coefficient of determination(R^2). This path model explanation is also divided into two sections: extension part of TAM, and original part of TAM (Davis, 1989).

In the extension part of TAM, the Government support (GOV) has the standardized coefficient to the Training (TRA) =0.332 and this path relationship is at significant level of 0.001. GOV has the standardized coefficient to the Business Process Re-Engineering (BPR) =0.1474 and this path relationship is at significant level of 0.05. Nevertheless, GOV has the standardized coefficient to the Intention to Use of ERP (IU) =0.044 and this path relationship is not at a significant level of 0.05. TRA has the standardized coefficient to the BPR =0.3806 and the path relationship is

at significant level of 0.001. TRA has the standardized coefficient to IU =0.2146 and the path relationship is at significant level of 0.001. BPR has the standardized coefficient to the Perceive Usefulness (PU) =0.3878 and the path relationship is at significant level of 0.001. BPR has the standardized coefficient to IU = 0.5269 and the path relationship is at significant level of 0.001. In terms of the coefficient of determination, variance explaining each relationship is presented accordingly. The GOV is able to explain 11% (R^2 =0.11) of variance in TRA. TRA and BPR is able to explain 29% (R^2 =0.29) of variance in PU. GOV and TRA is able to explain 20% (R^2=0.20) of variance in BPR. The proposed independent variables TRA, BPR and PU excluding GOV is able to explain 55% (R^2=0.55) of variance in IU.
In the original part of TAM, PU has the standardized coefficient to the Intention to use of ERP (IU) =0.1365 and this path relationship is at significant level of 0.05.

This modified path model is not statistically rigid and could not improve all statistical fit issues in the initial model. Therefore, this model cannot be considered as a completed conclusion of the SEM path analysis of this empirical study of ERP adoption.

Table 4.11 demonstrates a summary of this research's hypothetical interpretation. The entire results are very similar to the proposed hypotheses except with the addition of the extra hypothesis "The Government Support will have a direct, positive effect on the Intention to Use of the ERP system" to expect better fit indices. There is only one hypothesis (H12) that could not be tested because none of respondents had used the ERP program, and three hypotheses (H4, H7 and H10) are removed due to the Averaged Variance Extracted (AVE) being less than acceptable limits. Nine hypotheses are empirically accepted as SEM performing, six hypotheses (H1, H3, H5, H6, H8 and H9) are significant at 0.001 level and two hypotheses (H2 and H11) are significant at level 0.05. However, the extra hypothesis is not statistically accepted with a significant level of 0.05. In conclusion, enabling of the relationship between GOV and IU results in this model being not fitted. This analytical finding could imply that Government Support will not have a direct influence on the Use Intention of the ERP system.

Table 4.11 Summary of Hypothetical Development for Modified Path Model

Hypothesis	Hypothesis	Expected effect	β	Sig.	Results
H1	The Government Support will have a direct, positive effect on the Training of the ERP system.	+	0.332	**0.000**	***Accepted***
H2	The Government Support will have a direct, positive effect on the Business Process Re-Engineering of the ERP system.	+	0.1474	**0.0261**	***Accepted***
H3	The Training of the ERP will have a direct, positive effect on the Business Process Re-Engineering for using the ERP system.	+	0.3806	**0.0000**	***Accepted***
H4	The Training of the ERP will have a direct, positive effect on the Perceived Ease of Use of the ERP system.	+	N/A	N/A	**No test**
H5	The Training of the ERP will have a direct, positive effect on the Perceived Usefulness of the ERP system.	+	0.2449	**0.000**	***Accepted***
H6	The Training of the ERP will have a direct, positive effect on the Intention to Use of the ERP system.	+	0.2146	**0.000**	***Accepted***
H7	The Business Process Re-Engineering will have a direct, positive effect on the Perceived Ease of Use the ERP system.	+	N/A	N/A	**No test**
H8	The Business Process Re-Engineering will have a direct, positive effect the Perceived Usefulness of the ERP system.	+	0.3878	**0.0000**	***Accepted***
H9	The Business Process Re-Engineering will have a direct, positive effect on the Intention to Use of the ERP system.	+	0.5269	**0.0000**	***Accepted***
H10	The Perceived Ease of Use will have a direct, positive effect on the Perceive Usefulness of the ERP system.	+	N/A	N/A	**No test**
H11	The Perceived Usefulness will have a direct, positive effect on the Intention to Use of the ERP system.	+	0.1303	**0.0202**	***Accepted***
H12	The Intention to Use of the ERP system will have a direct, positive effect on the Behavior Use of the ERP system.	+	N/A	N/A	**No test**
H13	The Government Support will have a direct, positive effect on the Intention to Use of the ERP system.	+	0.044	**0.385**	***Not Accepted***

4.6.3 Model with Control Variables

As per those indices in the CFA session under the model with control variables, there is an index; significant values that are not theoretically accepted as fitted for SEM. Those empirical results implied that the model with control variables for still does not satisfy an overall significant fit.

This path diagram in Figure 4.3 is a combination of the proposed model and the four control variables; work experience of respondent, age of respondents, gender, and number of rice mill employees to determine the significant impact among those control variables and the Use Intention of the ERP program. This figure represents the results of this study of ERP adoption with interested control variables included that all constructs correlate to each other by standardized coefficient and are also explained by coefficient of determination (R^2). This path model explanation is also divided into two sections: the extension part of TAM and the original part of TAM (Davis, 1989).

In the extension part of TAM, the Government Support (GOV), the Training (TRA), the Business Process Re-Engineering (BPR), the Perceive Usefulness (PU) and the Intention to use of ERP (IU) have relationships of the standardized coefficients and the coefficients of determination (R2) that are almost identical in values and relative characteristics to the mentioned proposed structure equation model results (Figure 4.1). GOV has the standardized coefficient to TRA =0.332 and this path relationship is at significant level of 0.001. GOV has the standardized coefficient to BPR =0.1474 and this path relationship is at significant level of 0.05. TRA has the standardized coefficient to the BPR=0.3806 and the path relationship is at significant level of 0.001. TRA has the standardized coefficient to IU =0.2386 and the path relationship is at significant level of 0.001. BPR has the standardized coefficient to PU =0.3878 and the path relationship is at significant level of 0.001. BPR has the standardized coefficient to PU =0.3878 and the path relationship is at significant level of 0.001. BPR has the standardized coefficient to IU =0.5223 and the path relationship is at significant level of 0.001. In terms of the coefficient of determination, variance explaining each relationship is presented accordingly. The GOV is able to explain 11% (R^2 =0.11) of variance in TRA. TRA and BPR is able to explain 29% (R^2 =0.29) of variance in PU. GOV and TRA is able to explain 20% (R^2=0.20) of variance in

BPR. The proposed independent variables TRA, BPR and PU along with Gender is able to explain 57% (R2 =0.57) of variance in IU.

In the original part of TAM, PU has the standardized coefficient to IU =0.1347 and this path relationship is at a significant level of 0.05.

For a statistical explanation of control variables, the work experience of the respondent has the standardized coefficient to IU =-0.0149 and this path relationship is not at significant level of 0.05. The age has the standardized coefficient to IU = -0.0545 and this path relationship is not at significant level of 0.05. The gender has the standardized coefficient to UI = -0.2465 and this path relationship is at significant level of 0.05. The Number of rice mill employees has the standardized coefficient to IU = 0.0308 and this path relationship is not at significant level of 0.05.

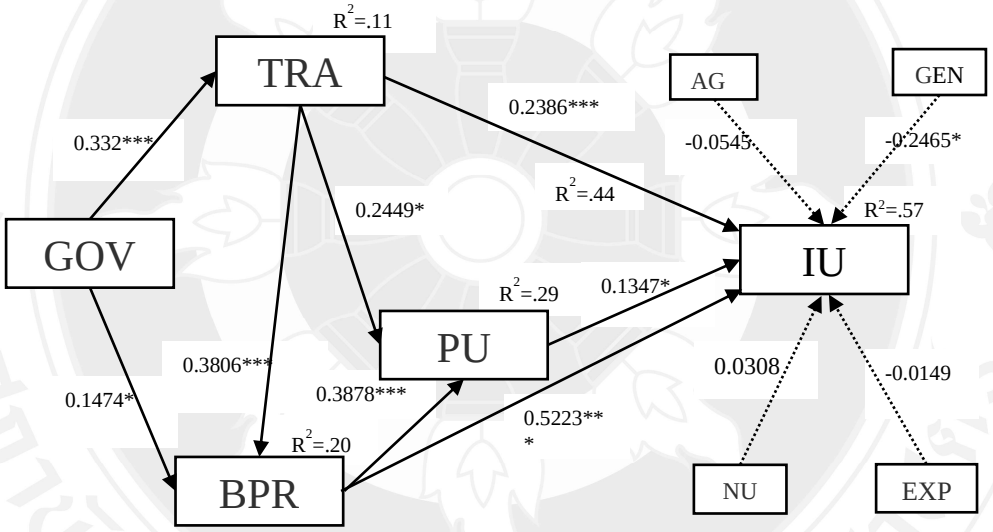

Figure 4.3 Modified Structure Equation Model Included Control Variables Results.

Note: *p= 0.05 level, **p= 0.01 level and ***p=0.001; **GOV**: Government support, **BPR**: Business Process Re-Engineering, **TRA**: Training, **PU**: Perceived Usefulness, **IU**: Intention to Use, **AGE**: Age of respondents, **GEN**: Gender of respondents, **EXP**: Work experience of respondents, and **NUM**: Number of rice mill employee.

Regarding the hypothetical testing of the model associated with four control variables; work experience of respondent, age of respondents, gender and number of rice mill employees shown in Table 4.12, most hypotheses, except the assumption of the control variables, are similar to the previous results of the proposed model in Table 4.10 in both β (standardized coefficient) characteristics and level of significance. Concerning the control variables, the results could be interpreted in detail accordingly. EXP: The work experience of respondents shows negative β of -0.0149 associated with the Intention to Use of the ERP system (IU) but not significant at 0.05 level (p=0.7889). Therefore, the work experience of respondents is statistically proved to have no significant impact toward IU.

AGE: The age of respondents proves to have negative β of -0.0545 associated with the Intention to Use of the ERP system (IU) but not significant at 0.05 level (p=0.3562). Therefore, the age of respondents is statistically proved to have no significant impact toward IU.

GEN: The gender demonstrates positive β of -0.2465 associated with the Intention to Use of the ERP system (IU) and significant at 0.05 level (p=0.0329). Therefore, the gender is statistically proved as having of significant negative impact toward UI. This impact could imply the reverse causality in the path relationship among this set of relationship. In other words, the IU probably has an impact to the gender instead. Therefore, the gender is proved to have no significant impact toward UI.

NUM: The number of rice mill employees shows positive β of 0.0308 associated with the Intention to Use of the ERP system (IU) but not significant at 0.05 level (p=0.6789). Therefore, number of rice mill employees is statistically proved to have no significant impact toward IU.

Table 4.12 Summary Hypothetical Development of Path Model with Control Variables

Hypothesis	**Hypothesis**	**Expected effect**	**β**	**Sig.**	**Results**
H1	The Government Support will have a direct, positive effect on the Training of the ERP.	+	0.332	**0**	***Accepted***
H2	The Government Support will have a direct, positive effect on the Business Process RE-Engineering of the ERP system.	+	0.1474	**0.0261**	***Accepted***
H3	The Training of the ERP will have a direct, positive effect on the Business Process Re-Engineering for using the ERP system.	+	0.3806	**0**	***Accepted***
H4	The Training of the ERP will have a direct, positive effect on the Perceived Ease of Use of the ERP system.	+	N/A	N/A	**No test**
H5	Training of the ERP will have a direct, positive effect on the Perceived Usefulness of the ERP system with.	+	0.2449	**0**	***Accepted***
H6	The Training of the ERP will have a direct, positive effect on the Intention to Use of the ERP system.	+	0.2386	**0**	***Accepted***
H7	The Business Process Re-Engineering will have a direct, positive effect on the Perceived Ease of Use the ERP system.	+	N/A	N/A	**No test**
H8	The Business Process Re-Engineering will have a direct, positive effect the Perceived Usefulness of the ERP system.	+	0.3878	**0**	***Accepted***
H9	The Business Process Re-Engineering will have a direct, positive effect on the Intention to Use of the ERP system.	+	0.5223	**0**	***Accepted***
H10	The Perceived Ease of Use will have a direct, positive effect on the Perceive Usefulness of the ERP system	+	N/A	N/A	**No test**
H11	The Perceived Usefulness will have a direct, positive effect on the Intention to Use of the ERP system.	+	0.1347	**0.0166**	***Accepted***
H12	The Intention to Use of the ERP system will have a direct, positive effect on the Behavior Use of the ERP system.	+	N/A	N/A	**No test**

The Table 4.13 presents a summary of the different models. This table could allow to significantly visualize the differences among three hypothetical models.

Table 4.13 Summary of Different Models

H	Hypothesis	Expected effect	Proposed model			Modified model			Model with control variables		
			β	Sig.	Results	β	Sig.	Results	β	Sig.	Results
H1	The Government Support will have a direct, positive effect on the Training of the ERP.	+	0.332	**0.000**	***Accepted***	0.332	**0.000**	***Accepted***	0.332	**0.000**	***Accepted***
H2	The Government Support will have a direct, positive effect on the Business Process Re-Engineering of the ERP system.	+	0.1474	**0.0261**	***Accepted***	0.1474	**0.0261**	***Accepted***	0.1474	**0.0261**	***Accepted***
H3	The Training of the ERP will have a direct, positive effect on the Business Process Re-Engineering of the ERP system.	+	0.3806	**0.000**	***Accepted***	0.3806	0.000	***Accepted***	0.3806	**0.000**	***Accepted***
H4	The Training of the ERP will have a direct, positive effect on the Perceived Ease of Use of the ERP system.	+	N/A	N/A	No test	N/A	N/A	No test	N/A	N/A	No test
H5	The Training of the ERP will have a direct, positive effect on the Perceived Usefulness of the ERP system.	+	0.2449	**0.000**	***Accepted***	0.2449	0.000	***Accepted***	0.2449	**0.000**	**Accepted**
H6	The Training of the ERP will have a direct, positive effect on the Intention to Use of the ERP system.	+	0.2247	**0.000**	***Accepted***	0.2146	0.000	***Accepted***	0.2386	**0.000**	**Accepted**
H7	The Business Process Re-Engineering will have a direct, positive effect on the Perceive Ease of Use the ERP system.	+	N/A	N/A	No test	N/A	N/A	No test	N/A	N/A	No test
H8	The Business Process Re-Engineering will have a direct, positive effect the Perceived Usefulness of the ERP system.	+	0.3878	**0.000**	***Accepted***	0.3878	0.000	***Accepted***	0.3878	**0.000**	***Accepted***
H9	The Business Process Re-Engineering will have a direct, positive effect on the Intention to Use of the ERP system.	+	0.5315	**0.000**	***Accepted***	0.5269	0.000	***Accepted***	0.5223	**0.000**	***Accepted***
H10	The Perceived Ease of Use will have a direct, positive effect on the Perceive Usefulness of the ERP system	+	N/A	N/A	No test	N/A	N/A	No test	N/A	N/A	No test
H11	The Perceive Usefulness will have a direct, positive effect on the Intention to Use of the ERP system.	+	0.1365	**0.0144**	***Accepted***	0.1303	0.0202	***Accepted***	0.1347	**0.0166**	***Accepted***
H12	The Intention to Use of the ERP system will have a direct, positive effect on the Behavior Use of the ERP system.	+	N/A	N/A	No test	N/A	N/A	No test	N/A	N/A	No test
H13	The Government Support will have a direct, positive effect on the Intention to Use of the ERP system.	+				0.044	0.385	Rejected			

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Overall Research Finding

This empirical study has theoretically identified the paths of the ERP adoption success in the Thai agricultural business, especially in the rice mill context. The TAM by Davis (1989) is the main theoretical approach being deployed to investigate the ERP adoption success with rice mill respondents. For the TAM parameter, there are two TAM dimensions: namely, the Perceived Usefulness; and the Behavioral Use. These are theoretically deployed to construct a motivational model for the Thai agricultural business (Davis, 1989) . In addition, there are three proposed ERP adoption success factors: namely, the Government Support; the Business Process Re-Engineering; and the ERP Training, which are considered to identify their influential factors to encourage the ERP adoption success associated with the TAM's constructs by (Davis, 1989).

5.1.1 Demographics

According to the demographical results, the business generation of the rice mill is still at the first and second generations and also under the shadow of family business, of which businesses mostly located in rural areas. In addition, the number of manpower is relatively low with relatively at short management hierarchy. Those implications could depict that the degree of the ERP exposure is still relatively low. However, there is a chance of improvement that requires collaborations among the government, the ERP experts, and the rice mill organizations.

For the ERP usage in Thai agricultural scenarios, the demographical results distinctively show that no users with ERP experience are found in the rice mill industry, meaning that this agricultural sector is less dependent on information technologies and business software program deployments. Therefore, the finding

could imply that this agricultural industry is non-technologically advanced in comparison to other sectors. A characteristic of the rice mills is that the product flow is not consistent during a year and seemingly seasonal. Consequently, a definite business plan is relatively difficult to establish. The long-term investment in the ERP is still an unclear target as per the current business development plan. Besides, business owners could play a decisive role in directing the business development plan. If a business owner realizes the usefulness of the ERP program, the ERP adoption could succeed effortlessly. Meanwhile, the level of knowledge of the ERP implementation is still significantly low as per ERP knowledge check results, causing the ERP program to be less likely to be attractive among the Thai agricultural scenarios, especially without interventions from the government.

5.1.2 Discussion of The ERP Adoption Process for The Thai Agricultural Business

The ERP adoption transition, which was empirically found by this study, comprises of both external and internal factors. The external factor is the transition impact from government contribution and the internal factor is the capability of adoption transition with regard to the agricultural business.

5.1.2.1 External Factor

The external factor in this ERP adoption is the Government Support, which is normally initiated by continuous national development policies and instigation schemes. This period represents the dramatic emergence of the 12th National Development plan that focuses on the exploitation of all technology deployments for improving competitive competencies (NESDB, 2016). The Thai Government Support is normally enforced through both direct and indirect channels. The direct (channel) scheme implementation is officially enforced through responsible offices in each administrative office, such as Ministry of Commerce (MOC), Ministry of Industry (MOI) and Ministry of Agriculture and Cooperatives (MOAC). The indirect (channel) schemes are implicitly imposed by enabling project funding, research development and learning centers though several related institutions and associations, such as the provincial Thai Chambers of Commerce, universities, Thai rice mill associations, public or private associations, and foreign non-profit

associations. Currently, the Thai government attempts to push all possible technology incentives to all industries. Nevertheless, each industry has their own characteristics, and there is no single approach to generalize the enabling of technological deployment to every industry. As a result, each set of technology adoptions or breakthrough system adoptions is required for an individual adoption support program.

For the transition of the ERP adoption process for the Thai agricultural business, experienced ERP users are not distinctively found in the Thai rice mill business. As a result, the direction of Government Support must be clear to create a positive perception of the ERP Training deployment and to have the willingness to change for a business re-structuring of the rice mill. There are plenty of policy techniques capable of going through all direct and indirect channels. Nevertheless, highly effective Government Support vastly depends on the quality of future ERP incentive schemes, trust of the government by rice mills and other agricultural businesses, public communication, and operational consistency of the schemes.

Governmental stability and trust are also success indications of the ERP program adoption because the current political status of the Thai government during this data collection period occurred shortly after the political coup and operated under the military junta government. In addition, the economic scenario was not relatively robust and physically under a downturn period, which gave the perception of an ineffective political intervention. These reasons could result in a decline of the ERP Use Intention. However, the Thai government is willing to push for a concentrated contribution. In this Thai scenario, the governmental support schemes for enabling business training and internal Business Process Re-Engineering are comparatively useful. Once ERP Training and Business Process Re-Engineering are interested and agreed by the rice mills due to governmental influence, and internal readiness and willingness of the rice mill, the Use intention of the ERP program is highly likely to be activated. The performance of the ERP Training and the distribution of knowledge through all related users in the rice mill is very essential and is the simplest way to transform the business process into the required standard ERP system and to significantly raise the ERP usefulness for the rice mill.

Importantly, the ERP Use Intention of all users and the rice mill owners is instantaneously raised through a quality training program along with the perception of the ERP usefulness and willingness to restructure a rice mill business operation. In addition, an external expert with a qualified ERP proficiency could be alternatively deployed by the government as a driving mechanism to simplify the ERP adoption transition. Currently, a penetration and quality of support by the implementation of the central government are nearly impossible to be accomplished, therefore, the ERP experts in several formats, such as ERP venders, consulting firms and ERP programmer developers are potential external players for enabling ERP adoption for the rice mill

5.1.2.2 Internal Factor

The internal factor in this ERP adoption is the agricultural business, which is the rice mill in this study's circumstance. On the other hand, the normal business characteristics of the rice mill and rural agricultural business are mostly a family business and still operated by the first generation and the second generation, which are the founder generation and the descendent generation. The business pattern is not considered to be a high standard operation and is still non-systematic. The existing business process seemingly depends on an owner's experiences instead of a systematic management with process optimizations.

Considering the process cycles, the rice mill business process comprises of two main stages: the production stage and the commercial stage. For the production stage, the rice mill business framework starts by obtaining paddy rice from farmers and transforms it into rice by milling and a heat treatment process. At this stage, the rice mill has the expenses of the paddy rice, the cost of the milling operation, and other administrative costs. The most important action for the business optimization of this preliminary stage is to purchase most of the paddy rice at the lowest cost and to operate the milling and the rice treatment process at the most optimal cost. For the commercial stage, the rice mill commercializes the rice products in various channels depending on business performance, such as whole sales, modern trades and exports. There are some unavoidable risks in this agricultural product as well that mostly depend on market prices of the rice paddy and the fragrance of rice. The rice prices are highly sensitive to various parameters, such as the rice product

guarantee policy, drought, flooding, demand, and supply on both international and domestic market demands. At this commercialized stage, the costs and profits are subject to business management and commercial skills because the rice product has a limited product shelf life and cannot last forever, but an availability of warehouse spaces with associated storage cost will provide a longer shelf-life period of the paddy rice. For a business competitive advantage, the readiness of each rice mill is relatively different because some rice mills have sufficient ability to acquire a redundancy of rice storages and sell the rice at the maximum demand and minimum supply. The rice mills with less business competitiveness cannot reach the mentioned business utopia, requiring them to have a better operation system to survive. Therefore, Enterprise Resource Planning for each rice business circumstance should be alternatively deployed.

For a distinctive comparison of the existing of the rice mill business process and the ERP operational supply chain, the operational concept of the standard ERP for the industry will first be explained. Actual enterprise planning is separated into strategic enterprise planning and operational enterprise planning. However, the most popular and widely deployed strategy; especially for the industrial sector is only operational enterprise planning. Operational planning consists of tasks that are performed annually and are used to balance business supply and demand. Operational planning comprises of five important elements, which are product development and customer relationship, procurement logistics, production logistics, quality management, and organization and human resource management. The starting point for operational planning is regularly to emphasize the sales forecast that determines production quantities within a required time frame. Thereafter, planned sales quantities are demanded for the production planning department in production logistics. Nevertheless, the decisions strategy for production planning are also dependent on financial planning and human resource management. For the current competitive markets, production flow could be rapidly increased by customer loyalty. To retain customer loyalty, the company must maintain satisfaction of each customer as the ultimate priority. In this circumstance, the ERP systems could assist to deliver and preserve a customer focused culture by allowing ERP users to carry successful interactions with the end customer with accurate information on a timely basis. For a

standard adoption process, the ERP commences with the identification of a company objective or targeted goal for an implementation. The implementation could lead to technology section, Business Process Re-Engineering, restructuring of organization, operation improvement and vertical integration. The ERP with a clear objective and goals significantly offers the following business process areas under enterprise planning, product development and marketing, asset management, organization and personnel, procurement logistics, production logistics, revenue and cost controlling, and external accounting that customer requirements can be related (T. Curran, Keller, & Ladd, 1998).

