

**PUBLIC-PRIVATE PARTNERSHIP IN SUSTAINING  
THAILAND'S FOOD INDUSTRY DEVELOPMENT**



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**A Dissertation Submitted in Partial  
Fulfillment of the Requirements for the Degree of  
Doctor of Public Administration  
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THAILAND'S FOOD INDUSTRY DEVELOPMENT**

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## ABSTRACT

<b>Title of Dissertation</b>	PUBLIC-PRIVATE PARTNERSHIP IN SUSTAINING THAILAND'S FOOD INDUSTRY DEVELOPMENT
<b>Author</b>	Pornsan Piyanantisak
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Over the past decade, the number of Public-Private Partnerships (PPP) in Thailand has risen significantly. The ‘Thailand 4.0’ economic model and the ‘Food Innopolis’ project, a pilot project initiated to utilize PPP as a tool for research and development (R&D) in the food industry, constitute two initiatives that emphasize the role of PPPs as a means of modernizing the nation’s food industry. However, despite the importance of PPPs in the food-processing sector, Thailand’s academic literature has not yet discussed this management tool in sufficient detail, and the topic has received minimal discussion in Public Policy and Public Administration academic literature. This study fills this knowledge gap, discussing the role of PPPs in the development of Thailand’s food industry with particular attention to the Food Innopolis project.

The purpose of this study is to investigate the development of Thailand’s food industry; to study the existing pattern of PPP involvement in the Food Innopolis project; to investigate the problems, obstacles, opportunities, and challenges in utilizing PPPs in the development of the nation’s food industry, and; to propose strategic measures to sustain the development of Thailand’s food industry in accordance with the ‘Thailand 4.0’ strategy. This study employs an exploratory descriptive research design, utilizing both qualitative and quantitative methodology. The methodology was selected due to its suitability in portraying the qualities and experiences of the study subjects to discover the real nature and characteristics of the phenomena. Qualitative data was obtained through 5 structured interviews with government officials in administrative roles, and 9 interviews from board members of participating private businesses in Food Innopolis project. Quantitative data was gathered through self-completion questionnaires, with a total of 200 respondents from private companies operating in the Thai food industry. The quantitative questionnaires were designed to reaffirm and to gauge the convergence

of findings from the quantitative interviews.

Findings offer some insight into the dynamic of the relationship between the public organizations and private companies involved in the Food Innopolis project. Study data distinguishes four types of partnerships within the Food Innopolis project. These are: partnerships for research, innovation and technology; partnerships for value chain development; partnerships for business consulting and services, and; partnerships for HR and talent mobility. Problems, constraints, opportunities, and challenges in various aspects were also identified and analyzed to formulate policy and practical recommendations to enhance the utilization of PPP in Thai food industry, as well as strategic measures to enhance value derived from the partnerships that benefit all stakeholders and sustain future Thai food industry development.

However, since this study is an exploratory descriptive research, which is a type of research that focuses on explaining the occurrence of phenomenon in a descriptive manner, therefore, the result of the research will not be able to measure the relations between variables or factors that cause or effect on the success or failure of the project. Conducting further quantitative research will then be beneficial to the determination of reasons for the success or failure of the PPP mechanism in public services.