In terms of the technology selection, IT is extremely important. For an in-house development of IT for ERP, prefect implementation is an ideal and the company is usually not capable of having a fast development. However, companies where IT support is available must consider customizable predefined solutions rather than proceeding with individual thinking. In addition, the ERP system requires the flexibility to provide Information Technology (IT) solutions with disregard to the normal business to maintain rigidity of the operational enterprise planning. For the ERP adoption selection, the ERP system typically contains several modular applications for business commercials, such as sales and distribution, financial investments, production planning, material management, human resource management. Companies of different sizes, complexity, business requirements and varieties could adopt either to implement an entire modular application or select some necessary-required modular applications (O'Leary, 2000).

As per aforementioned explanations between the existing rice mill process cycle and the ERP operational supply chain, the business format of the rice mill seems capable to match the ERP operational standard, especially in the three ERP elements, which are product development and customer relationship, procurement logistics, and production logistics and quality management. Explanation of each element along with rice mill business activities is presented accordingly.

For production logistics, this ERP modules comprises of planning, execution and performance control of the work orders. Production planning begins with the type of products, production quantities and production deadlines. The ERP process management will operate all specific requirements under make-to-order and

make-to-stock process strategies. These ERP standard modules allow a rice mill to have systematic management for incoming paddy rice to match with rice demand and to manage rice stock respectively. In addition, the rice mill may benefit from these standard ERP modules to make decisions of the rice production process by using Just-in-time (JIT) system to minimize inventories between the incoming paddy rice, rice for sale and available rice in stock. All process bottlenecks will be systematically managed to achieve optimal schedules. For a benefit of data sharing, ERP systems allow data to be simultaneously transferred and utilized for simulation and production planning. Once a production logistics module is in place for the rice mill, a feasible rice production plan, production waste and process cycle time will be measured in a real-time.

For procurement logistics, these ERP modules are also known as materials management and allows the procurement to manage and control materials and/or raw materials effectively through internal departments from the suppliers. This ERP process integrates inventory management, purchasing, and warehouse operations together for optimization of the material flows. The rice mill can use this ERP module to effectively manage inventory by having inventory tracking and conventional inventory controls. The inventory tracking will create stock information along with material codes to visualize quantity of paddy rice and rice product in stock on hand, location of different rice products, and incoming demand and supply of both of the paddy rice and the rice product in stock. The conventional inventory controls will permit the rice mill to have economic order quantity, economic run size, and quantity discount orders. As a result, the procurement will increase leverages for making purchased orders for equipment and the paddy rice. The conventional inventory controls under the IT system also literally notify and complement the management's decisions on inventory management. Therefore, the rice mill owner could select or adjust the inventory models best suited for their business environment and effectively manage their limited inventory resources (A. Gupta, 2000; Motwani, Mirchandani, Madan, & Gunasekaran, 2002).

For quality management, these ERP modules are initially designed for an enterprise-wide total quality system. Even so, these ERP modules are not a substitute for a quality management system for every single business, but several

elements in this modular application could solve quality issues by measuring the quality of purchased parts, routing receipts of raw materials for inspection, tracing the origin and use of defective material, material shortage and invalid production schedules. Apart from those mentioned elements, costs of rework, scrap, inspection costs, warranty costs, unsatisfied or lost customer orders are systematically detected and simultaneously presented in terms of rational data for real-time ratification. Consequently, part of these ERP modules could offer an inspection code to permit quality control to indicate the quality of paddy rice to purchase and rice production for sale, while the rice inspector must have a well-performed working discipline for the ERP data work input and recording. Besides, the regularly updated data is maintained online and offline. The ERP system analyzes all of the quality data collected over specific times to inform the rice mill of the quality performance ratings of the paddy rice venders and bundle of each rice product for sale.

On the other hand, the rest of the ERP operational planning elements; product development and customer relationship, and organization and human resource management are not yet considered as urgent and attractive modules to adopt, due to the nonexistence of product variation and low complexity of the product and use of small size manpower. In addition, the study also found an interesting assumption that the rice mill perceives in ERP usefulness, whereas none of available rice mills have the ERP implementation experience. This finding statement is very interesting and requires rational explanation. A gap of the ERP adoption development for the rice mill as per this study interview is that rice mill businesses could understand the usefulness of the ERP program, but the readiness of the investment and ERP product knowledge are significantly limited. A number of rural rice mills have an old-fashioned stock management by using manual records, and an adoption of IT into their business process is still a significant impediment. Most importantly, several rice mills still think that the switching cost of installing a new business process with IT adoption is seemingly higher than the continuity of the existing business operation and requires the incubation treatment for an IT adoption change. As a result, the readiness of the IT investment must be ungently resolved prior to let the rice mil having the will to use the ERP process. In this current circumstance, the Government Support should play a role as project champion to mitigate the impediment regarding

the IT investment and increase readiness and willingness of the rice mill to adopt the ERP into their uses respectively. As per aforenoted discussion, the transition of the ERP adoption for the rice mill by themselves required appropriate selection of some necessary ERP modular applications instead of adopting of the full package of ERP processes because most of the rice mills still have insufficient ERP background knowledge and require investment in IT resources to lower the ERP adoption impediment.

The study empirically found that the Business Process Re-Engineering and the ERP training program are potential success factors for enabling the ERP adoption process for Thai agricultural businesses, especially for Thai rice mills.

The Business Process Re-Engineering of the rice mill will be beneficial for the ERP adoption accordingly. Current rice mill business activities will be transformed to be systematic, data oriented, holistic, decision optimizable, predictive and relatively controllable. The ERP process adjustment should be rationally deployed and implemented in parallel with those mentioned rice mill stages and transform all activities into programmatical data, interconnected work processes and forecastable business automation to provide rational business process thinking. Most importantly, the re-engineering of the business for the ERP process adoption is not only to systematize, standardize and optimize the existing business for a reduction of operational waste, cost saving, whole process pre-visualizing and agile management, but this deployment will also potentially lead to the Perceived Usefulness of the ERP program for the rice mill. In addition, the Use Intention of the ERP program has also simultaneously emerged by a direct endorsement of the Business Process Re-Engineering, once the quality of the re-engineering process is seamlessly suitable for this agricultural business, allowing communication effectiveness within the business, minimizing the business operational burdens and distinctively illustrating a lower switching cost of the ERP program investment for the owners and managements.

A deployment of the training program and the business process restructuring consists of both direct and indirect influences towards the rice mill to the Use Intention of the ERP program. In terms of the direct influence, the implementation of both the ERP

Training and the Businesses Process Re-Engineering are necessary requirements prior to having a clear perception for the Use Intention of the ERP program. For the indirect influence, both the ERP Training and the Businesses Process Re-Engineering could substantially create the Perceived Usefulness of the ERP prior to enabling the rice mill into the Use intention of the ERP program. This is a specific aspect of the Thai rice mill business that relevant stakeholders have to highly address for the ERP adoption program. Alternatively, the ERP usefulness will directly encourage the Use Intention of the ERP program, but the program's ease of use will have no proven evidence towards the Use Intention of the ERP program. On the contrary, the visualization of the burden reduction and the improvement in every single business competence by the Perceived Usefulness of the ERP program is comparatively important for enabling the Use Intention of the ERP program instead.

In conclusion, the abovementioned transitions of the ERP adoption process in the Thai agricultural business could arise from the Government Support as a business externality. Thereafter, the Government Support programs could reinforce the rice mill's readiness and willingness to change by deploying an ERP Training program and a Business Process Re-Engineering that are appropriate with the Thai agricultural circumstances to generate the business condition. Consequently, the Perceived Usefulness and the Use Intention of the ERP program will be correspondingly activated.

5.1.3 Explanation of Each Constructive Finding

In the hypothetical analysis, most of the proposed hypotheses are accepted but there is an arising relationship to support the strength of this research proposal. The research finding explanation will be mostly concrete on the role of each authority or possible parties that are capable to settle the ERP initiation in the agricultural business, especially in the Thai context. Each constructive finding is explained accordingly.

5.1.3.1 Government Support

This research suggests that the Thai governmental support could make a significant contribution to organizational development, especially in reorganizing business processes and increasing training programs for technological

deployment. However, the understanding of the ERP and its aftermath are still not widely distributed to the rural Thai agricultural business and the rice mill seems to be a clear example. At present, technological exploitation is nearly impossible to ignore even in the Thai agricultural sector because the current national development plan focuses on escalating the digital economy and the use of technology to increase business competitive advantages and to modernize existing businesses for an optimization of cost and capital (NESDB, 2016). The ERP Training program from the national scheme and its support units will be potential incentives to promote ERP interests in the Thai rice mill context and this instigation from the Government Support is also in accordance with several profound findings from previous scholars accordingly. Nwankpa and Roumani (2014) mentioned that encouraging education could lead to a positive perception of the ERP's usefulness. Markus et al. (2000); Wang and Chen (2006) suggested that external providers of ERP systems also give rise to a wealth of experience for guiding and nurturing business adoption. Besley and Burgess (2002) claim that training opportunities and technology support are efficiently granted and by the appropriate support policy.

Government Support is not only beneficial to encourage the ERP Training program for rice mill organizations, but this support could also inspire the Business Process Re-Engineering or organization adjustment as well. This empirical study concludes that assistance from the Thai government toward public instruments could make a significant impact to business re-engineering, especially under the 12th national development plan that strongly strives to develop national competencies with a technology leverage (NESDB, 2016). Consequently, appropriate support schemes and public instruments are potentially effective in reorganizing and modernizing existing business into better structures for competing in the neo-business arena, specifically for the rice mill. Fundamentally, the rice mill business structure is relatively primitive without an appropriate intervention scheme from public agencies. Therefore, the making of the Business Process Re-Engineering for the ERP adoption is still significantly ignored. This finding is in accordance with several studies accordingly. Moosbruker and Loftin (1998) suggested that once organization staff obtain enough information about the purposes of the Business Process Re-Engineering, they are less resilient to resist having the business process reengineered.

Scott and Kaindl (2000) found that ERP is marginally compatible with an out-of-date business process and the processes required to be changed when the ERP process is very superior to the existing business process. In the rice mill context, Government Support is required to provide precise and consistent support, along with deploying niche support tools, such as professional consultancy services to enhance the business process because this industry is less familiar with the ERP application. In addition, Thai rice mills are spontaneously passive with a rarely deployed technology adoption. Connolly (1999); Pereira (1999) suggested that existing legacy businesses are normally inefficient and prefer to have process re-engineering along with adjustment of the ERP-embedded processes to raise overall performance and establish new standards. This implication is relatively in accordance with the Thai agricultural scenario; therefore, the Government Support could play a significant role for further ERP adoption.

Importantly, the study has also investigated a relationship between Governmental Support and the Use Intention of the ERP system. Initially, empirical research hypothesizes that “the Government Support will have a direct, positive effect on the Intention to Use of the ERP system” but the result turned out that there was no significant relationship between those constructs and the empirical model with insertion of this mentioned relationship presents no statistic fit. Therefore, Governmental Support will be able to drive the Use Intention of the ERP system by enabling an ERP Training program and Business Process Re-Engineering for the ERP adoption respectively.

In the Thai agricultural scenario, the rice mill itself is relatively saturated on their self-improvements for new system adoptions and governmental agencies supporting digital businesses mostly exist in the Ministry of Commerce (MOC), Digital Economy (MODE) and Industry (MOI) rather than the Ministry of Agriculture and Cooperatives (MOAC). In addition, enabling of technology and advance software adoption rarely enters into the Thai rural business with regards to limited distribution channels, levels of technology education, business capabilities and performance of local authorities. Those reasons are impediments for the ERP adoption that incurred by the quality and performance of Government Support.

In terms of trust, governmental trust is an intangible awareness from the capability of government official agencies to provide a service (Beccerra & Gupta, 1999; Jarvenpaa et al., 1999; M. K. Lee & Turban, 2001; Mayer et al., 1995; McKnight et al., 2002) Gefen, Rose, Warkentin, and Pavlou (2005) suggested that the governmental trust specifically, agency services could result in a vigorous impact on the adoption of a technology. As a result, expertise and technical resources proposed by governmental agencies must be sufficiently strong. Transparent and self-customizing government services or support will sustainably enhance trust and acceptance of a technological adaptation. Those research findings could be in accordance with the current Thai governmental context because Thailand is still currently (at this research data collection period) ruled by a military government and also faces issues in administration transparency and legitimate constitution. In addition, the support structure of responsibility units and agency services are not efficiently operated and cannot make an evenly distributed communication. This could also be the reason why ERP adoption will be less if a business has a significantly low trust of the governmental authority. In addition, the lack of promises and honesty from government officials could result in a decline of trust and an increase in disagreement of support initiatives instead (Belanger and Carter,2008). The characteristics of an organization and industry uniqueness are a significant concern for behavioral additionality of government support (Luukkonen, 2000; Radas et al., 2015; Wanzenböck et al., 2013). Therefore, it follows that having the rice mill business accept ERP support directly from the central government is not the appropriate answer. As a result of these findings with the academic support, this research potentially shows a reason why the ERP adoption is still not widely applicable in the rural agriculture context.

5.1.3.2 Business Process Re-Engineering

This research found that the adjustment of existing business processes for non-experienced ERP users in the Thai rice mill industry could establish an Intention to Use ERP and also have a significant impact to the Perceived Usefulness (Davis, 1989).

The Business Process Re-Engineering has a strong impact toward the Perceived Usefulness and the Intention to Use ERP in several terms of benefit. The

Business Process Re-Engineering is a radical reform of business processes to accomplish substantial developments in critical, up-to-date assessment of performance, such as cost, quality, service, and speed (Hammer & Champy, 2009). The normal business pattern of a rural Thai agricultural business is usually non-complex. Daily work structures are not decentralized and highly self-dependable, which possibly causes excess work and unnecessary business activities. In addition, this research finding also found that there is no existing standard pattern yet for the Thai rice mill business because there are no rice mill samples using ERP for their business operation.

According to an explanation of the motivations for ERP-driven business process change proposed by (Gattiker & Goodhue, 2002) , Thai rice mills must acquire an appropriate business restructuring to satisfy the business gap between the original business pattern and new business process (with ERP adopted) that would improve competitive advantage in terms of efficient operation, wastes reduction, cost and lessen cycle time so as to survive in the modern economic era as per the proposal of the 12th national development plan, which mainly aims to leverage the data and information technology (NESDB, 2016). As a result, IT deployment along with programming and business specialists will unavoidably play a significant role. This Thai agricultural scenario is in accordance with Scott and Kaindl (2000) which suggested that almost 20% of the existing business processes are incapable of being modelled in ERP such as SAP. In addition, the ERP specialists strongly proposed that ordinary practices are typically inefficient and require a re-engineering along with adjustment of ERP-embedded processes to elevate total performance and to establish new business practices (Connolly, 1999; Pereira, 1999).

1) Section (A): The Business Process Re-Engineering and the Perceived Usefulness.

According to the Thai rice mill scenario, ERP is currently less in attention of the usefulness when compared to no ERP being used. A possible reason is that an advance management for the complex system may not be suitable for the agricultural industry because rice mills require less manpower, are mostly located in the rural locations, are family business, and most have low technology adoption

levels. Nevertheless, the empirical study found that the Business Process Re-Engineering is a potential motivation for a rice mill to realize the usefulness of ERP. The Business Process Re-Engineering will significantly raise the Perceived Usefulness of the ERP system in several dimensions accordingly.

In terms of a competitive advantage, re-design of business processes in rice mills will be capable of escalating process performance and adjusting of appropriate resource allocation (Quiescenti et al., 2006). The Business Process Re-Engineering mitigates risk of existing processes by putting new processes in place Giaglis and Paul (1996); Paul et al. (1999); Quiescenti et al. (2006); Tumay (1995) suggested that using business modelling could combine and manipulate the random nature of the business processes and the random behavior of business resources (Irani et al., 2000). Ettlie et al. (2005); Velcu (2010) suggested that the Business Process Re-Engineering has a direct influence on ERP success by increasing performance and raising internal process efficiency. Therefore, the re-engineering approach is strongly required to reorganize non-valued actions, minimize the complexity of business processes, and remove wasteful processes within existing business processes of the rice mill (Shang & Seddon, 2007). In addition, the Business Process Re-Engineering is highly capable of creating an internal process optimization and a work simplification because the process re-engineering of the rice mill industry could standardize the business operation with a compact and efficient work process, especially in terms of budgeting, accounting, production, stock controls and delivery. Those re-adjustments could eventually lead to an optimizing of the entire business operation. As a result, business productivity for the rice mill or other agricultural businesses would be potentially and systemically increased. Once non-valued actions are removed, the complexity of business processes and wasteful processes within the existing business process of the rice mill are removed. In accordance with that re-engineering approach, all business decisions will be systematically rational, and business statistical data will be often used.

In term of business performance, the benefit of the Business Process Re-Engineering could directly generate the business outcomes in respective areas; finance, customer service and continual organizational growth (Devaraj & Kohli, 2000). However, this requires a type of adjustable organization design. Once the rice

mill organization hierarchy is designed to be an adjustable organization, an internal re-engineering will be easily deployed. Having a business process development in the rice mill will significantly raise productivity gains in term of sales per employee (Altinkemer et al., 1998). Therefore, the sales revenue of the rice mills could be improved, once the Business Process Re-Engineering in the rice mill is in place. In addition, the organization, which aims to reduce cost and increase productivity, needs Business Process Re-Engineering in order to upgrade an operational efficiency (Ramirez et al., 2010). Therefore, ERP users or business owners will believe in the usefulness of the ERP when the business re-engineering distinctively give rise to operational efficiency in the rice mill.

In terms of business decision making, ERP systems are intrinsically designed as a support element of business process improvements, improving information quality, decision making, and enhancing of company's performance (Ghosh & Skibniewski, 2010). The IT application of ERP systems along with the changing of the business operations could result in long-term organizational benefits (Delina, Packová, Roztocki, & Weistroffer, 2013). For the programmatic dimension, the ERP is not only developed for computerizing business processes but could also reshape the original way of doing business for the sake of several business benefits. In addition, the ERP has also a distinctive role of business decision assisting with a high precision from historical data and statistical analysis. So, this is not only an impressive program but also an efficient business tool. For a significant benefit to business decision making, business data collection within the rice mill must be systematically prepared for efficient data analysis and optimization. Thereafter, analysts and decision-makers must be able to interpret data and deploy data sets for further business decision-making. This is the strongest point of the ERP that leads to rational decision making and business optimization toward a precision of business decision making.

2) Section (B): The Business Process Re-Engineering and Intention to Use ERP System.

This research found that the Business Process Re-Engineering is a vital factor that could fully or partially enable the Intention to Use ERP in the Thai

rice mill. This relationship has similarities to the relationship between the Business Process Re-Engineering and the Perceived Usefulness, but there are slight differences in the actual willingness and readiness of the business organization. Schein (2010) addressed that the willingness and the readiness to re-engineer are highly required to accommodate ERP modeling for non-experienced companies because ERP standard setting for this type of company will not be resisted. A successful ERP adoption greatly depends on the willingness of a company to change or re-structure (Schein, 2010). In addition, the time, capital, and sustainability of leadership are significant factors that assist in an internal process re-engineering (Grover et al., 1995). Therefore, a rice mill having the internal willingness and readiness to use ERP will have a greater chance to adopt the ERP system compared to a rice mill having no ERP basic understanding.

In comparison, the Intention to Use ERP for the rice mill is different from the Perceived Usefulness by the readiness and willingness to change of the rice mill. The business re-engineering could allow all of the rice mills to visualize the tangible usefulness in several terms, especially finance, sale revenues, budgeting, decision making and internal operation, but the rice mills that have the readiness and willingness to change would be the ones that easily accept the Use Intention of ERP program. Therefore, the rice mill with the readiness and willingness for the ERP implementation could understand the future benefits. Accordingly, those are the opportunities of ERP adoption and project success, ERP post-implementation, and an opportunity for achieving competitive advantage (Ram & Corkindale, 2014). Nevertheless, rice mills without the readiness and willingness for an ERP implementation may only expect the tangible usefulness of the ERP program and short-term benefits, such as sale revenues and cost saving after the business process is completely changed.

This study also found that the Thai agricultural sector still has relatively low basic knowledge of ERP. In addition, the Business Process Re-Engineering could struggle to be applied, if the communication and information flow between organization staff are not sufficiently achieved (Moosbruker & Loftin, 1998). Nevertheless, this communication could be a strong point of the rice mills because this industry normally deploys a smaller amount of manpower. So, this advantage

could clearly allow an easier communication flow. Therefore, the communication and information flow within the rice mill are not issues for performing the Business Process Re-Engineering.

5.1.3.3 ERP Training

It is undeniable that training is a significant basis to support all business management activities and also vital for the business process development. Theoretically, the training provides a level of ease for system use, application of the new process or content, and navigating through subjects with regard to daily work (Ruivo et al., 2014). Nevertheless, the Thai rice mill industry found that ERP Training for rice mills with no ERP experience is a significant parameter to enable the Business Process Re-Engineering, the Intention to Use ERP and the Perceived Use Fullness, but the ERP Training has no effects on the Perceived Ease of Use (Davis, 1989). For ERP adoption and implementation, training is also the process of providing management and employees with the logic and overall structure of the ERP system (Yusuf et al., 2004). In the Thai rice mill scenario, there is no existing ERP experience. As a result, the ERP Training is a very new consideration within this industry. So, the ERP Training could be established from the lowest level of technology adoption or none of ERP experiences. As a result, the appropriate training pattern must be tailored to support the Business Process Re-Engineering within the rice mill industry as well as the Perceived Use Fullness and the Intention to Use ERP.

1) Section (A): The ERP Training and the Business Process Re-Engineering

Theoretically, training is used to reduce employees' anxiety and working pressure of using the ERP system and encourage the benefits of the system in each specific task (D. H. Lee et al., 2010). This research found that the ERP Training will encourage a rice mill to perform the Business Process Re-Engineering. Bradford and Florin (2003); O'Leary (2000) suggested that a better performance in the business operation arises from making great preparation for the ERP user. Once management of the rice mill deploys the training for ERP information distribution and corrects issues between the existing and proposed business process, the business process will be significantly improved (Amoako-Gyampah & Salam, 2004). The Thai rice mill

could deploy these mentioned training techniques along with providing an optimal training preparation, efficient communication, and clear and decisive management direction for the better Business Process Re-Engineering. Additionally, training is also a decisive element for not only a successful operation but also for sustaining the ERP system (Bingi et al., 1999). Once rice mill users are obligated to use the whole process of operation as well as their own tasks, ERP system will be perceived as more efficient (Bingi et al., 1999). The ERP Training for the Thai rice mill is also required to focus on a specific task and whole process training to enhance contribution of all users. Therefore, the ERP Training for achieving the Business Process Re-Engineering in this agricultural sector highly requires training techniques that could seamlessly transform existing business processes to new business processes with ERP adopted.

2) Section (B): The ERP Training and the Perceived ERP Usefulness

The study found that training is useful to inspire users to realize system performance and increase user confidence of system usages for an ERP program. Several ERP studies also strongly concluded that the ERP Training could allow users to have the Perceived ERP Usefulness (Bradford & Florin, 2003; Rajan & Baral, 2015; Youngberg et al., 2009). In addition, an effective training program could result in a better performance of system use (Ram & Corkindale, 2014). Once the rice mill expects to perform the ERP Training, the training program must be easy to understand and give redundant value add to encourage and inspire for an alternative change. Nevertheless, the ERP Training scenario of the rice mill has some limitations accordingly.

Firstly, the users have relatively less ERP experience and have very minimal ERP background knowledge.

Secondly, there is no existing standard training pattern.

Thirdly, the rice mill management still has insufficient ERP knowledge and understanding of how ERP works, therefore an optimal ERP Training program can rarely be created. Therefore, appropriate training techniques are highly required to instigate level of the Perceived ERP Usefulness of ERP program.

From those mentioned limitations, this study also proposes solutions accordingly.

For preparation of the ERP Training programs of the rice mill, the characteristics of the Thai rice mill are a family business and mostly with low organizational development program and low willingness for investment of the organization. The causes of those limitations are originally arisen from a limitation of investment, operation with a simple work process, limited level of knowledge base and centralized management. Therefore, it is highly required that a rice mill invest on preliminary and regular training programs that would result in the perception of an ERP adoption's usefulness. In terms of training design, the ERP Training program should contribute new skills and knowledge for users. This training deployment would benefit the organizational development that could yield benefits for internal human resource development and business competencies, as well as create long term benefits in terms of business competencies (Jones et al., 2011). Nevertheless, ERP training deployment could produce a perception of ERP usefulness, once the training design explains that the ERP program could improve financial performance, improve business performance, and lead to effectiveness of organizational management (Liu, 2011).

Training communication is also an important concern that the ERP Training could be prepared because the perception of ERP usefulness will be much less effective, if the training contents and communication style are unreachable for the rice mill owners and operational users. In addition, the ERP Training program cannot be successful in creating the perception on the usefulness of the ERP if the visualization of the ERP implementation future with business effort is not effectively communicated.

3) Section (C): The ERP Training and the Intention to Use of ERP System

This study found that the ERP Training program is clearly proven to be an important factor for enabling the perception of ERP Use Intention in Thai agriculture, especially for rice mill businesses. Theoretically, training is widely accepted as a significant parameter for success of ERP adoption and implementation

Bradford and Florin (2003); Muscatello and Chen (2008); Ruivo et al. (2014); Somers and Nelson (2001) addressed that training has a direct impact to the Use Intention and the Use Behavior of the ERP system. Therefore, the ERP system could succeed in the training obligation. Nevertheless, this mentioned relationship is not feasible, if there is an insufficient level of readiness and willingness to change for the ERP program within the rice mill industry. Accordingly, none of ERP systems have already successfully adopted or implemented ERP for the rice mill industry. Therefore, the Intention to Use an ERP system by foreseeing further competitive advantage of the business has not yet become an attractive attention for the ERP Training program for this industry. In the human resource dimension, a rice mill also has lower investment in human resource in comparison to other advance industries. Therefore, the number of trainings and training strategies are seriously required to assist the whole organization in the enabling of ERP Use Intention. More importantly, the management staffs or rice mill owners must strongly believe in the disruptive changes from the training and have redundant readiness and willingness to put effort into the ERP training as well.

From those mentioned limitations, this study also proposes solutions accordingly.

For ERP preparation of a non-experienced rice mill, the training could be otherwise manipulated by external expertise by using ERP expertise support to transform an organization for starting the use of the ERP system, to customize the training method to assign new specific jobs with ERP knowledge, and importantly to draw the user attention for the ERP system (Muscatello & Chen, 2008). In addition, Muscatello et al. (2003) strongly addressed that continuous training and education programs are always used for accessing new resources in the larger firms as well as in the agricultural business. For this study, the ERP expert is an ideal method of training solution for enabling ERP in the Thai rice mill. Because the rice mill itself has relatively low self-training ability and ERP training services, the expert definitely has more training experience for all technology adoptions with ERP included. In addition, having the ERP Training program in place for the rice mill will not only lead to the ERP adoption success, but the ERP Training could yield further benefits accordingly. The training could potentially be used to gain ERP implementation success, more than

the ERP Use Intention (Amoako-Gyampah & Salam, 2004; Bueno & Salmeron, 2008). The training has direct positive influence toward user satisfaction and potentially incurs a longer-term organizational development (Dezdar & Ainin, 2011). A well-organized training program is usually deployed to get rid of knowledge barriers associated with the ERP systems that is vital to accomplishing post-implementation of ERP (Robey, Ross, & Boudreau, 2002). In addition, frequency of training sessions could also indirectly produce sale revenues at a stage of ERP implementation, but those accomplishments are relatively time consuming. As mentioned about ERP training benefits, the ERP Training is apparently a worthwhile investment. Besides, the quality of training programs could inevitably give rise to the success of all training programs as well as organizational value because the organizational knowledge is developed by every single training program that could potentially reshape a business management and finally create several potential performances, such as organization knowledges, financing, accounting, HR management and production (Liu, 2011).Bradford and Florin (2003); O'Leary (2000); Ruivo et al. (2014) concluded from their empirical research that there is a linkage between training and use behavior, but performance of quality training will highly encourage the possibility to use ERP. Those scholars strongly addressed the benefit of quality training for ERP and this implication is also agreed by this Thai agricultural industry. Therefore, the rice mill should have good preparation of the ERP training program with an optimal training design to satisfy all constraints of the rice mill business to make all the users along with the owners and managements to substantially realize the use intention of the ERP program.

5.1.3.4 Technology Acceptance Model and The ERP Program Adoption

The Perceived Usefulness and the Use Intention are principally deployed for this empirical study (Davis, 1989). This empirical study found the roles of TAM constructs in this ERP adoption study accordingly (Davies ,1989). The Perceived Usefulness of the ERP system will encourage the Intention to Use of the ERP system, but the Intention to Use of the ERP system still cannot be verified as an effect to the Behavioral Use of the ERP system because there are no rice mills with ERP experience found in the Thai agricultural scenario.

1) Section (A): The Perceived Usefulness and the Intention to Use of the ERP System

The study found that the Perceived Usefulness will significantly encourage the Intention to Use of the ERP system in the rice mill. Theoretically, the Perceived Usefulness is also known as a level of which individuals trust or believe in using a particular system to raise their job performance. According to the TAM approach, a system with higher Perceived Usefulness values will possibly allow a better use-performance (Davis, 1989; Lederer et al., 2000).

This study suggests that the Perceived Usefulness of the ERP program could significantly create Intention to Use the ERP program for the Thailand agricultural business, specifically for rice mills. In addition, the Use Intension of an ERP program is directly caused by the Perceived Usefulness instead of the Perceived Ease of Use. Several scholars agreed that this Perceived Usefulness application of this study accordingly. In the humanity study, the Perceived Usefulness is far more important than the Perceived Ease of Use toward technology adoption because the ease of use is not always a success attention. The distinctive usefulness at least leads to a willingness of an adoption (Branscomb & Thomas, 1984; Chin, Diehl, & Norman, 1988; Sears & Shneiderman, 1991). The Perceived Usefulness is always statically correlated with the Intention to Use (Bagozzi, 1982; Cheng et al., 2006; Davis, 1989; Igbaria, 1993; Liaw et al., 2007; Lin & Lu, 2000).

In terms of strategic implementation for the Perceived Usefulness of ERP program, this study suggests that the realization of ERP usefulness should be generated ahead of the Intention to Use the ERP system in the Thai rice mill. Significantly, the rice mill owners and management are the most decisive persons to rule out organizational management, therefore the ERP program will be impossible to adopt with a lack of their concerns. However, the ERP program would easily be adopted, once those rice mill management teams have a sufficient perception of ERP program Usefulness. As a result, external support coming from public or private sectors could play an important role in assisting to gain ERP attention for rice mill managements. The external supports could instigate the ERP program Use Intention for the rice mill through both organizational and individual levels accordingly.

For the rice mill organizational level, the ERP system must result in a distinct improvement of the rice mill business and clearly demonstrate tangible improvements in terms of business success such as cost saving, better sale revenues, and systematic operation within relatively short period of time. In addition, the total benefits of the ERP adoption should be significantly higher than the switching cost of ERP adoption to persuade the rice mill owners and management staffs to clearly visualize further opportunity. However, the rice mill is still not relatively ready for the ERP adoption by itself. It is clearly seen that there are no experienced ERP users in the Thai rice mill industry. As a result, other knowledgeable supports from the public or private sectors are highly required for initiation of the ERP adoption in this Thai agricultural business.

For the individual level, this implementation should be started after the rice mill owners and managements are strongly persuaded by the usefulness of ERP system and have a sufficient willingness to change. All users are required to give sufficient information to the ERP, foresee aftermath of the ERP process, and provide new tasks of the ERP process. Those transitions are highly required together with efficient communication within the whole business organization. In addition, users must be routinely convinced to release their performances by giving promotions, bonuses, and rewards (Pfeffer, 1982; Schein, 1965; Vroom, 1964). Therefore, penalizing and rewarding techniques, such as promotions, bonuses, and extra rewards are beneficial as ERP transitional tactics so as to draw the Use Intention of the ERP system from all operational users.

2) Section (B) The Intention to Use of the ERP System and the Behavioral Use of the ERP System.

The relationship between The Intention to Use of the ERP system and the Behavioral Use of the ERP system cannot be verified due to none of the rice mills having ERP implementation experience, but the Perceived Usefulness will significantly encourage the Intention to Use of the ERP system in the rice mill, which means that the rice mill will have the intention to the ERP program, once the ERP program is considered as a useful program. However, there is an incredulity why the rice industry has not had an ERP implementation, whereas the ERP program is useful

and leads to the Intention to Use of the ERP system for all the rice mills. There are two main reason to explain this phenomenon.

Firstly, this study found that the level of ERP knowledge of the rice mill is significantly low, and that the majority of the respondents are rice mill owners and their descendants. Therefore, this is a family business that still has a level of the ERP understanding less than the trigger point of enabling the Behavioral Use of the ERP system. As for the marginal knowledge of ERP, the foreseen situations after a completed ERP adoption are still unclear for those rice mills. As a result, performing the business in the traditional way may be the most secure operation for them. Additionally, the ERP process is still too complex for them to invest, even if those owners feel the usefulness and are willing to use the ERP program.

Secondly, the switching cost of an ERP implementation seems too high for this agricultural business. A standard ERP implementation requires IT technology and necessary resources, process re-engineering, business restructuring, improving operations and vertical integration. An ERP program has these built-in application accordingly; enterprise planning, product development and marketing, asset management, organization and personnel, procurement logistics, production logistics, revenue and cost controlling, and external accounting (T. Curran et al., 1998). As per the standard structure of the ERP program, the rice mills with low ERP knowledge would hardly understand these concepts. Importantly, ERP implementation also has costs to justify, such as investment of the IT resources, cost of the ERP installments, annual fees and maintenance cost of the ERP resources, cost for the business restricting and other miscellaneous costs. In addition, the rice mills also have the opportunity cost of the adoption to concern. The opportunity cost is not only losing opportunities by being without the ERP adoption, but also must consider the ERP implementation failure and the time frame for the ERP implementation success. Several organizations have successfully adopted ERP systems, whereas many more organizations still invest only to achieve new business process that do not yet reach satisfactory levels within the expected time frame (Robinson & Wilson, 2001). Consequently, the phenomenon of which a rice mill perceives ERP usefulness and intends to use the ERP program, but still cannot decide to proceed to actually use the ERP program, may not be unusual. For the Thai rice mill, the switching cost of the

ERP program adoption may be far greater than possible expected returns and the opportunity cost of the ERP adoption is still less than continuing business in traditional pattern. Therefore, the reasons why the rice industry has not had the ERP implementation, even though the ERP program is useful and leads to the Intention to Use of the ERP system for all the rice mills, is that the complete operational package of ERP is too complex for the rice mills, and still may not be worthy enough to invest in at this present time.

5.2 Theoretical Contribution

This empirical research studies the success factor towards adoption of (Enterprise Resource Planning) ERP in Thai agricultural business, based upon four antecedents including Government Support, ERP Training, Business Process RE-Engineering and Perceived Usefulness. This research then determines how those antecedents could play a significant role for the Use Intention of the ERP program (Davis, 1989). In addition, this research also contributes an alternate dimension to the ERP study in Thailand because ERP adoption in the agricultural business in Thailand is rarely found in the agricultural context. The ERP studies in Thailand are mostly published in the educational industry, information technology and high-tech industry. Therefore, this study seems to be a pilot study for the ERP research in the Thai agricultural business. This study also assures that an application of the Technology Acceptance Model (TAM) could be used to create a new motivational model in capturing of the extrinsic motivation in Thai agricultural business (Muthitacharoen et al., 2006).

According to the analytical results of this research, the TAM parameters; Perceived Usefulness and Intention to Use are statistically accepted along with the new proposed external factors; Government Support, Training and Business Process Re-Engineering verified by the structural equation modeling techniques and accepted with a statistically fitted model as the new ERP adoption model. The TAM parameters will be not explained in this contribution because this theory is theoretically accepted and considered as the formal theory in the motivational study (Davis, 1989). However, the Government Support, the Training and the Business Process Re-Engineering are not a TAM approach that could distinctively yield new theoretical contributions accordingly (Davis, 1989).

Firstly, the Government Support is proven as a factor that could not indirectly affect the technology adoption and the ERP adoption. In the Thai rice mill scenario, the Government Support is theorized as no direct contribution to the Use intension of the ERP system. As a result, the Government Support is theoretically proven as a crucial factor related to the ERP study and technology adoption.

Secondly, the Training and the Business Process Re-Engineering have direct impact in terms of technology adoption, especially toward ERP adoption. This finding is a significant contribution for the ERP study because ERP studies are mostly emphasized in the field of system quality and information quality and user satisfaction (Duangekanong, 2014). Therefore, further ERP studies could deploy those two factors for further research with the existing theoretical evidence.

Alternatively, this study could also identify the gap between TAM and Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). This research was initially designed to deploy the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). The scope of study is the same as the aforementioned ERP model with TAM parameters, but all constructs from the UTAUT; Performance Expectancy, Effort Expectancy, Social Influence and Behavioral Intention, which are mostly developed from the TAM are not statistically fitted and accepted with the structure equation modelling techniques on the AMOS 22 (Venkatesh et al., 2003). Research questions of those UTAUT constructs are not theoretically accepted for construct validation investigation (Cronbach & Meehl, 1955). In other words, the set of measuring questions of four mentioned UTAUT constructs are not properly segregated into each specific construct and arbitrarily combined with one another. The arbitrary combination issue is an obstruction in deploying of the UTAUT, but not for the TAM, because the respondents in the Thai rice mill business are less capable of using and less familiar with technological deployments compared to other businesses in the industrial or IT sectors (Venkatesh et al., 2003). Theoretically, the original version of UTAUT is academically accepted as the development version of the TAM because those main UTAUT constructs are academically experimented with all TAM constructs related (Venkatesh et al., 2003). All theoretical development of each UTAUT is explained to what extent accordingly.

The Performance expectancy is the degree to which an individual believes that using the system will increase job performance (Venkatesh et al., 2003). This construct is initiated from those related constructs; the Perceived Usefulness, extrinsic motivation, the job fit, relative advantage, and outcome expectations. The Perceived usefulness arises from the TAM and the job fit arises from the MPCU accordingly (Venkatesh et al., 2003).

The Effort expectancy is an individual's ease associated with the system use (Venkatesh et al., 2003). The initiation of this construct comprises of the Perceived Ease of Use, complexity, and the ease of use. The Perceived Ease of Use and the complexity arise from the TAM the MPCU accordingly (Venkatesh et al., 2003).

The Social influence is an individual perception that influences others to believe which could possibly encourage in new system use (Venkatesh et al., 2003). Basic ideas of this construct arise from subjective norms, social factors, and image (Ajzen, 1991; Davis, 1989; Fishbein & Ajzen, 1977; Mathieson, 1991; S. Taylor & P.A. Todd, 1995). This is also a social factor being solely developed from the MPCU and the TAM which is not included as a source of this construct development (Venkatesh et al., 2003).

The Facilitating condition is what an individual believes that an organizational and technical infrastructure are available to support the system use (Venkatesh et al., 2003). This construct is theoretically developed from the perceived behavioral control, the facilitating conditions, and compatibility and those mentioned constructs are grounded from the MPCU, TRA and TPB (Venkatesh et al., 2003). Nevertheless, those TRA and the TPB are a mutual foundation of the TAM (Davis, 1989).

The Behavioral intention is an individual perception of actual use of the technology. Basic ideas of this construct are developed from the Intention to Use and intention to perform a specified behavior (Davis, 1989). The Intention to Use and intention to perform a specified behavior are constructs being deployed by the TAM and TRA respectively (Davis, 1989).

According to those aforementioned theoretical discussions, the TAM seems to be a simpler approach and deploys less constructs in comparison to the UTAUT (Venkatesh et al., 2003). Even though the Social Influence context is theoretically ignored by the TAM, this TAM approach is experimentally proven and accepted with this ERP adoption study as an appropriate motivational measuring tool for less complex business organizations and matching with this Thai agricultural sector. Therefore, respondents in Thai agricultural industry with their knowledge constraints could not be easily confused and misled in response to the set of UTAUT measuring questions instead of the set of TAM measuring questions. Consequently, an

identification of theoretical deployment between the TAM and the UTAUT is also another valuable contribution of this ERP study (Venkatesh et al., 2003).

5.3 Practical Contribution

This empirical study is not only delivering the theoretical contribution, but also contributing to valuable practices. Initially, this empirical study determines to study the success factors of the ERP adoption for the agricultural business, and to find a possible path for ERP adoption success in the perspective of the owners or organization representatives of the agricultural business, namely the rice mill respondents. The expectation of this research is to provide ERP adoption methods to Thai agricultural businesses, which contain more than one quarter of the national population and are important to rural areas. However, this study is providing not only the possible development in enabling of the Use Intention of the ERP program or the ERP use implementation, but also possible suggestions for business preparation and the role of ERP expert services. In addition, a practical contribution will be principally offered for non-experienced ERP users because all rice mill respondents have no previous experience with ERP program implementation.

Two proposed research questions as mentioned in the Chapter 1 in section 1.4: Research questions were presented accordingly:

1) What are the factors that influence the agricultural business to adopt the use of the ERP in their organization?

2) How can an agricultural business prepare their organizational structure of processes to accommodate the use of ERP at an early stage?

3) What criteria should an ERP software expert be concerned about, in order to capture the agricultural market?

The first and second questions will be explained in the session of Business preparation for the ERP (5.3.1) and the third question will be explained the session of Deployment of expert consultancy for the ERP adoption (5.3.2) respectively.

5.3.1 Business preparation for the ERP adoption

The preparation for the ERP adoption in this agricultural business for the Thai scenario has a specific characteristic. The technology adoption still noticeably has a gap for development for this agricultural business. In terms of necessity of the rice mill business, this business has long existed in the Thai agricultural business and is a

local agricultural industry, which directly relates to the rice famer's way of life. Thai rice is a high value export in the world agricultural market where several rice mills have been vastly beneficial from those export benefits. Nevertheless, the rice prices and export scenario are not always in an upturn. They also unpredictively fluctuate due to several market factors, such as drought, flooding, diseases, currency exchange rates, political situations, trade privileges and trade barriers. Those factors could decisively identify changes in the demand and supply of rice consumption. Those opportunities and constraints of rice consumption have a direct impact on the rice mill business operation because this business position is managerial between raw material producers and both retail and end customers. Therefore, business process management is essential to identify the business proficiency. Once better and more modern business process managements are in place, broader business resilience and improved competitive advantages will naturally occur. Currently, the ERP program is rarely adopted in the Thai business scenario. According to this study, no respondents have the ERP experience. In addition, the readiness and willingness for the ERP adoption is seemingly low and the basic understanding of the ERP with future benefits is marginally available in the rice mill owners and managements because the business structure of this business is a business monopoly, and the business profit margin has always been overwhelmingly high in the past. As a result, there is no willingness to change for any breakthrough business revolution and incurring a switching cost for the business revolution is still regarded as a business burden rather than future opportunities. However, the current agricultural business situation, especially the rice mill business, is not currently in a business utopia as in earlier times. The competitive scenario has become the red ocean business condition instead, and business margin between costs and incomes has significantly narrowed. Consequently, existing rice mills require significant changes, and the ERP process is potentially considered to be the significant alternative.

In terms of the rice mill management, the rice mill is currently operated under the first generation and the second generation. All the rice mills in the rural provinces belong to family business. Besides, there are some corporate rice mills in some rice hub provinces such as Suphan Buri, Chinart and Nakorn Sawan. Consequently, the technology adoption and information technology deployment are not easily accessible

to the majority of rice mills. In accordance with those mentioned situations, the readiness and willingness to change from an ordinary business of those rice mills are relatively low. The only business concern is only how to survive in a highly competitive economy along with maintaining the highest profit margins. Therefore, ERP program adoption is still a possible solution. More importantly, there is no existing adoption path in the ERP for these rice mill businesses. However, a current mill business circumstance of the Thai rice found that the usefulness of the ERP is appreciated by the business owners, but none of those rice mills practically bring it into use. The ERP adoption impediments are also caused by installing the full package of the Enterprise operational planning comprised of, the product development and customer relationship, management, the production logistics, the procurement logistics, the quality management, organization and human resource management, which utilizes too many IT resources and requires a dramatic change of the rice mill's organizational business pattern. Therefore, the rice mill cannot afford those adoption and changes. The standard ERP program not only offers the full package installation, but the program also allows a customization of the program use. According to the ERP adoption of SAP, which is one of the most popular ERP software packages and widely used, SAP commences with the identification of an objective or targeted goal for each business implementation. The implementation leads to IT technology selections, the Business Process Re-Engineering, organizational restructuring and new organization formation. At this stage, rice mills with sufficient and limited willingness have to decide whether to proceed for implementation or stop this ERP adoption. A distinct objective identification permits SAP to identify the relevant process developments in which the business rigidly agrees to use. SAP offers the following business process areas accordingly; enterprise planning, product development and marketing, asset management, organization and personnel, procurement logistics, production logistics, quality management, revenue and cost controlling, and external accounting that could match with each business requirement (T. Curran et al., 1998). Consequently, the rice mills with different readiness and willingness could customize the ERP program by selecting appropriate ERP modules that are suitable with their resilience of business and IT capability.

There are three recommended ERP modules; the production logistics, the procurement logistics, and the quality management, that a rice mill should adopt into use. Those ERP modules will be directly compatible to rice mill business's daily activities and could offer clear tangible benefit in terms of figures. Other ERP modules: the product development and customer relationship, and the organization and human resource management are not required as an urgent matter for a rice mill due to their product variety and business scale. Application and adoption benefit of those ERP modules are already discussed in the session of the Internal factor (2) in Discussion of the ERP adoption process for the Thai agricultural business (5.1.2).

For the business preparation of the ERP program adoption, the ERP Training and the Business Process Re-Engineering must be significantly deployed for the rice mill because those factors will potentially result in the perception that the ERP program is useful and will eventually lead to ERP program adoption. Therefore, the rice mills, which are interested in making use of the ERP program, should prepare accordingly.