**Keyword:** Public-Private Partnership, Food Industry, Food Innopolis

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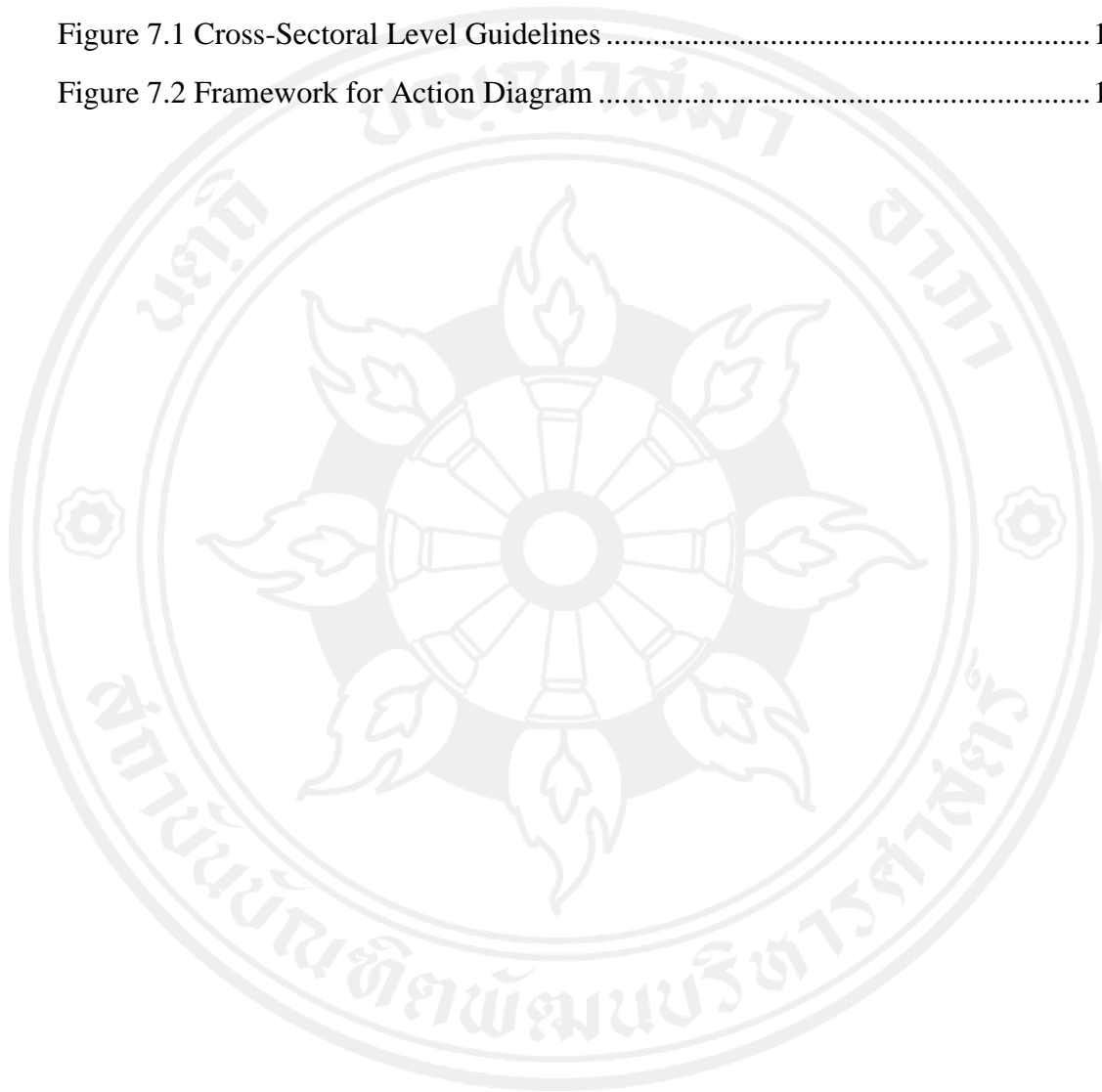
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# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Statement of Problem**

As twenty-first century proceeds, the impact of economic liberalization, globalization, environmental awareness, human rights notion, world-spread terrorism, poverty, and many natural disasters brought about the changing notion of development among nation states. Sustainable development goals which include agendas of food security, poverty, inequality, health and wellbeing of people, along with responsible consumption and production etc., are among public services that government is expected to deliver. Nation states are increasingly challenged by their responsibilities to provide public services and infrastructures that are more complex and thus surge to collaborate with each other as well as with their business partners to fulfill such high expectations. For its part, the private sector is an important source of information, assets, and capabilities that the government does not possess. These initiatives are commonly referred to as public-private partnerships (PPPs).

PPPs have been defined as collaboration between a public sector (government) and private sector (for-profit) entities to achieve a specific goal or set of objectives. This collaboration results in government-business relationships that range from service contracts, supply chains, ad hoc partnerships, information sharing system, resource dissemination partnerships, to concessions or joint venture in large projects. Over the past decade, the number of public-private partnerships has risen significantly and today one can find them in almost all policy areas, including being promoted as a mechanism for improving productivity and driving growth in the agriculture and food sectors around the world. And although PPPs are most common in such sectors as infrastructure, health and education, their applications in the food and agriculture sector is relatively new.