Conducting ERP Training is highly required for the ERP adoption. The ERP Training contents could also significantly contribute to organizational restructuring and bring about a perception of ERP's usefulness prior to encouraging the ERP adoption. Bingi et al. (1999), and Somers and Nelson (2001) suggested that a training program is the success indication for the ERP adoption. O'Leary (2000) and Bradford and Florin (2003) suggested that deploying appropriate training content will result in the re-engineering of business processes toward an organizational benefit. Most importantly, an outstanding benefit of the ERP Training will result in a direct positive impact for the Use Intention of the ERP. This implication is also theoretically agreed by several scholars, such as (Muscatello & Chen, 2008), (Bradford & Florin, 2003) and (Ruivo et al., 2014). As a result, the rice mill management must accordingly strive for quality ERP training from qualified trainers. Most of the rice mills have insufficient ERP experience and are not able to make the internal training by themselves. Therefore, ERP experts from public institutions and private firms are the significant alternatives. In addition, management must rationally accept the training programs and collaborate with the consultants in order to customize their ERP training content and contribute to the perception of usefulness of the ERP program.

For conducting the Business Process Re-Engineering, the most appropriate changes of the business process could be produced to create the Intention to Use ERP program. Nevertheless, a challenge of the re-engineering is that the perception of easiness and usefulness of the ERP program should be encouraged during the transformation period of the Business Process Re-Engineering. Jin Hyeung et al. (2015) suggested that organization re-engineering is a suitable technique for adoption of IT investment. Ram and Corkindale (2014) suggested that a suitable business process transformation significantly leads to a chance for success in the ERP adoption and implementation. The Business Process Re-Engineering for the rice mill is the most crucial issue because work attitudes of both management and operational users are dramatically required to be changed and all existing work processes must be disruptively changed to satisfy the standard ERP process. For the rice mill circumstance, there are hardly any rice mills that have ERP experience. Therefore, the motivations for an ERP-driven business process change proposed by (Gattiker & Goodhue, 2002) is theoretically recommended and potentially used for an appropriate business reformation to merge the business gaps between the existing business pattern and a new business process suitable for the ERP implementation. The ERP-driven business process change will demonstrate the ERP process flow as the standard business paradigm and will allow the rice mills and ERP program developers to mutually collaborate to re-engineer new business processes with all stakeholders mutually satisfied. An optimal business process of each rice mill would result in an efficient operation, waste reduction, cost and lessen cycle time, so as to strongly become a more agile business management. The rice mill with the readiness and willingness for the ERP implementation must search for qualified ERP expert services from both public institutions and private firms because many rice mills have insufficient ERP process transformation experience. In addition, the Business Process Re-Engineering is relatively sensitive. Therefore, an unprofessional transformation could damage the business of a rice mill. Besides, a professional transformation performed by experienced expert ERP services could lead to additional benefits over just the ERP program adoption. Therefore, the ERP consultant services from the public institutions and private firms that understand the nature of the agricultural business are also significant alternatives. Most importantly, the willingness to adopt

the ERP program will be rationally fulfilled, once the rice mill owners and managements foresee that the business opportunity cost and switching cost of the ERP program investment is overwhelmingly less than the future benefits. For improving of the Perceived Usefulness and Use Intention of ERP program during the transition of the Business Re-Engineering, the reward and penalty could also be efficiently deployed to create direct intention of all ERP practical users.

For the transitional strategy, both the ERP Training program and the Business Process Re-Engineering could also be prepared and completed at the same time because all ERP Trainings are the practical trainings that directly relate to system usage and operations of each specific task that are highly required to align with the ERP operational system of each rice mill. Alternatively, proficiency and trustfulness of the ERP consulting services or ERP venders for the ERP program implementation should be seriously verified prior to have a final term agreement so as to ensure that those experts totally understand how the ERP Training and the Business Process Re-Engineering are a substantial success for the ERP adoption of the rice mill. In addition, the utilization of ERP in the agricultural business is seemingly limited. ERP systems are principally designed for the demands of efficient supply chains considered as unwavering business processes and having low demand ambiguity (Akkermans et al., 2003; Koch, 2007; Rettig, 2007). Therefore, a standard ERP for normal business use is nearly impossible to apply to specific functionality in this agricultural business. The customization of the ERP program is highly compulsory because systematic mimicry of the rice mill business characteristics and operation of each business activity will be unextractable from adoption success as well. Over the past decades, technology development and information technology have allowed transformation of ERP into ERPII, which evolved from the offline base programs into web-based, open sourcing and componentized based on a Service-Oriented Architecture (Bond et al., 2000; Møller, 2005). Those disruptive technologies have instantaneously made a significant impact to the ease of ERP use and cost reduction accordingly. Therefore, an impediment of program accessibility does not currently become an ERP accessibility issue. Both rice mills and ERP experts should deploy those disruptive technologies for web-based and open-sourced accessibility for all users that could remotely work at the ERP program as significant watersheds.

For a dimension of rice mill business consortium, the ERP program implementation could be a possible agenda in the Thai rice mill association and agricultural cooperatives which are available in nearly every province and are the strongest network with efficient information communication. The rice mills interested in the ERP program could use those venues for gathering ERP support requests so as to search and explore all qualified consulting expertise and qualified ERP vendors. Those gatherings through channels of the Thai rice mill association and agricultural cooperatives will obviously increase leverage power of business negotiation in terms of ERP consulting promotions and service fees. Benefits of the consortium will also be used for the exchange of ERP implementation experience and possibly for making Governmental Support requests.

Interestingly, an evolution in business generation is significantly vital for the evolution in ERP adoption for this Thai agricultural business. Making an assumption that the younger generation will be more technologically aware, ERP adoption and/or implementation will be significantly higher.

5.3.2 Deployment of Expert Consultancy for The ERP Adoption

The ERP consultancy service will be deployed to assist this agricultural business. The ERP experts could be either public or private experts from assigned government departments, university professors, and/or ERP vendors. Those experts must compulsorily have backgrounds in programming and business administration. Specifically, a developed programming mindset must be established for non-ERP background users. Most importantly, all ERP experts have to realize that the ERP Training and the Business Process Re-Engineering are already proven as key components to change their perceptions toward ERP adoption and implementation in the agricultural business with having no ERP background. Therefore, the ERP experts must understand the business process of the rice mill and rationally understand the final outcomes that each rice mill is satisfied with the ERP implementation. Apart from establishing the ERP program process settings, ERP experts must be able to collaborate with rice mill owners and managements to suggest a re-engineering of the existing business processes to create the most optimal business processes with the

ERP process, including specific feasible operating scenarios. In addition, the ERP experts must be able to issue an ERP Training program series that corresponds with the new business process with the ERP process included. The ERP Training contents must encourage the benefits of the ERP program and be simple enough to suit the knowledge level of the users of the rice mills. Additionally, the ERP Training must be initially designed to eventually become the ERP working manual for each specific task as well. For another significant remark for the ERP consultancy service, the rice mills may not be able to adopt a full ERP program package due to the current IT's performance and other business constraints. Alternatively, customizing use of the ERP is a viable solution for the ERP adoption in this agricultural business. The expert should emphasize on procurement logistics, production logistics, and quality management module of the ERP work process because the rice mill highly desires to operate with efficient speed for incoming paddy rice and rice products for sale to avoid stock expiration. In addition, the quality of the rice product requires effective shelf-life control.

As mentioned in this research finding, the ERP experts must at least understand the need of consultancy for the ERP adoption accordingly.

On the one hand, Business Process Re-Engineering is the most important mechanism for the rice mills because the existing work process of this business is still relatively primitive and less systematized. Therefore, the Business Process Re-Engineering for rice mill business processes will potentially allow an ERP program to be easily adopted because this ERP program will be more compatible with standardized and systematized business process. In addition, the optimal process re-engineering design could instantaneously lead to the usefulness of the ERP program whereas the users will conveniently and unavoidably realize the usefulness of the ERP and respectively adopt the program into real use. For details of ERP using modules, procurement logistics, production logistics, and quality management must use a single source manager to avoid complexity and become user-friendly.

On the other hand, the ERP Training also must be conducted in parallel with Business Process Re-Engineering in order to educate and gain personal confidence in business process changes. Once ERP Training can offer users with an appropriate training series, simplified training materials and efficient training communication, the

users will definitely realize the usefulness of the ERP and respectively adopt the program into real use. Regarding the use of ERP modules, procurement logistics, production logistics, quality management must have an emphasis on background knowledge. The operation manuals of the material require planning and inventory control for all user levels because those approaches are the foundation of a rice mill business.

In terms of ERP software program development, an ERP program developer and the rice mill owners are suggested to agree with the basis of the changes in the business process to satisfy the ERP operation as per (Gattiker & Goodhue, 2002), because the ERP system will theoretically enhance the competitive performance of the rice mill. Nevertheless, the software developers are highly required to develop for non-IT background users and customize their programs to meet this Thai agricultural characteristic. In addition, the user interface of the ERP program has to be user-friendly. The ERP system and its visualization of the ERP program must clearly present the distinctive advantages, especially in terms of tangible benefits, such as cost reduction, manpower reduction and real time communication. Consequently, the ERPII process that deploys web-based, open sourcing and componentized functions based on Service-Oriented Architecture are more feasible as ERP mobile access for each user (Bond et al., 2000; Møller, 2005). Therefore, the ERP program developers could exploit this technology disruption to persuade and explain to rice mill owners and managements that the ERP implementation is currently portable, easy to use, and freely accessible. For in-depth software developments, this study found that the full ERP program package is not yet compatible with the rice mill, only three modules: the procurement logistics, production logistics, quality management present tangible business benefits. Therefore, the software developer may make a combination of those three modules and deploy the ERPII process as a source of programmatic development to allow users to work with their mobile devices or laptops, having access to real-time data (Bond et al., 2000; Møller, 2005). In addition, the cost of software investment should be lowered to capture this market demand and having a user-friendly program and ease of use are parameters that cannot be ignored.

Lastly, the greatest challenge of the ERP expert services for this agricultural business seems to be how to determine an appropriate ERP systematical paradigm that

all rice mills should entirely accept and follow. In addition, the quality of consultancy and training from an experienced expert is significantly necessary to address the success of the ERP program adoption. Besides, communication between all experts and rice mill owners along with the ERP program users are also important in every single step of the ERP adoption transition. Therefore, the communication design of all ERP experts must be clear and simple to provide a comprehensive understanding for the rice mill. Technical terms and unnecessary information should be avoided.

5.3.1 Research Finding of Governmental Support Influence for The ERP Adoption

This research suggested that governmental support policies could not positively influence a direct use of the ERP program in the Thai agricultural business, especially for the rice mill. Basically, the governmental scheme currently is enforced through financial nurturing, tax privileges, knowledge incubation and information support. However, those governmental instruments are seemingly not feasible for the current political scenario. In terms of economy, the trust in the Thai government is not relatively high and the internal investment of each business is also subjectively low. Therefore, the most practical intervention scheme has to understand the existing operation and business nature of this agricultural sector as mentioned in the section of the practical contribution. This research also suggests that the support scheme should be initiated from a logical basis of non-ERP backgrounds because those rice mills have no ERP experiences. Thereafter, appropriate governmental schemes are suggested in terms of knowledge distribution, consultancy, and business incubation so as to generate use awareness and values of the ERP system. The financial privilege without business incubation is the inappropriate scheme. In addition, the selection of an operating channel is also a significant concern. The Thai Rice mill Association and the Agricultural Cooperatives have long existed in every provincial network and usually gather and continuously communicate with the local rice mills. The government scheme makers will benefit from locality and accessibility of making rice mill related policies, once those provincial services are significantly involved. According to those aforementioned constraints and existing Governmental Support techniques, the ERP implementation scheme must be able to capture all intrinsic

requirements of the rice mill business, offer a positive revolution for the rice mill industry, and expressively subsidize the cost of the impact. This results from the ERP program being nearly impossible to be embedded as part of the rice mill business, if the rice mills cannot appreciate the importance and substantial benefits of the ERP program and the system implications. Importantly, significant challenges of the Governmental Support schemes are continuity and feasibility that could incur a revolution of the agricultural business and also tangibly represent the value of the ERP adoption. At present, the National Development Program as per the National Economic Development Program No:12 (12^{th} NESDPs) has already issued the most supreme concerns for the current national economic propagation with high emphasis on Economy 4.0 (NESDB, 2016). For the Economy 4.0 of the agricultural industry, a smart farmer policy is currently popular and there are several public schemes issued for the enabling of information system technology deployment, increasing the competitive advantage of agricultural business, re-structuring traditional agricultural practices with a bandwagon of innovation and technology evolution (NESDB, 2016). However, those policies seemingly require customization for business behavior of the Thai agricultural and rural businesses, which are dramatically different from the standard of industrial corporations. The business characteristics of the Thai agricultural business are already explained in the section of the Demographics (5.1.1). According to the empirical analysis, this research highly suggests that the ERP Training and the Business Process Re-Engineering are the keys to success for enabling the ERP program use for the rice mill. Therefore, responsible scheme makers must design the schemes that highly encourage the ERP Training and lead to development of the Business Process Re-Engineering.

Besides, this study emphasizes that the ERP Training and Business Process Re-Engineering are significant moderators for enabling of the ERP Use Intention. If the scheme makers are willing to take those two mentioned key successes into account along with public authority, an ERP adoption scheme could be wisely realized through both direct and indirect channels in the transition of the ERP adoption process for the Thai agricultural business. In addition, the government scheme should be enforced in a top-down approach through all governmental support services because the support scheme will be more easily tractable. A top-down

governmental support approach could also encourage innovative education and training within organizations, especially once special privileges, such as how the government fund and the business incubation program are received (Nwankpa & Roumani, 2014; Urbach et al., 2010). Therefore, the government fund and the business incubation program interestingly account for a principal of scheme development. However, the Term of Reference (TOR) of the support program must be precisely identified in detail to avoid failure of the scheme development.

This study believes that the Thai Rice Mill Association, the Provincial Agricultural Cooperatives, and the Bank for Agriculture and Agricultural Cooperatives (BAAC) are the most optimal working network for the policy collaboration because those agencies are relatively familiar with the rice mills and most rice mill profiles are properly recorded with those services. Therefore, the issuing of direct instigation policy of an ERP implantation from the central governmental department through each ministry, such as Ministry of Commerce (MOC), Ministry of Industry (MOI) and Ministry of Agriculture and Cooperatives (MOAC) is practically less effective.

5.4 Policy Recommendation

The rural development study by (Besley & Burgess, 2002) suggested that government policy could instantly trigger the enabling of technology in developing countries, once those policies deliver in terms of fiscal support and all business incubations. Nevertheless, this Thai rice mill business study partially contradicts this mentioned rural development study because the trust and the public admiration under the military government are not as normal as the elected government. As a result, a direct vigorous endorsement of the ERP adoption scheme use could not be practically exercised into the rice mill. A gradual enforcement of an ERP development scheme for the agricultural business through existing agricultural mechanisms will be more feasible for all scheme makers for the rice mill dimension. Generally, Government Support is normally imposed into both direct and indirect channels through public administrative offices and private administrative offices respectively. However, weaknesses of public policy are the absence of the continuous support, the quality of the scheme, and the quality of public administrators. As a result, the success indexes of all support policies crucially require precision of the support policy and consistency of the support program. However, using a government scheme is academically agreed upon by several scholars as a possible intervention for business revolutions (Bingi et al., 1999; Rajan & Baral, 2015).

A proposed research questions as per mentioned in the Chapter 1 in section 1.4: The research questions are presented accordingly

1) How can government policy leverage the agricultural business to start the adoption of the ERP use?

This question will be explained in the session of Research Finding of Governmental Support Influence for the ERP Adoption (5.4.1).

5.4.1 Strong Supports for Existing Policy

At present, the Thai government has actively imposed a number of schemes and initiated several development projects for technological revolution for development as per the Thailand 4.0 strategy through potential governmental department agencies and issuing financial subsidies into technological collaboration

research programs among universities and businesses (NESDB, 2016). Those are miracle opportunities for all Thai businesses. However, this support structure is relatively limited to specific groups that already have a readiness and willingness for these development regards, but opportunities are not evenly dispersed to rural opportunities.

For existing examples of government support program, the Division of the Digital Industry Development (DDID), which is the government agency under the Ministry of Industry (MOI), supports ERP program implementation by providing an educational program, in-depth consultancy and a list of recommended ERP vendors to all registered SMEs in the database of DDID (DDID, 2009). The Department of Industrial Promotion (DOIP), which is the government agency under the Ministry of Industry (MOI) and King Mongkut's University of Technology North Bangkok (KMUTNB) issued a collaboration program; development of SME business competitiveness for becoming the digital SMEs in production, service and trading. This collaboration program offers business consultancy for implementation of ERP programs to the SMEs and also offers an ERP program incubation for two systems per SME. The program recruited 120 qualified SMEs from all registered members in the database of the DOIP.

Those mentioned examples demonstrate that an ERP support scheme could be possibly issued through both direct and indirect governmental support channels, which also arrange matching between ERP expert services, ERP vendors and prospective business organizations. In addition, this support under the national program of enhancing a competitive advantage by the use of digital tools is seemingly tailored specifically for only the industrial sector rather than the agricultural sector. This support is partially distributed within limited groups of business. Therefore, businesses with an insufficiency of willingness and readiness for an ERP implementation will be excluded.

5.4.2 Introduction of ERP Support Scheme

The Department of Agricultural Extensions (DOAE) under Ministry of Agriculture and Cooperatives (MOAC) could collaborate with relevant stakeholders; namely, the Thai Rice Mill Association, the Provincial Agricultural Cooperatives, the

Bank of Agriculture and Agriculture Cooperatives (BAAC), the Revenue Department (RD) under the Ministry of Finance (MOF), university research centers and the Division of the Digital Industry Development (DDID), and the ERP experts should corroborate to create the ERP promotion scheme for the rice mill to achieve success in the ERP program adoption. The DOAE could be a primary scheme driver to issue descriptions of the terms and references that identify all collaboration and support benefit milestones. The Thai Rice Mill Association and the Provincial Agricultural Cooperatives play a role as the ERP support scheme distribution channels, a communication center and recruiting of the rice mills that are willing and ready to get involved in the ERP implementation support promotions. The DDID should disclose and provide profiles of the registered and qualified expertise such as ERP venders and ERP consulting services for the DOAE to match and allocate to the rice mills, which are highly interested. The university research centers with the ERP expertise could be included with all qualified expertise from the DDID as the ERP program incubator for the ERP promotion scheme for the rice mills. Thereafter, the DOAE needs to issue Terms of Reference (TOR) to describe the roles and functions between the rice mill and the ERP experts. Successful milestones of this support scheme must be clearly identified in terms of tax privileges or financial support payments because the TOR provided by the DOAE should be used as a masterplan to regulate the BAAC or the RD to allocate the mentioned support privileges to the qualified rice mills. In addition, a success approval agreement must be clearly addressed as successful milestones to identify the success criteria of the Government Support program. In this stage, the ERP experts such as ERP venders, ERP consulting services and university research centers act as judges for the mentioned success criteria of the Government Support program. Therefore, professionalism and transparency of those ERP experts are highly required because a progress assessment of the ERP implementation of the rice mills and completion of the success milestones will be rated by those experts who will subsequently inform the DOAE of every single step of the supportive approvals. Finally, the most crucial success of the ERP support scheme is the quality of collaborative integrations for all stakeholders and continuity of the ERP support scheme. Therefore, the TOR of an ERP support masterplan must clearly identify the collaboration with all stakeholders as well.

According to the aforementioned recommendation of the ERP support scheme, an alternative scheme proposal will be proposed accordingly.

Proposals of the ERP support scheme

Background

According to the empirical study in the ERP adoption in the agricultural business, it has been found that the ERP implementation in the rice mill business is still significantly low. Therefore, the ERP incubation program is significantly offered as a technology employment scheme to improve business efficiency. In the demographics of the rice mill, this industry is usually located in a rural area and is still less likely to have deployment of advanced management software packages. Therefore, government intervention is the only significant way for the ERP to be adopted into this agricultural business. In addition, the 12th National Development Program as National Economic Development Program (12th NESDPs) has already issued "Thailand 4.0" as developing principles, especially that developing principles require disruptive changes in all industries by using science and technology deployments (NESDB, 2016). In this regard, the ERP adoption program in the agricultural business would also satisfy the current national development programs.

Objectives

1) To create an ERP incubation program for rice mills with no ERP experience.

2) The incubation program must offer the ERP Training support and the Business Process Re-Engineering for the rice mills.

3) The ERP adoption and implementation are the final success of this ERP support program.

Stakeholders

1) The rice mills
2) The Department of Agricultural Extensions (DOAE)
3) The Bank for Agriculture and Agricultural Cooperatives (BAAC)
4) The Revenue Department (RD)
5) The Thai Rice Mill Association
6) The Provincial Agricultural Cooperatives
7) ERP Experts; ERP venders and university research centers

Descriptions of Each Streak Holder

1) The Rice Mills

The rice mills who attend the program should have a strong willingness for an ERP implementation. The ERP understanding of the rice mill owner is the most important among other factors because the ERP process implementation requires considerable time, business restructuring, training program and investment of information technology with the ERP process related. Therefore, the decisive personnel that have sufficient ERP understanding will potentially push the rice mill into the direction of a successful adoption.

2) The Department of Agricultural Extensions (DOAE)

The DOAE is the primary scheme driver for this proposal. The DOAE will corroborate with other stakeholders to draft a scheme masterplan and indicate the role of each stakeholder except the rice mill. Importantly, The DOAE is required to issue the Terms of Reference (TOR) of the ERP support scheme that could regulate actions of each stakeholder and given authority. The benefit of the support program will principally be approved and allocated by the DOAE.

3) The Bank for Agriculture and Agricultural Cooperatives (BAAC)

The BAAC has many rice mill's contacts all over the country because several rice mills depend on the BAAC for the business loan. The BAAC is under the Ministry of Finance (MOF), therefore this stakeholder has played a role in supporting financial payments for the rice mill. However, the approval of the financial support is not decided by the BAAC but is authorized the DOAE instead.

4) The Revenue Department (RD)

The RD, which is under the Ministry of Finance (MOF) has played a role as financial supporter similar to the BAAC, except that the RD issues financial support in the form of tax privileges instead. However, the approval of financial support is not decided by the RD but is authorized the DOAE.

5) The Thai Rice Mill Association

Thai rice mill associations have available networks in nearly every single province and hold the strongest rice mill network having efficient information communication among members could assist in this support scheme in several dimensions. The Thai Rice Mill Association could assist this support scheme by

becoming venues for gathering between the rice mills and other stakeholders, providing a list of potential rice mills for consideration of the DOAE and also by acting as recruiters, providing demographical profiles of the Thai rice mill along with impediments for the ERP adoption for the DOAE.

6) The Provincial Agricultural Cooperatives

The Provincial Agricultural Cooperatives, which exist in every province could contribute to this support scheme by providing the provincial rice mill profile data with real-time updates to the DOAE.

7) ERP Experts; ERP Venders and University Research Center

Those experts have played a highly important role in enabling the use of the ERP for the rice mills. In this support scheme, those experts are deployed by the DOAE as the business incubator to enable the ERP implementation for the selected rice mills. Apart from the role of the busines incubator, those experts also have to rate the ERP adoption and implementation success of the rice mill prior to receiving the benefits of the support program being approved by the DOAE.

Time frame

6-12 months.

Implementation

The Thai government should endorse tax privilege policies and incentive programs through the Provincial Agricultural Cooperatives of each province because those local services are familiar with local rice mills and clearly understand the business dynamics of each local area. Therefore, deployment of those local authorities could result in precise and up-to-date national rice mill business data. In addition, the government could easily deploy the Thai Rice Mill Organization, which comprises of 1,681 rice mill members in Thailand (both active and inactive members) and has several provincial offices to distribute the ERP incentive scheme and use it as the main communication venue between the public authorities, the rice mill representatives, the banking services, and the experts.

Regarding financial data and support, the Bank for Agriculture and Agricultural Cooperatives (BAAC) under the Ministry of Finance (MOF) with financial profiles of the rice mills could be used as governmental instruments along

with the Revenue Department (RD) under the Ministry of Finance (MOF) to assist all monetary support for the ERP program for this agricultural business.

For support of the ERP incubation program, the university research institutions, and the ERP expert venders, who are capable of the ERP Training and widely accepted, are assigned to a role of the business incubators and the ERP trainers at the same time.

For the Business Process Re-Engineering support, the research institutions, and the ERP expert venders, which also have service professionalism, could assist in the business process transformation of the ERP program adoption in the rice mill. Those stakeholders are also highly required to be an important driver of the ERP incubation schemes. Therefore, the government agencies should cooperate with the qualified ERP experts from the universities and consulting services by financial grant and research funding in a cooperation program between the ERP experts and the rice mills. As per those mentioned Government Supports, the quality of the collaboration among all public and private services are highly required to fully contribute to this scheme.

In terms of practical implementation, the roles of and collaboration among all stakeholders are highly required to fulfill the success of the ERP adoption scheme. Therefore, the Term of Reference (TOR) is mainly utilized as the policy masterplan to identify success milestones, support benefits, roles, and collaboration of stakeholders to make the ERP program usable in the rice mills. The TOR of this scheme should be mainly regulated by the DOAE. The tax privilege and the incentive payment offered by the Revenue Department (RD) and the Bank for Agriculture and Agricultural Cooperatives (BAAC) respectively are required to explain the success milestones of the ERP adoption program.

The ERP experts must work under control of the DOAE in a role of the ERP process incubators to develop the ERP adoption transition for the rice mill users. Necessarily, those ERP experts have to work hand in hand with both the rice mills and the DOAE to rate the support achievements in accordance with the success milestones as mentioned in the TOR (to describe in the program achievement). Most importantly, these TOR must address that the ERP Training and the changes of the rice mill business process are the most significant achievement for this ERP incubation

program. Thereafter, the rice mills that are actively capable of accommodating the achievement of this ERP incubation program will respectively obtain the financial support from the BAAC and/or tax privileges from the RD under the approval agreement from both the ERP experts and the DOAE agency. The ERP adoption support program must be implemented per the mentioned sequences because the rice mills and other agricultural businesses are comparatively unfamiliar with the Enterprise Resource Program and the existing business operation is relatively not systematically efficient. In addition, several rice mill owners and managements still remain with their traditional business operation instead of migrating to the technological management, leading to the rice mill representatives with no robust inspiration and readiness to change. As a result, the new breakthrough process management is nearly impossible to be adopted or implemented. Therefore, the ERP adoption program must be proactive and promptly offer tangible support promotions to persuade the attention of the rice mills. Lastly, high intensity of this ERP support program is rigidly expected to obtain an interest and good collaboration in this agricultural business because the disruptive changes by this governmental intervention support would significantly result in the readiness and willingness of the rice mill business.

The program achievement and achievement benefits in accordance with this implementation will be illustrated in the following sections.

Program achievement

The description of the ERP incubation program achievement is presented in Table 5.1. The program achievement is divided into four stages, which comprise of project preparation, transition, adoption, and preservation. The ERP support activities, the success milestones, and the related stakeholders related to each stage of the ERP support program are also described to visualize developing sequences and interrelationship of tasks, and the importance of each stage.

Table 5.1 Descriptions of The ERP Incubation Program Achievement

Stages	ERP support activities	Success milestones	Stakeholders
Preparation	• To provide term of references. • To identify rice mills attending the ERP incubation program. • To collaborate with all stakeholders.	• Completed agreements of the Term of Reference (TOR). • Completed masterplan of the scheme.	• DOAE • BAAC • RD • The Thai Rice Mill Association • Provincial Agricultural Cooperatives • ERP Experts
Transition	• To perform the ERP Training program. • To perform the Business Process Re-Engineering.	• Completed the ERP Training program • Completed the Business Process Re-Engineering.	• The Rice Mills • DOAE • BAAC • RD • ERP Experts
Adoption	• Rice mill is changed to operate with the ERP program. • ERP program implementation can satisfy all users.	• ERP program is successfully adopted.	• The Rice Mills • DOAE • BAAC • RD • ERP Experts
Preservation	• Continuity of ERP program implementation in the rice mill.	• ERP program is continuously implemented.	• The Rice Mills • DOAE

For the preparation stage, the DOAE should issue the initiatives of the draft ERP incubation program and invite the BAAC, the RD, the Provincial Agricultural Cooperatives, the Thai Rice Mill Association, and the ERP Experts to form a development team. This team will work together to generate a feasibility study and a draft ERP incubation program. Thereafter, agreements of the TOT and the masterplan of the scheme are obtained from this stage as final outcomes of the DOAE.

For the transition stage, the selected rice mills that attend this ERP incubation program will work closely with the DOAE agency and the ERP Experts to start the ERP Training program and business process transformation. The rice mill will directly obtain the ERP incubation treatment from the assigned experts by the DOAE. A completion of the ERP Training program and the Business Process Re-Engineering that allow the ERP implementation in the rice mills are the required outcomes in this stage. All progression in the success milestones in this stage will be rated by the ERP experts, who are also the program incubators whereas the achievement in the success milestones must be instantaneously reported to the DOAE prior to having the approval of the benefits, as arranged by the BAAC and the RD.

For the adoption stage, the rice mills must successfully adopt the ERP program into their business operation. Thereafter, the ERP experts will perform the ERP implementation assessment to verify the adoption success of each rice mill. Once the ERP adoption is complete and the ERP experts have approved this final achievement, the DOAE will be respectively informed by the approval report and subsequently, the DOAE will finally regulate the BAAC and the RD to settle all financial supports.

For the preservation stage, the DOAE should randomly contact the rice mills to verify the continuity of the ERP program implementation and take implementation issues into account for further assistance.

Program achievement benefits

The description of the ERP support benefits is presented in Table 5.2. The ERP program achievement benefits are also divided into three stages, consisting of project preparation, transition, adoption, and preservation. The ERP success milestones along with the roles of beneficiaries and auditors corresponding to each

stage of the ERP support program are also described to visualize a clear contribution of governmental subsidies.

Table 5.2 The Description of The ERP Program Achievement Benefits

Stages	Success milestones	Governmental subsidies	Beneficiaries	Auditors
Preparation	• Completed agreements of the Term of Reference (TOR). • Completed masterplan of the scheme.	• N/A	• DOAE	• BAAC • RD • The Thai Rice Mill Association • ERP Experts
Transition	• Completed the ERP Training program. • Completed the Business Process Re-Engineering.	• Incubation program • Tax privilege • Financial support	• The Rice mills	• DOAE • BAAC • RD • ERP Experts
Adoption	• ERP program is successfully adopted.	• Incubation program • Tax privilege • Financial support	• The Rice Mills • DOAE	• DOAE • BAAC • RD • ERP Experts
Preservation	• ERP program is continuously implemented.	• N/A	• The Rice Mills	• DOAE

For the preparation stage, the DOAE should benefit from having the term of references and the masterplan of the scheme. There is still no rice mill support available.

For the transition stage, all selected rice mills that attend this ERP incubation program will obtain some parts of financial subsidies from the BAAC, once those rice mills have progressed in terms of the ERP Training and the Business Process Re-Engineering at each accepted achievement agreed by both the DOAE and the ERP experts.

For the adoption stage, the final terms of payments and tax privileges will be settled for the rice mills that have completely adopted the ERP program and have started the ERP implementation into their business operation. The DOAE will finally regulate the BAAC and the RD to settle all financial support, once the DOAE and the ERP experts have mutually agreed with this final achievement of the ERP incubation program. For the benefit arrangements, the BAAC will be responsible for all financial support terms while the RD will be responsible for the tax privileges.

For the preservation stage, there are no financial support and tax privileges available because this stage only tracks the ERP post-implementation.

5.5 Limitations and Direction for Further Study

There are four main limitations of this empirical study.

Firstly, the publicly available data from the Bank of Agriculture and Agriculture Cooperatives (BAAC) are not currently updated. 76% of the rice mill contacts are unreachable. Therefore, the number of the total sampling of all active rice mill members in Thailand is not precisely reached. This limitation also results in a precision of sample size calculation. The rice mill contacts are only dependable from the Thai Rice Mill Association's data set, which has nearly half as many as available in the data from the BAAC.

Secondly, this empirical study exclusively exposes that rice mills have no ERP experiences. Therefore, the ERP adoption characteristics could be significantly altered, once there are rice mill respondents with ERP experiences.

Thirdly, the empirical findings only focus on rice mill samplings and are relatively not rigid enough to generalize to the whole population of the Thai agricultural business. Nevertheless, the limitation of time, the variety and the size of the agricultural industry are the ultimate limitations for making of arbitrary selection samples in the Thai agricultural business.

Lastly, the concept of ERP is still relatively unknown and too complex to understand. The rice mill may need another type of program that is a simpler version of the ERP, such as Material Requirement Planning (MRP) and inventory controls because those concepts are more closely related to their daily operation tasks.

Further study will be conducted to evaluate generalizability of this empirical study. Although Thailand has a vast number of agricultural populations, approximately one quarter of the total population, also known as the famous agricultural export country, the research of Enterprise Resource Planning in the Thai agricultural business is still very limited and nearly neglected. The feasibility of this empirical model could be alternatively deployed to evaluate other agricultural industries such as sugar cane, corn, cassava, fisheries industry, and livestock industry so as to identify weaknesses and validity of this proposed empirical model.

The Government Support is interestingly obligated to reinvestigate in the validity of the relation toward the Use Intention of the ERP program in Thailand in a

normal political system, not under the military government, and other countries with different political systems and political situations. Further study could also identify how political situations influence the perception of Governmental Support. Alternatively, governmental trust is an alternative construct that could be interestingly introduced to the further motivational model of the ERP application in the agricultural research. Because Government Support is required as a mediating construct that could calibrate an intensity and Government Support quality ahead of linking toward the motivational constructs. Alternatively, the readiness and willingness of businesses to change are interestingly seen as parameters that could deploy the motivational model to mediate the relation between Government Support and Use Intention of the ERP program. Readiness has a definite meaning to define whether there is readiness or not under specific circumstances. Nevertheless, the willingness to change has a non-definite meaning and is relatively sensitive to the perception of each respondent. Therefore, further study could insert the readiness and willingness to change as a mediator for a future motivational model to clearly observe the relation between the Government Support and the readiness and willingness to change respectively. This alternate study could lead to visualizing the perception of the respondents toward the quality of the government support policy in respect of the readiness and willingness to change, prior to finding a relation toward the Use Intention. As a result, the explanation between Government Supports and the Use Intention constructs will be distinctively elaborated. In addition, the readiness and willingness to change could also be used to avoid a reverse causality issue.

In addition, the management leadership of an organization with a successful ERP implementation is an alternative research for future study. This research would study on the leadership style and management characteristics that could allow an ERP program to be adopted and effectively implemented because the best of the ERP adoption paradigms must be mimicked from an organization with existing ERP implementation. In addition, this future research will also identify research gaps that are differences between the management leadership style of the organization with an ERP implementation success and without ERP adoption (or ERP implementation failure). This future research finding is expected to contribute to the management

leadership characteristics paradigm that must be available for further technology adoption and ERP implementation.

BIBLIOGRAPHY

Abonyi, G. (2005). *Policy Reform in Thailand and the Asian Development Bank's Agricultural Sector Program Loan*: Manila, Philippines: Asian Development Bank.

Adel, M. A. (2001). Change Management Strategies for Successful ERP Implementation. *Business Process Management Journal, 7*(3), 266-275. doi:10.1108/14637150110392764

Aerts, K., & Czarnitzki, D. (2004). Using Inovation Survey Data to Evaluate R&D Policy: The Case of Belgium. *ZEW-Centre for European Economic Research Discussion Paper*(04-055).

Aerts, K., & Schmidt, T. (2008). Two for the Price of One?: Additionality Effects of R&D Subsidies: A Comparison between Flanders and Germany. *Research Policy, 37*(5), 806-822.

Afthanorhan, W. (2013). A Comparison of Partial Least Square Structural Equation Modeling (PLS-SEM) and Covariance Based Structural Equation Modeling (CB-SEM) for Confirmatory Factor Analysis. *International Journal of Engineering Science and Innovative Technology, 2*(5), 198-205.

Agarwal, R., & Prasad, J. (1998). A Conceptual and Operational Definition of Personal Innovativeness in the Domain of Information Technology. *Information systems research, 9*(2), 204-215. doi:10.1287/isre.9.2.204

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211. doi:10.1016/0749-5978(91)90020-T

Ajzen, I., & Fishbein, M. (2000). Attitudes and the Attitude-behavior Relation: Reasoned and Automatic Processes. *European review of social psychology, 11*(1), 1-33.

Akkermans, H. A., Bogerd, P., Yücesan, E., & van Wassenhove, L. N. (2003). The impact of ERP on supply chain management: Exploratory findings from a European Delphi study. *European Journal of Operational Research, 146*(2), 284-301. doi:10.1016/S0377-2217(02)00550-7

Al-Gahtani, S. S., Hubona, G. S., & Wang, J. (2007). Information Technology (IT) in Saudi Arabia: Culture and the Acceptance and Use of IT. *Information & Management, 44*(8), 681-691. doi:10.1016/j.im.2007.09.002

Al-Mashari, M., & Zairi, M. (2000). Supply-chain Re-engineering using Enterprise Resource Planning (ERP) Systems: An analysis of a SAP R/3 Implementation case. *International Journal of Physical Distribution & Logistics Management, 30*(3/4), 296-313.

Al-Mashari, M. (2002). Enterprise Resource Planning (ERP) Systems: a Research Agenda. *Industrial Management Data Systems*.

Ali-Yrkkö, J. (2005). Impact of Public R&D Financing on Employment. *ETLA Discussion Papers*.

Altenburg, T., Schmitz, H., & Stamm, A. (2008). Breakthrough? China's and India's Transition from Production to Innovation. *World Development, 36*(2), 325-344.

Altinkemer, K., Chaturvedi, A., & Kondareddy, S. (1998). Business Process Reengineering and Organizational Performance: An Exploration of Issues.

International Journal of Information Management, 18(6), 381-392.
Amoako-Gyampah, K., & Salam, A. F. (2004). An Extension of the Technology Acceptance Model in an ERP Implementation Environment. *Information & Management, 41*(6), 731-745. doi:org/10.1016/j.im.2003.08.010
Anandarajan, M., Igbaria, M., & Anakwe, U. P. (2002). IT Acceptance in a Less-developed Country: A Motivational Factor Perspective. *International Journal of Information Management, 22*(1), 47-65. doi:10.1016/S0268-4012(01)00040-8
Anderson, M., Banker, R., & Ravindran, S. (2003). The New Productivity Paradox. *Communications of the ACM, 46*(3), 91-94. doi:10.1145/636772.636776
Ashmore, R. D., & Sewell, A. D. (1998). Sex/Gender and the Individual. In *Advanced personality* (pp. 377-408): Springer.
Askar, P., Usluel, Y. K., & Mumcu, F. K. (2006). Logistic Regression Modeling for Predicting Task-Related ICT Use in Teaching. *Journal of Educational Technology & Society, 9*(2).
Attaran, M. (2004). Exploring the Relationship between Information Technology and Business Process Reengineering. *Information & Management, 41*(5), 585-596.
Attewell, P. (1992). Technology diffusion and organizational learning: The case of business computing. *Organization science, 3*(1), 1-19.
BAAC. (2017). Bank for Agriculture and Agricultural Cooperatives (BAAC) Retrieved from http://www.baac.or.th
Bagozzi, R. P. (1982). A Field Investigation of Causal Relations among Cognitions, Affect, Intentions, and Behavior. *Journal of Marketing Research, 19*(4), 562-583.
Bagozzi, R. P., & Yi, Y. (2012). Specification, Evaluation, and Interpretation of Structural Equation Models. *Journal of the Academy of Marketing Science, 40*(1), 8-34.
Bakos, J. Y. (1991). A Strategic Analysis of Electronic Marketplaces. *MIS Quarterly*, 295-310.
Bauer, J., & Kenton, J. (2005). Toward Technology Integration in the Schools: Why It Isn't Happening. *Journal of technology and teacher education, 13*(4), 519-546.
Bayram, N. (2010). *Introduction to Structural Equation Model and Amos Applications*.
Bearden, W. O., Sharma, S., & Teel, J. E. (1982). Sample Size Effects on Chi Square and Other Statistics Used in Evaluating Causal Models. *Journal of Marketing Research, 19*, 425-430.
Beccerra, M., & Gupta, A. K. (1999). Trust within the Organization: Integrating the Trust Literature with Agency Theory and Transaction Costs Economics. *Public Administration Quarterly*, 177-203.
Bélanger, F., & Carter, L. (2008). Trust and Risk in E-government Adoption. *The Journal of Strategic Information Systems, 17*(2), 165-176.
Bem, D. J., & Allen, A. (1974). On Predicting Some of the People Some of the Time: The Search for Cross-situational Consistencies in Behavior. *Psychological Review, 81*(6), 506.
Bennett, J., & Bennett, L. (2003). A review of Factors That Influence the Diffusion of Innovation When Structuring a Faculty Training Program. *The Internet and Higher Education, 6*(1), 53-63.
Bentler, P. M. (1990). Comparative Fit Indexes in Structural Models. *Psychological bulletin, 107*(2), 238.

Bernardi, R. A. (1994). Validating Research Results when Cronbach's alpha is below. 70: A Methodological Procedure. *Educational and Psychological Measurement, 54*(3), 766-775.

Besley, T., & Burgess, R. (2002). The Political Economy of Government Responsiveness: Theory and Evidence from India. *The Quarterly Journal of Economics, 117*(4), 1415-1451.

Beugelsdijk, S., & Cornet, M. (2002). 'A far Friend Is Worth More Than a Good Neighbour': Proximity and Innovation in a Small Country. *Journal of Management and Governance, 6*(2), 169-188.

Bhattacherjee, A. (2001). Understanding Information Systems Continuance: an Expectation-confirmation Model. *MIS Quarterly, 25*(3), 351-370.

Bingi, P., Sharma, M. K., & Godla, J. K. (1999). Critical Isues Affecting an ERP Implementation. *IS Management, 16*(3), 7-14.

Bollen, K. A. (1990). Overall Fit in Covariance Structure Models: Two Types of Sample Size Effects. *Psychological bulletin, 107*(2), 256.

Bollen, K. A., & Davis, W. R. (2009). Two Rules of Identification for Structural Equation Models. *Structural Equation Modeling: A Multidisciplinary Journal, 16*(3), 523-536.

Bond, B., Genovese, Y., Miklovic, D., Wood, N., Zrimsek, B., & Rayner, N. (2000). ERP is dead–Long live ERP II. *Gartner Group, New York*.

Botta-Genoulaz, V., Millet, P.-A., & Grabot, B. (2005). A Survey on the Recent Research Literature on ERP Systems. *Computers in Industry, 56*(6), 510-522.

Boyd, J. D., & Fishbein, M. (1937). *Nutrition of the infant and child*. New York, N.Y.,: National medical book co., inc.

Bozionelos, N. (1996). Psychology of Computer Use: XXXIX. Prevalence of Computer Anxiety in British Managers and Professionals. *Psychological reports, 78*(3), 995-1002.

Bradford, M., & Florin, J. (2003). Examining the role of innovation diffusion factors on the implementation success of enterprise resource planning systems. *International Journal of Accounting Information Systems, 4*(3), 205-225.

Bradley, J. (2008). Management Based Critical Success Factors in the Implementation of Enterprise Resource Planning Systems. *International Journal of Accounting Information Systems, 9*(3), 175-200.

Branscomb, L. M., & Thomas, J. C. (1984). Ease of Use: A System Design Challenge. *IBM Systems Journal, 23*(3), 224-235.

Briz-Ponce, L., & Juanes-Méndez, J. A. (2015). Mobile Devices and Apps, Characteristics and Current Potential on Learning. *Journal of Information Technology Research (JITR), 8*(4), 26-37.

Brown, S. (2005). Model of Adoption of Technology in Households: A Baseline Model Test and Extension Incorporating Household Life Cycle1. *MIS Quarterly, 29*(3), 399-426.

Browne, M. W., Cudeck, R., Bollen, K. A., & Long, J. S. (1993). Testing Structural Equation Models. In (Vol. 154): Sage.

Buabeng-Andoh, C. (2012). Factors Influencing Teachers' Adoption and Integration of Information and Communication Technology into Teaching: A Review of the Literature. *International Journal of Education and Development using Information and Communication Technology, 8*(1), 136-155.

Bueno, S., & Salmeron, J. L. (2008). TAM-based Success Modeling in ERP. *Interacting with Computers, 20*(6), 515-523.

Busom , I. (2000). An Empirical Evaluation of The Effects of R&D Subsidies. *Economics of Innovation and New Technology, 9*(2), 111-148. doi:10.1080/10438590000000006

Byrne, B. M. (2010). Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming (Multivariate Applications Series). *New York: Taylor & Francis Group, 396*, 7384.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and Discriminant Validation by the Multitrait-multimethod Matrix. *Psychological bulletin, 56*(2), 81.

Carlsson, C., Liu, Y., & Li, H. (2010). Factors Driving the Adoption of M-learning: An Empirical Study. *Computers & Education, 55*(3), 1211-1219.

Carmines, E. G., & Zeller, R. A. (1979). *Reliability and Validity Assessment* (Vol. 17). CA: Sage Publications.

Celik, V., & Yesilyurt, E. (2013). Attitudes to Technology, Perceived Computer Self-efficacy and Computer Anxiety as Predictors of Computer Supported Education. *Computers & Education, 60*(1), 148-158.

Chan, K. Y., Gong, M., Xu, Y., & Thong, J. Y. L. (2008). *Examining User Acceptance of SMS: an Empirical Study in China and Hong Kong.* Paper presented at the PACIS Proceedings, HK.

Chang, H. H. (2006). Technical and Management Perceptions of Enterprise Information System Importance, Implementation and Benefits. *Information Systems Journal, 16*(3), 263-292.

Chang, H. H. (2008). Intelligent Agent's Technology Characteristics Applied to Online Auctions' Task: A Combined Model of TTF and TAM. *Technovation, 28*(9), 564-577.

Charles, M. (2005). ERP II: A Conceptual Framework for Next-generation Enterprise Systems? *Journal of Enterprise Information Management, 18*(4), 483-497. doi:10.1108/17410390510609626

Cheng, J. M.-S., Sheen, G.-J., & Lou, G.-C. (2006). Consumer Acceptance of the Internet as a Channel of Distribution in Taiwan—a Channel Function Perspective. *Technovation, 26*(7), 856-864.

Chian-Son, Y. (2005). Causes influencing the effectiveness of the post-implementation ERP system. *Industrial Management & Data Systems, 105*(1), 115-132. doi:10.1108/02635570510575225

Chiles, T. H., & McMackin, J. F. (1996). Integrating Variable Risk Preferences, Trust, and Transaction Cost Economics. *Academy of management review, 21*(1), 73-99.

Chin, J. P., Diehl, V. A., & Norman, K. L. (1988). *Development of an instrument measuring user satisfaction of the human-computer interface.* Paper presented at the Proceedings of the SIGCHI conference on Human factors in computing systems.

Chong, A. Y.-L. (2013). A Two-staged SEM-neural Network Approach for Understanding and Predicting the Determinants of M-Commerce Adoption. *Expert Systems With Applications, 40*(4), 1240-1247. doi:10.1016/j.eswa.2012.08.067

Chou, C.-P., & Bentler, P. M. (1995). Estimates and Tests in Structural Equation Modeling. In *Structural Equation Modeling: Concepts, Issues, Applications* (pp.

37-55). Thousand Oaks, CA, US: Sage Publications, Inc.
Christmann, A., & Van Aelst, S. (2006). Robust Estimation of Cronbach's alpha. *Journal of Multivariate Analysis, 97*(7), 1660-1674.
Civelek, M. E. (2018). Essentials of Structural Equation Modeling. In *Essentials of Structural Equation Modeling*.
Cohen, W. M., Nelson, R. R., & Walsh, J. P. (2002). Links and Impacts: the Influence of Public Research on Industrial R&D. *Management Science, 48*(1), 1-23.
Compeau, D. R., & Higgins, C. A. (1995). Computer Self-efficacy: Development of a Measure and Initial Test. *MIS Quarterly, 19*(2), 189-211.
Compeau, D. R., Higgins, C. A., & Huff, S. (1999). Social Cognitive Theory and Individual Reactions to Computing Technology: A Longitudinal Study. *J MIS Quarterly, 23*(2), 145-158.
Comrey, A. L., & Lee, H. B. (2013). *A First Course in Factor Analysis*. NJ: Psychology Press.
Connolly, J. (1999). ERP: Corporate Cleanup. *Computerworld, 33*(9), 74-78.
Cozzarin, B. P. (2006). Performance Measures for the Socio-economic Impact of Government Spending on R&D. *Scientometrics, 68*(1), 41-71.
Creswell, J. W., & Clark, V. L. P. (2017). *Designing and Conducting Mixed Methods Research*. CA: Sage publications.
Cronbach, L. J., & Meehl, P. E. (1955). Construct Validity in Psychological Tests. *Psychological bulletin, 52*(4), 281.
Curran, P. J., West, S. G., & Finch, J. F. (1996). The Robustness of test Statistics to Nonnormality and Specification Error in Confirmatory Factor Analysis. *Psychological Methods, 1*(1), 16.
Curran, T., Keller, G., & Ladd, A. (1998). *SAP R/3 business blueprint: understanding the business process reference model* (Vol. 255). NJ: Prentice Hall.
Czarnitzki, D., & Lopes-Bento, C. (2013). Value for Money? New Microeconometric Evidence on Public R&D Grants in Flanders. *Research Policy, 42*(1), 76-89.
Daniel, L., Siong, O. C., Chay, L. S., Lee, K. H., & White, J. (2004). A Multiparameter Moment-matching Model-Reduction Approach for Generating Geometrically Parameterized Interconnect Performance Models. *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, 23*(5), 678-693.
Davenport, T. H. (1998). Putting the Enterprise into the Enterprise System. *Harvard business review, 76*(4), 121-131.
Davenport, T. H. (2000). The future of enterprise system-enabled organizations. *Information Systems Frontiers, 2*(2), 163-180.
David, P. A., Hall, B. H., & Toole, A. A. (2000). Is Public R&D a Complement or Substitute for Private R&D? A Review of the Econometric Evidence. *Research Policy, 29*(4-5), 497-529.
Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly, 13*(3), 319-340. doi:10.2307/249008
Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science, 35*(8), 982-1003. doi:10.1287/mnsc.35.8.982
Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and Intrinsic Motivation to Use Computers in the Workplace 1. *Journal of Applied Social Psychology, 22*(14), 1111-1132. doi:10.1111/j.1559-1816.1992.tb00945.x

DDID. (2009). *Enhancing SMEs Competitveness Throught IT*. Bangkok: Department of Industrial Promotion

De Ruyter, K., Wetzels, M., & Kleijnen, M. (2001). Customer Adoption of E-service: An Experimental Study. *International journal of service industry management, 12*(2), 184-207.

Delina, R., Packová, M., Roztocki, N., & Weistroffer, H. R. (2013). *Information Technology Investments and Stock Market Reaction: Evidence from Czech Republic, Hungary and Slovakia.* Paper presented at the Proceedings of the Second International Conference on ICT Management for Global Competitiveness and Economic Growth in Emerging Economies (ICTM 2013), Wroclaw, Poland.

Dennis, S., King, B., Hind, M., & Robinson, S. (2000). *Applications of Business Process Simulation and Lean Techniques in British Telecommunications PLC.* Paper presented at the Proceedings of the 32nd conference on Winter simulation, FL.

Derrick, J. N., Linying, D., & Chris, H. (2007). Charismatic Leadership and User Acceptance of Information Technology. *European Journal of Information Systems, 16*(4), 494. doi:10.1057/palgrave.ejis.3000682

Derue, D. S., Nahrgang, J. D., Hollenbeck, J. R., & Workman, K. (2012). A Quasi-experimental study of After-event Reviews and Leadership Development. *Journal of Applied Psychology, 97*(5), 997-1015. doi:10.1037/a0028244

Devaraj, S., & Kohli, R. (2000). Information Technology Payoff in the Health-care Industry: A Longitudinal Study. *Journal of Management Information Systems, 16*(4), 41-67.

Dezdar, S., & Ainin, S. (2011). The Influence of Organizational Factors on Successful ERP Implementation. *Management Decision, 49*(6), 911-926.

Di Maio, M. (2009). Industrial Policies in Developing Countries: History and Perspectives. *Industrial Policy Development, 08*(1), 107-143.

Dodds, W., Monroe, K., & Grewal, D. (1991). Effects of Price, Brand, and Store Information on Buyers' Product Evaluations. *JMR, Journal of Marketing Research, 28*(3), 307. doi:10.2307/3172866

Doh, S., & Kim, B. (2014). Government Support for SME Innovations in the Regional Industries: The Case of Government Financial Support Program in South Korea. *Research Policy, 43*(9), 1557-1569. doi:10.1016/j.respol.2014.05.001

Doney, P. M., & Cannon, J. P. (1997). Trust in Buyer-seller Relationships. *Journal of marketing, 61*, 35-51.

Duangekanong, S. (2014). Factors influencing the success of an ERP system: A study in the context of an agricultural enterprise in Thailand. *Silpakorn University Science and Technology Journal, 8*(1), 18-45.

Edquist, C. (2011). Design of Innovation Policy Through Diagnostic Analysis: Identification of Systemic Problems (or Failures). *Industrial and Corporate Change, 20*(6), 1725-1753.

Eichinger, J., Heifetz, L. J., & Ingraham, C. (1991). Situational Shifts in Sex Role Orientation: Correlates of Work Satisfaction and Burnout among Women in Special Education. *Sex Roles, 25*(7-8), 425-440.

Ein-Dor, P., & Segev, E. (1978). Organizational Context and the Success of Management Information Systems. *Management Science, 24*(10), 1064-1077.

Esteva Armida, E. (2008). Adoption Process for VOIP: The Influence of Trust in the UTAUT Model. In R. Widdows (Ed.). IN: ProQuest Dissertations Publishing.

Ettlie, J. E., Perotti, V. J., Joseph, D. A., & Cotteleer, M. J. (2005). Strategic Predictors of Successful Enterprise System Deployment. *International Journal of Operations & Production Management, 25*(10), 953-972.

Fishbein, M., & Ajzen, I. (1977). Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research. *Journal of Business Venturing, 5*, 177-189.

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research, 18*(1), 39-50.

Frambach, R. T., & Schillewaert, N. (2002). Organizational innovation adoption: a multi-level framework of determinants and opportunities for future research. *Journal of Business Research, 55*(2), 163-176. doi:10.1016/S0148-2963(00)00152-1

French, J. R., Raven, B., & Cartwright, D. (1959). The Bases of Social Power. *Classics of Organization Theory, 7*, 3111-3320.

Fürnkranz, J., Hüllermeier, E., Cheng, W., & Park, S.-H. (2012). Preference-based Reinforcement Learning: A Formal Framework and a Policy Iteration Algorithm. *Machine learning, 89*(1-2), 123-156.

Gable, G., Sedera, D., & Chan, T. (2003). Enterprise Systems Success: A Measurement Model. *ICIS 2003 Proceedings*, 48.

Garner, W. R., & McGill, W. J. (1956). The Relation between Information and Variance Analyses. *Psychometrika, 21*(3), 219-228. doi:10.1007/BF02289132

Gattiker, T. F., & Goodhue, D. L. (2002). Software-Driven Changes to Business Processes: An Empirical Study of Impacts of Enterprise Resource Planning (ERP) Systems at the Local Level. *International Journal of Production Research, 40*(18), 4799-4814. doi:10.1080/0020754021000033913

Gattiker, T. F., & Goodhue, D. L. (2004). Understanding the Local-level Costs and Benefits of ERP through Organizational Information Processing Theory. *Information & Management, 41*(4), 431-443. doi:10.1016/S0378-7206(03)00082-X

Gefen, D., Rose, G. M., Warkentin, M., & Pavlou, P. A. (2005). Cultural Diversity and Trust in IT Adoption: A Comparison of Potential E-voters in the USA and South Africa. *Journal of Global Information Management, 13*(1), 54-78.

George, D. (2000). *SPSS for Windows Step by Step : A Simple Guide and Reference 9.0 Update* (2nd ed.. ed.). Boston, MA: Allyn and Bacon.

Gerbing, D. W., & Anderson, J. C. (1988). Structural Equation Modeling in Practice: A Review and Recommended Two-step Approach. *Psychological bulletin, 103*(3), 411.

Ghosh, S., & Skibniewski, M. J. (2010). Enterprise Resource Planning Systems Implementation as a Complex Project: a Conceptual Framework. *Journal of Business Economics and Management, 11*(4), 533-549.

Giaglis, G. M., & Paul, R. J. (1996). It's Time to Engineer Re-engineering: Investigating the Potential of Simulation Modelling for Business Process Redesign. In *Business Process Modelling* (pp. 313-332). MI: Springer.

Gifford, R. (1980). Review of Differential Psychology. *Canadian Psychology/Psychologie canadienne, 21*(3), 137-138. doi:10.1037/h0081325

Gist, M. E. (1987). Self-efficacy: Implications for organizational behavior and human resource management. *Academy of management review, 12*(3), 472-485.
González, X., & Pazó, C. (2008). Do Public Subsidies Stimulate Private R&D Spending? *Research Policy, 37*(3), 371-389.
Gopal, A., Bostrom, R. P., & Chin, W. W. (1992). Applying Adaptive Structuration Theory to Investigate the Process of Group Support Systems Use. *Journal of Management Information Systems, 9*(3), 45-69. doi:10.1080/07421222.1992.11517967
Görg, H., & Strobl, E. (2007). The Effect of R&D Subsidies on Private R&D. *Economica, 74*(294), 215-234.
Gottschalk, P., & Foss Abrahamsen, A. (2002). Plans to Utilize Electronic Marketplaces: The Case of B2B Procurement Markets in Norway. *Industrial Management & Data Systems, 102*(6), 325-331.
Gravetter, F. J., & Forzano, L.-A. B. (2018). *Research Methods for the Behavioral Sciences*. LA: Cengage Learning.
Green, S. B., Lissitz, R. W., & Mulaik, S. A. (1977). Limitations of Coefficient Alpha as an Index of Test Unidimensionality1. *Educational and Psychological Measurement, 37*(4), 827-838.
Grewal, R., Comer, J. M., & Mehta, R. (2001). An Investigation into the Antecedents of Organizational Participation in Business-to-business Electronic Markets. *Journal of marketing, 65*(3), 17-33.
Grover, V., Jeong, S. R., Kettinger, W. J., & Teng, J. T. (1995). The Implementation of Business Process Reengineering. *Journal of Management Information Systems, 12*(1), 109-144.
Grover, V., Teng, J. T., & Jeong, S. R. (1998). Profiling successful reengineering projects. *Communications of the ACM, 41*(6), 96-102.
Guan, J., & Yam, R. C. (2015). Effects of Government Financial Incentives on Firms' Innovation Performance in China: Evidences from Beijing in the 1990s. *Research Policy, 44*(1), 273-282.
Gunasekaran, A., & Nath, B. (1997). The Role of Information Technology in Business Process Reengineering. *International Journal of Production Economics, 50*(2-3), 91-104.
Gupta, A. (2000). Enterprise Resource Planning: The Emerging Organizational Value Systems. *Industrial Management & Data Systems, 100*(3), 114-118.
Gupta, B., Dasgupta, S., & Gupta, A. (2008). Adoption of ICT in a government organization in a developing country: An empirical study. *Journal of Strategic Information Systems, 17*(2), 140-154. doi:10.1016/j.jsis.2007.12.004
Hair, J. F. (2010). *Multivariate data analysis : a global perspective* (7th ed.). Upper Saddle River, NJ: Prentice Hall.
Hair, J. F. (2019). *Multivariate Data Analysis* (8th ed.): Upper Saddle River, NJ : Prentice Hall.
Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Multivariate Data Analysis: International Version. In. NJ: Pearson.
Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. (2006). SEM: confirmatory factor analysis. In *Multivariate data analysis.* (pp. 770-842). NJ: Pearson Prentice Hall.
Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet.

Journal of Marketing Theory and Practice, 19(2), 139-152.
Hall, B. H., & Mairesse, J. (1995). Exploring the Relationship between R&D and Productivity in French Manufacturing Firms. *Journal of Econometrics, 65*(1), 263-293.
Hall, D. T., & Fenton, N. (1997). Implementing Effective Software Metrics Programs. *Software, IEEE, 14*(2), 55-65. doi:10.1109/52.582975
Hall, D. T., & Mansfield, R. (1975). Relationships of Age and Seniority with Career Variables of Engineers and Scientists. *Journal of Applied Psychology, 60*(2), 201.
Hammer, M. (1990). Reengineering Work: Don't Automate, Obliterate. *Harvard business review, 68*(4), 104-112.
Hammer, M., & Champy, J. (2009). *Reengineering the Corporation: A Manifesto for Business Revolution*. NY: Collins Business Essentials
Harrison, D. A., Mykytyn, P. P., & and Riemenschneider, C. K. (1997). Executive Decisions About Adoption of Information Technology in Small Business: Theory and Empirical Tests. *Information systems research, 8*(2), 171-195. doi:10.1287/isre.8.2.171
Haskell, W. L., Lee, I.-M., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A., . . . Bauman, A. (2007). Physical Activity and Public Health: Updated Recommendation for Adults from the American College of Sports Medicine and the American Heart Association. *Circulation, 116*(9), 1081.
Hattie, J. (1985). Methodology Review: Assessing Unidimensionality of Tests and ltenls. *Applied Ppsychological Measurement, 9*(2), 139-164.
Helson, R., & Moane, G. (1987). Personality Change in Women from College to Midlife. *Journal of Personality Social Psychology, 53*(1), 176.
Hermann, M., Pentek, T., & Otto, B. (2016). *Design principles for industrie 4.0 scenarios.* Paper presented at the System Sciences (HICSS), 2016 49th Hawaii International Conference
Hernández, B., Jiménez, J., & Martín, M. J. (2008). Extending the Technology Acceptance Model to Include the IT Decision-maker: A Study of Business Management Software. *Technovation, 28*(3), 112-121. doi:10.1016/j.technovation.2007.11.002
Herrera, L., & Sanchez-Gonzalez, G. (2013). Firm Size and Innovation Policy. *International Small Business Journal, 31*(2), 137-155.
Hewison, K. (2008). Thailand Human Development Report. Sufficiency Economy and Human Development. *Journal of Contemporary Asia, 38*(1), 212-215.
Higgins, C. A., Thompson, R. L., & Howell, J. M. (1991). Personal Computing: Toward a Conceptual Model of Utilization. *MIS Quarterly, 15*(1), 125-143.
Hitt, L. M., Wu, D. J., & Xiaoge, Z. (2002). Investment in Enterprise Resource Planning: Business Impact and Productivity Measures. *Journal of Management Information Systems, 19*(1), 71-98.
Hlupic, V., & Robinson, S. (1998). Business Process Modelling and Analysis Using Discrete-event Simulation. *Proceedings of the 30th Conference on Winter Simulation*, 1363-1370.
Holzmüller, H. H., & Schlüchter, J. (2002). Delphi Study About the Future of B2B Marketplaces in Germany. *Electronic Commerce Research and Applications, 1*(1), 2-19.

Hong, K.-K., & Kim, Y.-G. (2002). The critical Success Factors for ERP Implementation: An Organizational Fit perspective. *Information & Management, 40*(1), 25-40.

Hong, S., & Ho, H.-Z. (2005). Direct and Indirect Longitudinal Effects of Parental Involvement on Student Achievement: Second-Order Latent Growth Modeling Across Ethnic Groups. *Journal of Educational Psychology, 97*(1), 32.

Hottenrott, H., & Lopes-Bento, C. (2014). (International) R&D Collaboration and SMEs: The Effectiveness of Targeted Public R&D Support Schemes. *Research Policy, 43*(6), 1055-1066.

Hsu, L.-L., Lai, R. S. Q., & Weng, Y.-T. (2008). Understanding the Critical Factors Effect User Satisfaction and Impact of ERP through Innovation of Diffusion Theory. *International Journal of Technology Management, 43*(1-3).

Hu, L.-T., & Bentler, P. M. (1995). Evaluating Model Fit. In *Structural Equation Modeling: Concepts, Issues, and Applications.* (pp. 76-99). Thousand Oaks, CA, US: Sage Publications.

Hu, L.-T., & Bentler, P. M. (1999). Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1-55.

Hu, Q., Liang, H., Saraf, N., & Xue, Y. (2007). Assimilation of Enterprise Systems: the Effect of Institutional Pressures and the Mediating Role of Top Management. *MIS Quarterly, 31*(1), 59-87.

Huang, G.-B., Zhu, Q.-Y., & Siew, C.-K. (2006). Extreme Learning Machine: Theory and Applications. *Neurocomputing, 70*(1-3), 489-501.

Hulin, C., Netemeyer, R., & Cudeck, R. (2001). Can a Reliability Coefficient be Too High? *Journal of Consumer Psychology, 10*(1/2), 55-58.

Hung, S.-Y., Chang, C.-M., & Yu, T.-J. (2006). Determinants of User Acceptance of the E-Government Services: The Case of Online Tax Filing and Payment System. *Government Information Quarterly, 23*(1), 97-122. doi:10.1016/j.giq.2005.11.005

Hussinger, K. (2008). R&D and Subsidies at the Firm level: An Application of Parametric and Semiparametric Two-step Selection Models. *Journal of Applied Econometrics, 23*(6), 729-747.

Ifinedo, P. (2008). Impacts of Business Vision, Top Management Support, and External Expertise on ERP Success. *Business Process Management Journal, 14*(4), 551-568. doi:10.1108/14637150810888073

Igbaria, M. (1993). User Acceptance of Microcomputer Technology: An Empirical Test. *Omega, 21*(1), 73-90.

Irani, Z., Hlupic, V., Baldwin, L. P., & Love, P. E. (2000). Re-engineering Manufacturing Processes through Simulation Modelling. *Logistics Information Management, 13*(1), 7-13.

Jacobs, F. R., & Whybark, D. C. (2000). *Why ERP? A primer on SAP Implementation* (Vol. 31). NY: McGraw-Hill Higher Education.

Jarvenpaa, S. L., Tractinsky, N., & Saarinen, L. (1999). Consumer Trust in an Internet Store: A Cross-cultural Validation. *Journal of Computer-Mediated Communication, 5*(2), 80-88.

Jedeskog, G., & Nissen, J. (2004). ICT in the Classroom: Is Doing More Important than Knowing? *Education and Information Technologies, 9*(1), 37-45.

doi:10.1023/B:EAIT.0000024260.17501.e6
Jin Hyeung, K., Jung Rock, D., & Young Chan, C. (2015). A Study of Success and Failure in ERP Implementation : The Case of the Agricultural Products Processing Center. *International Journal of u- and e- Service, Science and Technology, 8*(7), 183-194. doi:10.14257/ijunesst.2015.8.7.18
Johansson, H., McHugh, P., Pendlebury, J., & Wheeler, W. (1993). *Business Process Reengineering : Breakpoint Strategies for Market Dominance*. Chichester: Wiley.
Jones, D. C., Kalmi, P., & Kauhanen, A. (2011). Firm and Employee Effects of an Enterprise Information System: Micro-Econometric Evidence. *International Journal of Production Economics, 130*(2), 159-168.
Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: Structural Equation Modeling with the SIMPLIS Command Language*. IL: Scientific Software International.
Kafura, D., & Reddy, G. R. (1987). The Use of Software Complexity Metrics in Software Maintenance. *Software Engineering, IEEE Transactions on, SE-13*(3), 335-343. doi:10.1109/TSE.1987.233164
Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika, 39*(1), 31-36.
Kang, K.-N., & Park, H. (2012). Influence of Government R&D Support and Inter-firm Collaborations on Innovation in Korean Biotechnology SMEs. *Technovation, 32*(1), 68-78.
Kaplan, D. (2000). *Structural equation modeling : foundations and extensions*. CA: Sage.
Kasem, S., & Thapa, G. B. (2012). Sustainable Development Policies and Achievements in the Context of the Agriculture Sector in Thailand. *Sustainable Development, 20*(2), 98-114. doi:10.1002/sd.467
Keong, C. C., Horani, S., & Daniel, J. (2005). A Study on the Use of ICT in Mathematics Teaching. *Malaysian Online Journal of Instructional Technology, 2*(3), 43-51.
Khandekar, A., & Sharma, A. (2005). Managing Human Resource Capabilities for Sustainable Competitive advantage: An Empirical Analysis from Indian Global Organisations. *Education+ Training, 47*(8/9), 628-639.
King, W. R., & He, J. (2006). A Meta-analysis of the Technology Acceptance Model. *Information & Management, 43*(6), 740-755.
Kirchmeyer, C. (2002). Gender Differences in Managerial Careers: Yesterday, Today, and Tomorrow. *Journal of Business Ethics, 37*(1), 5-24.
Kline, R. B. (2011). Principles and practice of structural equation modeling. In (3rd ed., pp. 11-12). NY: Guilford Press.
Koch, S. (2007). ERP Implementation Effort Estimation Using Data Envelopment Analysis. *Technologies for Business Information Systems*, 121-132.
Kozar, K. A., Lee, Y., & Larsen, K. R. (2003). The Technology Acceptance Model: Past, Present, and Future. *Communications of the Association for information systems, 12*(1), 50.
Kwateng, K. O., Atiemo, K. A. O., & Appiah, C. (2019). Acceptance and Use of Mobile Banking: An Application of UTAUT2. *Journal of Enterprise Information Management, 31*(1), 118-151. doi:10.1108/JEIM-03-2018-0055
Lach, S. (2002). Do R&D Subsidies Stimulate or Displace Private R&D? Evidence from Israel. *The Journal of Industrial Economics, 50*(4), 369-390.

Lach, S., & Schankerman, M. (2008). Incentives and Invention in Universities. *The RAND Journal of Economics, 39*(2), 403-433.

Lall, S. (1992). Technological Capabilities and Industrialization. *World Development, 20*(2), 165-186.

Laudon, K. C. (2010). *Management Information Systems : Managing the Digital Firm* (11th ed.). NJ: Pearson.

Lederer, A. L., Maupin, D. J., Sena, M. P., & Zhuang, Y. (2000). The Technology Acceptance Model and the World Wide Web. *Decision Support Systems, 29*(3), 269-282.

Lee, D. H., Lee, S. M., Olson, D. L., & Hwan Chung, S. (2010). The Effect of Organizational Support on ERP Implementation. *Industrial Management & Data Systems, 110*(2), 269-283.

Lee, M. K., & Turban, E. (2001). A Trust Model for Consumer Internet Shopping. *International Journal of electronic commerce, 6*(1), 75-91.

Lei, M., & Lomax, R. G. (2005). The Effect of Varying degrees of Nonnormality in Structural Equation Modeling. *Structural Equation Modeling, 12*(1), 1-27.

Levy, M. B., & Davis, K. E. (1988). Lovestyles and Attachment Styles Compared: Their Relations to Each Other and to Various Relationship Characteristics. *Journal of social Personal Relationships, 5*(4), 439-471.

Lewis, C. C., Fretwell, C. E., Ryan, J., & Parham, J. B. (2013). Faculty Use of Established and Emerging Technologies in Higher Education: A Unified Theory of Acceptance and Use of Technology Perspective. *International Journal of Higher Education, 2*(2), 22-34.

Lhuillery, S., & Pfister, E. (2009). R&D cooperation and failures in innovation projects: Empirical evidence from French CIS data. *Research Policy, 38*(1), 45-57.

Liaw, S.-S., Huang, H.-M., & Chen, G.-D. (2007). Surveying Instructor and Learner Attitudes toward E-Learning. *Computers & Education, 49*(4), 1066-1080.

Likert, R. (1932). A Technique for the Measurement of Attitudes. *Archives of Psychology, 22*(140), 55.

Limayem, M., & Cheung, C. (2007). How Habit Limits the Predictive Power of Intention: The Case of Information Systems Continuance. In (Vol. 31, pp. 705-737). Minneapolis: University of Minnesota, MIS Research Center.

Lin, J. C.-C., & Lu, H. (2000). Towards an Understanding of the Behavioural Intention to Use a Web Site. *International Journal of Information Management, 20*(3), 197-208.

Liu, P. L. (2011). Empirical Study on Influence of Critical Success Factors on ERP Knowledge Management on Management Performance in High-tech Industries in Taiwan. *Expert Systems With Applications, 38*(8), 10696-10704. doi:10.1016/j.eswa.2011.02.045

Lockett, A., & Thompson, S. (2001). The Resource-based View and Economics. *Journal of Management, 27*(6), 723-754. doi:10.1177/014920630102700608

Lubinski, D., Tellegen, A., & Butcher, J. (1983). Masculinity, Femininity, and Androgyny Viewed and Assessed as Distinct Concepts. *Journal of Personality Social Psychology, 44*(2), 428.

Lundvall, B.-Å. (2007). National Innovation Systems—Analytical Concept and Development Tool. *Industry and Innovation, 14*(1), 95-119.

Lundvall, B.-Å., & Borrás, S. (2005). Science, Technology and Innovation Policy. *The*

Oxford Handbook of Innovation, 599-631.
Luukkonen, T. (2000). Additionality of EU Framework Programmes. *Research Policy, 29*(6), 711-724.
Lynott, P. P., & McCandless, N. J. (2000). The Impact of Age vs. life Experience on the Gender Role Attitudes of Women in Different Cohorts. *Journal of Women Aging, 12*(1-2), 5-21.
Ma, Q., & Liu, L. (2004). The Technology Acceptance Model: A Meta-analysis of Empirical Findings. *Journal of Organizational and End User Computing (JOEUC), 16*(1), 59-72.
Mabert, V. A., Soni, A., & Venkataramanan, M. A. (2003). Enterprise Resource Planning: Managing the Implementation Process. *European Journal of Operational Research, 146*(2), 302-314. doi:10.1016/S0377-2217(02)00551-9
Mac Callum, K., & Jeffrey, L. (2014). Factors Impacting Teachers' Adoption of Mobile Learning. *Journal of Information Technology Education, 13*, 142-154.
Magni, M., Susan Taylor, M., & Venkatesh, V. (2010). 'To Play or Not to Play': A Cross-temporal Investigation Using Hedonic and Instrumental Perspectives to Explain User Intentions to Explore a Technology. *International Journal of Human - Computer Studies, 68*(9), 572-588. doi:10.1016/j.ijhcs.2010.03.004
Mahmood, M. A., Hall, L., & Swanberg, D. L. (2001). Factors Affecting Information Technology Usage: A Meta-analysis of the Empirical Literature. *Journal of organizational computing and electronic commerce, 11*(2), 107-130.
Malhotra, Y., & Galletta, D. F. (1999). *Extending the Technology Acceptance Model to Account for Social influence: Theoretical Bases and Empirical Validation.* Paper presented at the Systems sciences, 1999. HICSS-32. Proceedings of the 32nd annual Hawaii international conference.
Manganelli, R. L., & Klein, M. M. (1994). Your Reengineering Toolkit. *Management Review, 83*(8), 26.
Markus, M. L., Axline, S., Petrie, D., & Tanis, S. C. (2000). Learning from Adopters' Experiences with ERP: Problems Encountered and Success Achieved. *Journal of Information Technology, 15*(4), 245-265.
Marsh, H. W., & Grayson, D. (1995). Latent Variable Models of Multitrait-multimethod Data. In *Structural Equation Modeling: Concepts, Issues, and Applications.* (pp. 177-198). Thousand Oaks, CA: Sage Publications.
Marsh, H. W., Hau, K.-T., & Grayson, D. (2005). Goodness of Fit in Structural Equation Models. In *Contemporary psychometrics: A festschrift for Roderick P. McDonald.* (pp. 275-340). NJ: Lawrence Erlbaum Associates
Mathieson, K. (1991). Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior. *Information systems research, 2*(3), 173-191. doi:10.1287/isre.2.3.173
Mathieu, J. E., & Taylor, S. R. (2006). Clarifying Conditions and Decision Points for Mediational Type Inferences in Organizational Behavior. *Journal of Organizational Behavior: The International Journal of Industrial, OccupationalnOrganizational Psychology Behavior, 27*(8), 1031-1056.
Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An Integrative Model of Organizational Trust. *Academy of management review, 20*(3), 709-734.
McAfee, A. (2002). The Impact of Enterprise Information Technology Adoption on Operational Performance: an Empirical Investigation. *Production and*

Operations Management, 11(1), 33-53. doi:10.1111/j.1937-5956.2002.tb00183.x
McKnight, D. H., Choudhury, V., & Kacmar, C. (2002). Developing and Validating Trust Measures for E-commerce: An Integrative Typology. *Information systems research, 13*(3), 334-359.
Metcalfe, J. S. (1994). Evolutionary Economics and Technology Policy. *The Economic Journal, 104*(425), 931-944.
Miles, M. B. (2014). *Qualitative Data Analysis : A Methods Sourcebook* (3rd ed.). CA: SAGE Publications.
Møller, C. (2005). ERP II: a conceptual framework for next-generation enterprise systems? *Journal of Enterprise Information Management, 18*(4), 483-497.
Moore, G. C., & Benbasat, I. (1991). Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. *Information Systems Research, 2*(3), 192-222.
Moosbruker, J. B., & Loftin, R. D. (1998). Business Process Redesign and Organization Development: Enhancing Success by Removing the Barriers. *The Journal of Applied Behavioral Science, 34*(3), 286-304.
Motowidlo, S. J. (1982). Relationship between Self-rated Performance and Pay Satisfaction among Sales Representatives. *Journal of Applied Psychology, 67*(2), 209-213. doi:10.1037/0021-9010.67.2.209
Motwani, J., Mirchandani, D., Madan, M., & Gunasekaran, A. (2002). Successful implementation of ERP projects: evidence from two case studies. *International Journal of Production Economics, 75*(1-2), 83-96.
Mulaik, S. A., James, L. R., Van Alstine, J., Bennett, N., Lind, S., & Stilwell, C. D. (1989). Evaluation of Goodness-of-fit Indices for Structural Equation Models. *Psychological bulletin, 105*(3), 430.
Munnukka Minna. (2004). Service Bundling as Pricing Strategy for Mobile Services: Scandinavian Perspective. *Journal of Internet Banking and Commerce, 9*(2).
Muscatello, J. R., & Chen, I. J. (2008). Enterprise Resource Planning (ERP) Implementations: Theory and Practice. *International Journal of Enterprise Information Systems (IJEIS), 4*(1), 63-83. doi:10.4018/jeis.2008010105
Muscatello, J. R., Small, M. H., & Chen, I. J. (2003). Implementing Enterprise Resource Planning (ERP) Systems in Small and Midsize Manufacturing Firms. *International Journal of Operations & Production Management, 23*(8), 850-871.
Muthén, L. K., & Muthén, B. O. (2002). How to Use a Monte Carlo Study to Decide on Sample Size and Determine Power. *Structural Equation Modeling, 9*(4), 599-620.
Muthitacharoen, A., Palvia, P. C., Brooks, L. D., Krishnan, B. C., Otondo, R. F., & Retzlaff-Robert, D. (2006). Reexamining technology acceptance in online task behaviours. *Electronic Markets, 16*(1), 4-15.
Nah, F. F.-H., Islam, Z., & Tan, M. (2007). Empirical Assessment of Factors Influencing Success of Enterprise Resource Planning Implementations. *Journal of Database Management (JDM), 18*(4), 26-50.
Nelson, D. L., & Quick, J. C. (2006). *Organizational Behavior: Foundations, Realities, and Challenges*: Thomson/South-Western.
NESDB. (1961). The First National Economic and Social Development Plan (1961–1966). In. National Economic and Social Development Board (NESDB).Bangkok: Office of the Prime Minister.

NESDB. (1967). The Second National Economic and Social Development Plan (1967–1971). In. National Economic and Social Development Board (NESDB).Bangkok: Office of the Prime Minister.
NESDB. (1982). The Fifth National Economic and Social Development Plan (1982–1986). In. National Economic and Social Development Board (NESDB). Bangkok: Office of the Prime Minister.
NESDB. (2002). The Ninth National Economic and Social Development Plan (2002–2006). In. National Economic and Social Development Board (NESDB).Bangkok: Office of the Prime Minister.
NESDB. (2008). The Eleventh National Economic and Social Development Plan (2008–2016). In. National Economic and Social Development Board (NESDB).Bangkok: Office of the Prime Minister.
NESDB. (2016). The Twelfth National Economic and Social Development Plan (2016–2035). In. National Economic and Social Development Board (NESDB).Bangkok: Office of the Prime Minister.
Ngai, E. W. T., Law, C. C. H., & Wat, F. K. T. (2008). Examining the Critical Success Factors in the Adoption of Enterprise Resource Planning. *Computers in Industry, 59*(6), 548-564. doi:10.1016/j.compind.2007.12.001
NSO(1). (2016). Averaged National Income ,National Statistic Office. Retrieved from http://www.nso.go.th/
NSO(2). (2016). Access to Electronic Devices ,National Statistic Office. Retrieved from http://www.nso.go.th/
Nwankpa, J., & Roumani, Y. (2014). Understanding the Link Between Organizational Learning Capability and ERP System Usage: An Empirical Examination. *Computers in Human Behavior, 33*, 224-234.
O'Leary-Kelly, S. W., & Vokurka, R. J. (1998). The empirical assessment of construct validity. *Journal of operations management, 16*(4), 387-405.
O'Leary, D. E. (2000). *Enterprise resource planning systems: systems, life cycle, electronic commerce, and risk*: Cambridge university press.
OAE. (2017). Office of Agriculture Economics. http://aginfo.oae.go.th/ewtnews/secondrice.html
OECD. (1998). *The Stimulation Effect of Government Support to Private R&D.* . Paper presented at the Group of National Experts on Science and Technology Indicators, Paris.
Ogunleye, L., Oyejola, B., & Obisesan, K. (2018). Comparison of some common tests for normality. *Int. J. Probab. Stat, 7*, 130-137.
Ong, C.-S., & Lai, J.-Y. (2006). Gender Differences in Perceptions and Relationships among Dominants of E-learning Acceptance. *Computers in Human Behavior, 22*(5), 816-829.
OTA. (1995). *The Effectiveness of Research and Experimentation Tax Credits*. Paper presented at the The Effectiveness of Research and Experimentation Tax Credits, Washington, D. C.
Pan, M.-J., & Jang, W.-Y. (2008). Determinants of the Adoption of Enterprise Resource Planning within the Technology-organization-environment Framework: Taiwan's Communications Industry. *Journal of Computer information systems, 48*(3), 94-102.
Park, S. (2015). Evaluating the Efficiency and Productivity Change within Government

Subsidy Recipients of a National Technology Innovation Research and Development Program. *R&D Management, 45*(5), 549-568.
Paul, R. J., Giaglis, G. M., & Hlupic, V. (1999). Simulation of Business Processes. *American Behavioral Scientist, 42*(10), 1551-1576.
Pavitt, K. (1990). What We Know About the Strategic Management of Technology. *California Management Review, 32*(3), 17-26.
Pedhazur, E. J., & Schmelkin, L. P. (2013). *Measurement, Design, and Analysis: An Integrated Approach*. NY: Psychology Press.
Penrod, J., Preston, D. B., Cain, R. E., & Starks, M. T. (2003). A Discussion of Chain Referral as a Method of Sampling Hard-to-reach Populations. *Journal Of Transcultural Nursing: Official Journal Of The Transcultural Nursing Society, 14*(2), 100-107.
Pereira, R. (1999). Resource View Theory Analysis of SAP as a Source of Competitive Advantage for Firms. *Database for Advances in Information Systems, 30*(1), 38-46.
Pfeffer, J. (1982). *Organizations and Organization Theory*: Pitman Boston.
Pfleeger, S. (1993). Lessons Learned in Building a Corporate Metrics Program. *IEEE Software, 10*(3), 67-74. doi:10.1109/52.210606
Pituch, K. A., & Lee, Y.-k. (2006). The Influence of System Characteristics on E-learning Use. *Computers & Education, 47*(2), 222-244.
Plude, D. J., & Hoyer, W. J. (1986). Age and the Selectivity of Visual Information Processing. *Psychology and Aging, 1*(1), 4.
Poapongsakorn, N., Anuchitworawong, C., & Mathrsuraruk, S. (2006). The Decline and Recovery of Thai Agriculture: Causes, Responses, Prospects and Challenges [Press release]. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=edsagr&AN=edsagr.XF2007429679&authtype=ip,cookie,uid
Pollux, P. M. J., Hall, S. S., Roebuck, H., & Guo, K. (2013). ERP Evidence for Human Early Visual Sensitivity to Co-linearity Compared to Co-circularity. *Neuroscience Letters, 556*, 46.
Porter, M. E. (1991). Towards a Dynamic Theory of Strategy. *Strategic management journal, 12*(S2), 95-117.
Quiescenti, M., Bruccoleri, M., La Commare, U., Noto La Diega, S., & Perrone, G. (2006). Business Process-oriented Design of Enterprise Resource Planning (ERP) Systems for Small and Medium Enterprises. *International Journal of Production Research, 44*(18-19), 3797-3811.
Radas, S., Anić, I.-D., Tafro, A., & Wagner, V. (2015). The Effects of Public Support Schemes on Small and Medium Enterprises. *Technovation, 38*, 15-30.
Radner, R., & Rothschild, M. (1975). On the Allocation of Effort. *Journal of Economic Theory, 10*(3), 358-376.
Ragu-Nathan, B. S., Apigian, C. H., Ragu-Nathan, T., & Tu, Q. (2004). A Path Analytic Study of the Effect of Top Management Support for Information Systems Performance. *Omega, 32*(6), 459-471.
Rahat, B. H. (2005). The Relationship between System Usage and User Satisfaction: A Meta-analysis. *Journal of Enterprise Information Management, 18*(2). doi:10.1108/17410390510579927
Rajan, C. A., & Baral, R. (2015). Adoption of ERP System: An Empirical Study of

Factors Influencing the Usage of ERP and Its Impact on End User. *IIMB Management Review, 27*(2), 105-117.

Ram, J., & Corkindale, D. (2014). How "Critical" Are the Critical Cuccess Factors (CSFs)? Examining the role of CSFs for ERP. *Business Process Management Journal, 20*(1), 151-174.

Ram, J., Wu, M.-L., & Tagg, R. (2014). Competitive Advantage from ERP Projects: Examining the Role of Key Implementation Drivers. *International Journal of Project Management, 32*(4), 663-675.

Ramayah, T. K., Mei Ling, Kurnia, S., & Chiun, L. M. (2012). Explaining Intention to Use an Enterprise Resource Planning (ERP) System: An Extension of the UTAUT model. *Business Strategy Series, 13*(4), 173-180. doi:10.1108/17515631211246249

Ramirez, R., Melville, N., & Lawler, E. (2010). Information Technology Infrastructure, Organizational Process Redesign, and Business value: An Empirical Analysis. *Decision Support Systems, 49*(4), 417-429.

Raykov, T. (2001). Estimation of Congeneric Scale Reliability Using Covariance Structure Analysis with Nonlinear Constraints. *British Journal of Mathematical and Statistical Psychology, 54*(2), 315-323.

Raykov, T., & Marcoulides, G. A. (2006). On Multilevel Model Reliability Estimation from the Perspective of Structural Equation Modeling. *Structural Equation Modeling, 13*(1), 130-141.

Rea, L. M., Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (1997). *Designing and Conducting Survey Research : A Comprehensive Guide*. CA: Jossey-Bass.

Reichardt, C. S., & Coleman, S. (1995). The Criteria for Convergent and Discriminant Validity in a Multitrait-multimethod Matrix. *Multivariate Behavioral Research, 30*(4), 513-538.

Rettig, C. (2007). The trouble with enterprise software. *MIT Sloan management review, 49*(1), 21.

Robey, D., & Farrow, D. (1982). User Involvement in Information System Development: A Conflict Model and Empirical Test. *Management Science, 28*(1), 73-85.

Robey, D., Ross, J. W., & Boudreau, M.-C. (2002). Learning to Implement Enterprise Systems: An Exploratory Study of the Dialectics of Change. *Journal of Management Information Systems, 19*(1), 17-46.

Robinson, B., & Wilson, F. (2001). Planning for the Market? Enterprise Resource Planning Systems and the Contradictions of Capital. *ACM SIGMIS Database: the DATABASE for Advances in Information Systems, 32*(4), 21-33.

Rogers, E. M. (1995). Diffusion of Innovations: Modifications of a Model for Telecommunications. In M.-W. Stoetzer & A. Mahler (Eds.), *Die Diffusion von Innovationen in der Telekommunikation* (pp. 25-38). Berlin, Heidelberg: Springer Berlin Heidelberg.

Rogers, E. M. (2003). *Diffusion of Innovations* (5th ed.. ed.). New York: New York : Free Press.

Rogers, E. M. (2010). *Diffusion of Innovations*: Simon and Schuster.

Romijn, H., & Albaladejo, M. (2002). Determinants of Innovation Capability in Small Electronics and Software Firms in Southeast England. *Research Policy, 31*(7),

1053-1067.
Ruivo, P., Oliveira, T., & Neto, M. (2014). Examine ERP Post-implementation Stages of Use and Value: Empirical Evidence from Portuguese SMEs. *International Journal of Accounting Information Systems, 15*(2), 166-184.
Sánchez, R. A., & Hueros, A. D. (2010). Motivational Factors that Influence the Acceptance of Moodle Using TAM. *Computers in Human Behavior, 26*(6), 1632-1640.
Sathirathai S, & Pioolsravut, P. (2004). *Sufficiency Economy and a Healthy Community*. Paper presented at the Proceedings of the Third IUCN World Conservation Congress, Bagkok. http://www.sufficiencyeconomy.org/en/files/17.pdf
Schein, E. H. (1965). *Organizational Psychology.* Paper presented at the Conference on Advances in Management,, MA.
Schein, E. H. (2010). *Organizational Culture and Leadership : Jossey-Bass Business and Management Series*.
Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the Fit of Structural Equation Models: Tests of Significance and Descriptive Goodness-of-fit Measures. *Methods of Psychological Research Online, 8*(2), 23-74.
Schumacker, R. E., & Lomax, R. G. (1996). *A Beginner's Guide to Structural Equation Modeling*. Hillsdale, NJ: Lawrence Erlbaum Associates.
Scott, J., & Kaindl, L. (2000). Enhancing Functionality in an Enterprise Software Package. *Information & Management, 37*, 111-122. doi:10.1016/S0378-7206(99)00040-3
Sears, A., & Shneiderman, B. (1991). High Precision Touchscreens: Design Strategies and Comparisons with a Mouse. *International Journal of Man-Machine Studies, 34*(4), 593-613.
Seymour, L., Makanya, W., & Berrangé, S. (2007). *End-users' Aacceptance of Enterprise Resource Planning Systems: An Investigation of Antecedents.* Paper presented at the Proceedings of the 6th annual ISOnEworld conference.
Shang, S., & Seddon, P. B. (2007). Managing Process Deficiencies with Enterprise Systems. *Business Process Management Journal, 13*(3), 405-416.
Shatat, A. (2015). Critical Success Factors in Enterprise Resource Planning (ERP) System Implementation: An Exploratory Study in Oman. *Electronic Journal of Information Systems Evaluation, 18*(1), 36-45.
Soh, C., Kien, S., & Tay-Yap, J. (2000). Enterprise Resource Planning: Cultural Fits and Misfits: is ERP a Universal Solution? *Communications of the ACM, 43*(4), 47-51. doi:10.1145/332051.332070
Somers, T. M., & Nelson, K. (2001). *The Impact of Critical Success Factors across the Stages of Enterprise Resource Planning Implementations.* Paper presented at the System Sciences, 2001. Proceedings of the 34th Annual Hawaii International Conference
Sørensen, C. G., Fountas, S., Nash, E., Pesonen, L., Bochtis, D., Pedersen, S. M., & Blackmore, S. (2010). Conceptual Model of a Future Farm Management Information System. *Computers and Electronics in Agriculture, 72*(1), 37-47.
Souitaris, V. (2002). Technological Trajectories as Moderators of Firm-level Determinants of Innovation. *Research Policy, 31*(6), 877-898.
Stockdale, R., & Standing, C. (2004). Benefits and Barriers of Electronic Marketplace Participation: An SME Perspective. *Journal of Enterprise Information*

Management, 17(4), 301-311.
Stratman, J. K., & Roth, A. V. (2002). Enterprise resource planning (ERP) Competence Constructs: Two-stage Multi-item Scale Development and Validation. *Decision Sciences, 33*(4), 601-628.
ŠUmak, B., HeričKo, M., & PušNik, M. (2011). A Meta-analysis of E-learning Technology Acceptance: The Role of User Types and E-learning Technology types. *Computers in Human Behavior, 27*(6), 2067-2077.
Sun, Y., Bhattacherjee, A., & Ma, Q. (2009). Extending Technology Usage to Work Settings: The Role of Perceived Work Compatibility in ERP Implementation. *Information & Management, 46*, 351-356. doi:10.1016/j.im.2009.06.003
Szajna, B. (1996). Empirical evaluation of the revised technology acceptance model. *Management Science, 42*(1), 85-92.
Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2007). *Using Multivariate Statistics* (Vol. 5). MA: Pearson Boston.
Tanaka, J. S., & Huba, G. J. (1984). Confirmatory Hierarchical Factor Analyses of Psychological Distress Measures. *Journal of Personality and Social Psychology, 46*(3), 621.
Tao, Y.-H., Cheng, C.-J., & Sun, S.-Y. (2009). What Influences College Students to Continue Using Business Simulation Games? The Taiwan Experience. *Computers Education and Information Technologies, 53*(3), 929-939.
Taylor, S., & Todd, P. A. (1995). Assessing IT Usage: The Role of Prior Experience. (Information Technology). *MIS Quarterly, 19*(4), 561. doi:10.2307/249633
Taylor, S., & Todd, P. A. (1995). Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research, 6*(2), 144-176. doi:10.1287/isre.6.2.144
Tharenou, P., Saks, A. M., & Moore, C. (2007). A review and Critique of Research on Training and Organizational-level Outcomes. *Human Resource Management Review, 17*(3), 251-273.
Thode, H. C. (2002). *Testing for normality* (Vol. 164): CRC press.
Thompson, R., Higgins, C., & Howell, J. (1991). Personal Computing: Toward a Conceptual Model of Utilization. *MIS Quarterly, 15*(1), 125.
Thong, J. Y., Yap, C.-S., & Raman, K. (1996). Top management support, external expertise and information systems implementation in small businesses. *Information systems research, 7*(2), 248-267.
Tibshirani, R. J., & Efron, B. (1993). An Introduction to the Bootstrap. *Monographs on Statistics and Applied Probability, 57*, 1-436.
Toh Tsu, W., Govindan, M., Alain Yee-Loong, C., Keng-Boon, O., & Seetharam, A. (2009). What Drives Malaysian M-commerce Adoption? An Empirical Analysis. *Industrial Management & Data Systems, 109*(3), 370-388. doi:10.1108/02635570910939399
Triandis, H. C. (1977). *Interpersonal Behavior* CA: Brooks/Cole.
Tucker, L. R., & Lewis, C. (1973). A Reliability Coefficient for Maximum Likelihood Factor Analysis. *Psychometrika, 38*(1), 1-10. doi:10.1007/BF02291170
Tumay, K. (1995). *Business Process Simulation.* Paper presented at the Simulation Conference Proceedings, VA.
Urbach, N., Smolnik, S., & Riempp, G. (2010). An empirical investigation of employee portal success. *The Journal of Strategic Information Systems, 19*(3), 184-206.

Velcu, O. (2010). Strategic Alignment of ERP Implementation Stages: An Empirical Investigation. *Information & Management, 47*(3), 158-166.

Venkatesh, V. (2000). Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model. *Information systems research, 11*(4), 342-365.

Venkatesh, V., & Davis, F. D. (1994). Modeling the Determinants of Perceived Ease of Use. *ICIS Proceedings*, 17.

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science, 46*(2), 186-204. doi:10.1287/mnsc.46.2.186.11926

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science, 46*(2), 186-204.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). USER ACCEPTANCE OF INFORMATION TECHNOLOGY: TOWARD A UNIFIED VIEW. *MIS Quarterly, 27*(3), 425-478.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. *MIS Quarterly, 36*(1), 157.

Verdouw, C. N., Robbemond, R. M., & Wolfert, J. (2015). ERP in Agriculture: Lessons Learned from the Dutch Horticulture. *Computers and Electronics in Agriculture, 114*, 125-133. doi:10.1016/j.compag.2015.04.002

Vroom, V. H. (1964). Work and Motivation. In *Work and Motivation*. NY: John Wiley &Sons.

Wallace, L. G., & Sheetz, S. D. (2014). The Adoption of Software Measures: A Technology Acceptance Model (TAM) Perspective. *Information & Management, 51*(2), 249-259. doi:10.1016/j.im.2013.12.003

Wallsten, S. (2000). The Effects of Government-Industry R&D Programs on Private R&D: The Case of the Small Business Innovation Research Program. *RAND Journal of Economics, 31*, 82-100. doi:10.2307/2601030

Wang, E. T., & Chen, J. H. (2006). Effects of Internal support and Consultant Quality on the Consulting Process and ERP System Quality. *Decision Support Systems, 42*(2), 1029-1041.

Wanzenböck, I., Scherngell, T., & Fischer, M. M. (2013). How Do Firm Characteristics Affect Behavioural Additionalities of Public R&D Subsidies? Evidence for the Austrian Transport Sector. *Technovation, 33*(2-3), 66-77.

Watson, G. (2006). Technology Professional Development: Long-term Effects on Teacher Self-efficacy. *Journal of Technology Teacher Education, 14*(1), 151-166.

White, B. (2015). World Development Report 2015: mind, society, and Behavior, by the World Bank Group. *Canadian Journal of Development Studies / Revue canadienne d'études du développement, 36*(4), 581-584. doi:10.1080/02255189.2015.1102719

Whitely, S. E. (1983). Construct validity: Construct Representation Versus Nomothetic Span. *Psychological bulletin, 93*(1), 179.

Widaman, K. F. (1985). Hierarchically Nested Covariance Structure Models for Multitrait-multimethod Data. *Applied Psychological Measurement, 9*(1), 1-26.

William, D., Kent, M., & Dhruv, G. (1991). Effects of Price, Brand, and Store Information on Buyers' Product Evaluations. *JMR, Journal of Marketing Research, 28*(3), 307. doi:10.2307/3172866

Wolfert, J., Verdouw, C., Verloop, C., & Beulens, A. (2010). Organizing Information Integration in Agri-food—A method Based on a Service-oriented Architecture and Living Lab Approach. *Computers and Electronics in Agriculture, 70*(2), 389-405.

Wong, P. T., Kettlewell, G., & Sproule, C. (1985). On the Importance of Being Masculine: Sex Role, Attribution, and Women's Career Achievement. *Sex Roles, 12*(7), 757-769.

Wozney, L., Venkatesh, V., & Abrami, P. (2006). Implementing Computer Technologies: Teachers' Perceptions and Practices. *Journal of technology and teacher education, 14*(1), 173-207.

Yamane, T. (1967). *Elementary Sampling Theory*. Englewood Cliffs, N.J.: Prentice-Hall.

Yang, K. (2010). Determinants of US Consumer Mobile Shopping Services Adoption : Implications for Designing Mobile Shopping Services. *The Journal of Consumer Marketing, 27*(2), 262-270.

Yi, M. Y., Jackson, J. D., Park, J. S., & Probst, J. C. (2006). Understanding Information Technology Acceptance by Individual Professionals: Toward an Integrative View. *Information & Management, 43*, 350-363. doi:10.1016/j.im.2005.08.006

Youngberg, E., Olsen, D., & Hauser, K. (2009). Determinants of Professionally Autonomous End User Acceptance in an Enterprise Resource Planning System Environment. *International Journal of Information Management, 29*(2), 138-144.

Yousafzai, S. Y., Foxall, G. R., & Pallister, J. G. (2007). Technology Acceptance: A Meta-analysis of the TAM: Part 1. *Journal of Modelling in Management, 2*(3), 251-280.

Yu, C.-S., & Tao, Y.-H. (2009). Understanding Business-level Innovation Technology Adoption. *Technovation, 29*(2), 92-109. doi:10.1016/j.technovation.2008.07.007

Yu, Y., Dong, X.-Y., Shen, K. N., Khalifa, M., & Hao, J.-X. (2013). Strategies, technologies, and organizational learning for developing organizational innovativeness in emerging economies. *Journal of Business Research, 66*(12), 2507. doi:10.1016/j.jbusres.2013.05.042

Yusuf, Y., Gunasekaran, A., & Abthorpe, M. S. (2004). Enterprise Information Systems Project Implementation:: A Case Study of ERP in Rolls-Royce. *International Journal of Production Economics, 87*(3), 251-266.

Zain, M., Rose, R. C., Abdullah, I., & Masrom, M. (2005). The Relationship between Information Technology Acceptance and Organizational Agility in Malaysia. *Information & Management, 42*(6), 829-839.

Zhang, L., Lee, M. K., Zhang, Z., & Banerjee, P. (2003). *Critical Success Factors of Enterprise Resource Planning Systems Implementation Success in China*. Paper presented at the Proceedings of the 36th Annual Hawaii International Conference on System Sciences (HICSS'03) - Track 8 - Volume 8, HI.

APPENDICES

Appendix A

Normality Test

Normality Test: GOV

	GOV1	GOV2	GOV3	GOV4
Samples	205	205	205	205
Missing samples	0	0	0	0
Mean	4.16	3.67	3.75	3.84
Median	4.00	4.00	4.00	4.00
Mode	5	4	4	4
Std. Deviation	.983	.964	1.015	.905
Variance	.966	.929	1.031	.819
Skewness	*-.501*	*-.486*	*-.504*	*-.529*
Std. Error of Skewness	.170	.170	.170	.170
Kurtosis	*.234*	*.209*	*.185*	*.808*
Std. Error of Kurtosis	.338	.338	.338	.338
Minimum	1	1	1	1
Maximum	5	5	5	5

*Three times Std. Error of Skewness is 0.51

**Three times Std. Error of Kurtosis is 1.04

Normality Test: TRA

	TRA1	TRA2	TRA3
Samples	205	205	205
Missing samples	0	0	0
Mean	3.95	3.93	3.92
Median	4.00	4.00	4.00
Mode	4	4	4
Std. Deviation	.919	.828	.899
Variance	.845	.686	.808
Skewness	*-.504*	*-.490*	*-.475*
Std. Error of Skewness	.170	.170	.170
Kurtosis	*1.072*	*.047*	*.530*
Std. Error of Kurtosis	.338	.338	.338
Minimum	1	1	1
Maximum	5	5	5

*Three times Std. Error of Skewness is 0.51

**Three times Std. Error of Kurtosis is 1.04

Normality Test: BPR

	BPR1	BPR2	BPR3
Samples	205	205	205
Missing samples	0	0	0
Mean	3.60	3.86	3.59
Median	4.00	4.00	4.00
Mode	4	4	4
Std. Deviation	.889	.921	.964
Variance	.790	.848	.930
Skewness	-.*306*	-.*481*	-.*475*
Std. Error of Skewness	.170	.170	.170
Kurtosis	-.*227*	.*600*	.*528*
Std. Error of Kurtosis	.338	.338	.338
Minimum	1	1	1
Maximum	5	5	5

*Three times Std. Error of Skewness is 0.51

**Three times Std. Error of Kurtosis is 1.04

Normality Test: PEOU

	PEOU1	PEOU2	PEOU3	PEOU4
Samples	205	205	205	205
Missing samples	0	0	0	0
Mean	3.72	3.80	3.87	2.85
Median	4.00	4.00	4.00	3.00
Mode	4	4	4	3
Std. Deviation	.932	.989	.936	1.176
Variance	.868	.977	.876	1.384
Skewness	-.482	-.508	-.413	.024
Std. Error of Skewness	.170	.170	.170	.170
Kurtosis	-.247	.125	.068	-.765
Std. Error of Kurtosis	.338	.338	.338	.338
Minimum	1	1	1	1
Maximum	5	5	5	5

*Three times Std. Error of Skewness is 0.51
**Three times Std. Error of Kurtosis is 1.04

Normality Test: PU

	PU1	PU2	PU3	PU4
Samples	205	205	205	205
Missing samples	0	0	0	0
Mean	3.52	4.03	4.20	3.96
Median	4.00	4.00	4.00	4.00
Mode	4	4	4	4
Std. Deviation	.973	.915	.735	.962
Variance	.947	.837	.540	.925
Skewness	-.387	-.512	-.473	-.514
Std. Error of Skewness	.170	.170	.170	.170
Kurtosis	-.138	1.548	1.055	.723
Std. Error of Kurtosis	.338	.338	.338	.338
Minimum	1	1	1	1
Maximum	5	5	5	5

*Three times Std. Error of Skewness is 0.51
**Three times Std. Error of Kurtosis is 1.04

Normality Test: INT

	INT_1	INT_2	INT_3
Samples	205	205	205
Missing samples	0	0	0
Mean	3.87	3.88	3.79
Median	4.00	4.00	4.00
Mode	4	4	4
Std. Deviation	.836	.779	.891
Variance	.700	.608	.794
Skewness	-.369	-.461	-.508
Std. Error of Skewness	.170	.170	.170
Kurtosis	.443	1.072	.470
Std. Error of Kurtosis	.338	.338	.338
Minimum	1	1	1
Maximum	5	5	5

*Three times Std. Error of Skewness is 0.51
**Three times Std. Error of Kurtosis is 1.04

Appendix B

Additional Explanation of Results

Cronbach's Alpha and Factor loading

Constructs	Items	Factor loading						α
Government Support (GOV)	GOV1	0.691						0.798
	GOV2	0.622						
	GOV3	0.766						
	GOV4	0.827						
Training (TRA)	TRA1		0.892					0.812
	TRA2		0.807					
	TRA3		0.506					
Business Process Re-Engineering (BPR)	BPR1			0.397				0.762
	BPR2			0.694				
	BPR3			0.917				
Perceived Ease of Use (PEOU)	PEOU1				0.482			0.698
	PEOU2				0.463			
	PEOU3				0.574			
	PEOU4				0.596			
Perceived Usefulness (PU)	PU1					0.553		0.716
	PU2					0.694		
	PU3					0.575		
Intention to Use (IU)	IU1						0.607	0.772
	IU2						0.853	
	IU3						0.743	

Confirmatory Factor Analysis Results of The Proposed Model with PEOU Included

	X^2/Df	Significant	GFI	AGFI	RMR	CFI	TLI	RMSEA
Acceptable criteria	< 3	p > 0.05	≥ 0.95	≥ 0.90	< 0.05	≥ 0.90	≥ 0.90	<0.08
Proposed model	*2.9736**	***0.0182***	*0.98**	***0.8948***	*0.0084**	*0.9924**	*0.9713**	***0.0984***

Summary of Convergent Validity and Reliability Test with PEOU Included

Construct	Item Lebel	Factor Loading	α	Average Variance Extracted (AVE)	Composite Reliability (CR)
Government support (GOV)	GOV1	0.827	0.798	0.534	0.819
	GOV2	0.766			
	GOV3	0.691			
	GOV4	0.622			
Training (TRA)	TRA1	0.892	0.812	0.568	0.790
	TRA2	0.807			
	TRA3	0.506			
Business Process Re-engineering (BPR)	BPR1	0.397	0.762	***0.494***	0.727
	BPR2	0.694			
	BPR3	0.917			
Perceived Ease of Use (PEOU)	PEOU1	0.482	0.698	***0.283***	***0.609***
	PEOU2	0.463			
	PEOU3	0.574			
	PEOU4	0.596			
Perceived Usefulness (PU)	PU1	0.553	0.716	***0.373***	***0.638***
	PU2	0.694			
	PU3	0.575			
Intention to Use (IU)	IU1	0.607	0.772	0.549	0.782
	IU2	0.853			
	IU3	0.743			

Summary of Convergent Validity and Reliability Test After Remove PEOU

Construct	Item Lebel	Factor Loading	α	Average Variance Extracted (AVE)	Composite Reliability (CR)
Government support (GOV)	GOV1	0.825	0.798	0.526	0.815
	GOV2	0.757			
	GOV3	0.685			
	GOV4	0.617			
Training (TRA)	TRA1	0.925	0.812	0.586	0.802
	TRA2	0.797			
	TRA3	0.518			
Business Process Re-Engineering (BPR)	BPR1	0.337	0.762	0.514	0.731
	BPR2	0.654			
	BPR3	1			
Perceived Usefulness (PU)	PU1	0.626	0.716	***0.4985***	0.742
	PU2	0.879			
	PU3	0.575			
Intention to Use (IU)	IU1	0.607	0.772	0.549	0.782
	IU2	0.853			
	IU3	0.743			

Appendix C

Survey Questionnaires

Survey Questionnaire: ***Success Factors toward Adaptation of Technology for the Enterprise Resource Planning in Thai Agricultural business: Study of the Thai Rice mill.***

Instructions

Answer questions as they relate to you. For most answers, check the box(es) most applicable to you or fill in the blanks.

About You

1. Your Age

□Less than 20 years-old

□21-30 years-old

□31-40 years-old

□41-50 years-old

□51-60 years-old

□More than 60 years-old

2. Your Gender

(Select only one.)

□Female

□Male

□Other

3. Your Role

(Select all that apply.)

□Rice mill owner

□Rice mill heir

□Rice Executive

□Rice Supervisor

□Other (please in identify: _____)

4. Your Education

(Select all that apply.)

□Lower than high school

□High School

□Vocational

□Bachelor’s degree

□Master’s degree

□Doctoral degree

5. How long have you been with this rice mill?

(Select only one.)

□less than 1 year

□1-5 years

□5-10 years

□11-20 year

□21-30 year□

□31-40 year□

□more than 41 years

About Your Rice mill

6. How many employees are at your rice mill?

(Select only one.)

□10 or less

□11-50

□51-100

□101-200

□201-300

□301-400

□401-500

□501 or more

7. How long does your rice mill established?

(Select only one.)

□less than 1 year

□1-5 years

□5-10 years

□11-20 year

□21-30 year□

□31-40 year□

□41-50 year

□more than 51 years

8. What is rice mill business generation?

(Select only one.)

□Establisher

□2nd generation (Son and Daughter)

□3rd generation (Grandson and Granddaughter

□4th generation (Great-grandson and Great-granddaughter)

□Other (please in identify: _____)

9. Please identify your per product (rice milling) capacity per year in (Ton)?

Please identify in number_____(Tons)

10. Where is you rice mill location (answer in city name)?

City name_____

About Usage of Enterprise Resource Planning System

11. Enterprise Resource Planning Knowledge Check?

Please select one answer each that is best apply to question, leaving blank is also allow.

(1) ERP Stands for:

□A) Engaged Research and Planning

□B) Enterprise Reasoned Plan

□C) Enterprise Resource Planning

□D) Effective Resource Planning

□E) Electronic Research Plan

(2) An ERP system should be capable of:

□A) Posting and tracking the detailed activities of a business

□B) Help users make intelligent judgments about how to run a business

□C) A or B

□D) A and B

□E) None of the above

(3) The scope of ERP applications extends to:

□A) Accounting and finance

□B) Human resources, sales and marketing, and manufacturing and logistics

□C) Customer relationship management and cloud computing

□D) A and B

□E) All of the above

(4) Cash-to-cash cycle time is equal to:

□A) Inventory days of supply - Days of sales outstanding + Average payment period for material

□B) Inventory days of supply + Days of sales outstanding - Average payment period for material

□C) Inventory days of supply - Days of sales outstanding + Average payment period for material

□D) Inventory days of supply - Days of sales outstanding - Average payment period for material

(5) Internal supply chain of a manufacturing enterprise consists of all of the following except:

□A) Procurement cycle

□B) Marketing cycle

□C) Sales and distribution cycle

□D) Manufacturing cycle

12. What is the Enterprise Resource Planning?

Please identify in brief (no more than 2 sentences)

_____

_____

13: Did your rice mill use the Enterprise Resource Planning System in business?

□Yes □NO

If you answer NO (N) in question 13 please go for section A but If you answer Yes (Y) in question 13 please go for section B.

SECTION A

About Technology adoption and Enterprise Resource Planning

Statement	(1) Strongly Disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly Agree
PEOU					
1) Feeling ease of use from other rice mills could influence our rice mill decision to use the ERP system or other advance system.					
2) It would be easy for me and team to become skillful at using highly systemic program.					
3) Our rice mill has the sufficient resources necessary to use the ERP system such as PC and internet support.					
4) Learning to operate the advance and systematic software is possibly easy for our rice mill.					
PU					
1) Using standard and highly systematic process could enables our rice mill to accomplish work tasks quickly.					
2) Using the ERP could increase productivity in rice mill operation.					
3) If our rice mill uses the ERP system, there will be more chances of getting a business competitive advantage.					
IU					
1) Our rice mill intends to have rapid use of system like the ERP, once the program is proven efficiently.					
2) I predict that rice mill would use the new enterprise resource planning system in quick time after agreement is made.					
3) Our rice mill plans to use the new system in very soon after having satisfied with the system condition.					

Business Process Re-engineering

Statement	(1) Strongly Disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly Agree
BPR					
1) Our rice mill could allow to spend long time in redesigning business processes before configuring the ERP use.					
2) Our rice mill is willing to standardize the business processes to fit the ERP system or better work system.					
3) Our rice mill will allow to adjust organizational process to accommodate the process built in the ERP.					

Training

Statement	(1) Strongly Disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly Agree
TRA					
1) Training will substantially improve the level of staffs' understanding with the ERP intention.					
2) Training gives our rice mill staff's confidence in the new ERP system or other advance systems.					
3) Knowledgeable trainer can navigate through the well performing after training and inspire to use the program.					

Government support

Statement	(1) Strongly Disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly Agree
GOV					
1) Tax privilege and government incentives could inspire our rice mill to start using the ERP system or program.					
2) Providing information and service of ERP from government will result in attention of ERP use.					
3) Consistency in national support, especially in IT and technology, could affect investment of new system and program in the rice mill.					

4) Supportive government policy could be an importance to uncover the ERP opportunities for the rice mill industry.	

SECTION B

About Technology adoption and Enterprise Resource Planning

Statement	(1) Strongly Disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly Agree
PEOU					
1) Feeling ease of use from other rice mills could influence our rice mill decision to use the ERP system or other advance system.					
2) It would be easy for me and team to become skillful at using highly systemic program.					
3) Our rice mill has the sufficient resources necessary to use the ERP system such as PC and internet support.					
4) Learning to operate the advance and systematic software is possibly easy for our rice mill.					
PU					
1) Using standard and highly systematic process could enables our rice mill to accomplish work tasks quickly.					
2) Using the ERP could increase productivity in rice mill operation.					
3) If our rice mill uses the ERP system, there will be more chances of getting a business competitive advantage.					
IU					
1) Our rice mill intends to have rapid use of system like the ERP, once the program is proven efficiently.					
2) I predict that rice mill would use the new enterprise resource planning system in quick time after agreement is made.					
3) Our rice mill plans to use the new system in very soon after having satisfied with the system condition.					
BI					

1) Our rice mill often uses the system to manage my task 2) Our rice mill satisfied with my decision to use the system

Business Process Re-engineering

Statement	(1) Strongly Disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly Agree
BPR					
1) Our rice mill could allow to spend long time in redesigning business processes before configuring the ERP use.					
2) Our rice mill is willing to standardize the business processes to fit the ERP system or better work system.					
3) Our rice mill will allow to adjust organizational process to accommodate the process built in the ERP.					

Training

Statement	(1) Strongly Disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly Agree
TRA					
1) Training will substantially improve the level of staffs' understanding with the ERP intention.					
2) Training gives our rice mill staff's confidence in the new ERP system or other advance systems.					
3) Knowledgeable trainer can navigate through the well performing after training and inspire to use the program.					

Government support

Statement	(1) Strongly Disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly Agree
GOV					
1) Tax privilege and government incentives could inspire our rice mill to start using the ERP system or program.					
2) Providing information and service of ERP from government will result in attention of ERP use.					

3) Consistency in national support, especially in IT and technology, could affect investment of new system and program in the rice mill. 4) Supportive government policy could be an importance to uncover the ERP opportunities for the rice mill industry.	

BIOGRAPHY

NAME	Chalett Vichinrojjarul
ACADEMIC BACKGROUND	Bachelor's Degree with a major in Mechanical Engineer from Nottingham University, Nottingham, United Kingdom in 2009 and a Master's Degree with a major in Environmental System Engineer from University College London, London United Kingdom in 2010.
EXPERIENCES	The Vice president, Naraihill golf resort and country club, Lopburi province, Thailand and the Vice president, Siam mini factory Co., Ltd, Saraburi province, Thailand from 2017 to 2020. Construction project manager at Chor Thawee Thep Co., Ltd, Bangkok Thailand from 2016-2018 and Piping field engineer and Construction engineer at Bechtel Global Service Co., Ltd, United Sate of America from 2011-2016.