The recognition of PPPs as a tool for food and agricultural development is clearly increased over the past few years, especially for developing countries and emerging economic nations, as it is reflected in many national food and agricultural development strategies and the design of PPP policies and laws (e.g. Government of Uganda; Government of Peru, Government of Pakistan; Government of Kenya; Government of Indonesia; Government of Ghana; Government of the Philippines; and Government of China) (FAO, 2016). The global interest in food and agriculture related PPPs also reflected in recent development literatures such as those works of Spielman, Hartwich and von Grebmer, 2010; Boland, 2012; Brickell and Elias, 2013, and those in food policy and food security literatures such as Krishna and Qaim, 2007; Narrod, C.A., Roy, D., Okello, J., Avendaño, B., Rich, K.M., Thorat, A., 2009; Huang and Yarocho, 2009; Hawkes and Buse, 2011; and Harris and Seymour et al, 2012. The inclusion of PPPs in international organizations' strategies for food industry development (e.g. BCLC, 2009; MFA, 2010; IFAD, 2012; GIZ, 2011; WEF, 2011; FAO, 2013; WEF & McKinsey and Company, 2013) also underlines that PPPs are broadly promoted as means for smallholder farmers engagement with the potential to help modernize the agriculture sector and brings about beneficial contributions towards the pursuit of sustainable food industry development.

For Thailand, due to the rapid growth of economy over the last two decades, the country has transformed into a middle-income nation with fast growing agribusiness and food industries. Thailand's food industry became one of the most developed in Asia as the country became the world's top exporter of rice, cassava/tapioca, chicken, canned and frozen seafood, canned pineapples, as well as sugar cane and sugar. (FAO, 2013). The popularity of Thai food products among international customers also have helped to dub Thailand as "The kitchen of the World". Nevertheless, as a result of such economic growth and recent development, new challenges for Thailand's food processing have emerged. Increased incomes and living standards of Thai farmers which led to the increasing of the costs of food and agriculture production, along with growing competition from neighboring countries e.g. Viet Nam, Cambodia, Laos and Myanmar, has made it more difficult for Thailand to offer low prices on the global marketplace. In response, Thai government has been trying to shift the food production towards a higher value chain to stay competitive.



The recent development plans from the government (Thailand 4.0 and Food Innopolis) underline the need for food industry to advance on a foundation of science and technology rather than on cheap labor, and primary or resource intensive production.

Thailand 4.0 and Food Innopolis are among recent development strategies from the government that emphasize the importance of science and technology development in food industry. These development plans also highlight the use of PPPs as a means to modernize the nation's food processing industries, for instance, by sharing in large financial outlays and by managing or providing expertise for research and development projects. In essence, Thailand 4.0 underlines the establishment of PPPs to promote value-based supply chain, technology transfer, and the creation of Special Economic Zone within the country. Food Innopolis, the Thai government project focusing on research, development, and innovation for food industry which aims to promote Thailand as a world class hub for food innovation, highlights the importance of private sector by offers privileges and incentives for businesses that willing to invest in the project. These incentives including income tax exemption, tax deduction for research expenditures, special permit to own land, advanced technology training, and other public-private resource sharing. Recent National Economic and Social Development Plan (NESDP) also addressed several key development measures associated with PPPs in food related sectors, for example; the 11th NESDP (2012-2016) refers to seeking private sector participation based on PPPs to develop infrastructure and logistics systems and to create a knowledge-based economy; the 12th NESDP (2017-2021) promotes PPPs as one of the key strategies to support value chain management, promoting technology transfer, research and development, as well as using PPP as a means to alleviate the unfairly depreciation of agricultural products from small scale farmers in the market. (NESDB, 2016; NESDB, 2017)

With these development goals and ongoing trend in Thailand development policies, food related PPPs have become a crucial discussion for practitioners in food processing businesses. However, Thailand's academic literature has not yet caught up to the practitioner understanding of PPPs prominence in food industry. This topic has received much less interests and only has been discussed in narrow ways in the scholarly literature in Public Policy or Public Administration arena. Concrete

contributions from other related disciplines such as Management Sciences and Economics also appeared to be limited. This is surprising, as PPPs are perhaps the most dynamic and important subjects for national and global development agenda today. Given the evolving policy framework and ongoing organizational change within Thailand and the so-called government reforms, it is even more important to note where we are in our efforts to establish effective PPPs in our food industry. In addition, because of loosed manner in which concept is defined, PPPs also raise questions about the types of project that may suitably be governed by this mechanism, and about the mechanism's effectiveness in delivering sustainable development objectives in the long run.

This dissertation, therefore, would try to fill a gap in PPPs scholarship by discussing essential role that public-private partnerships are now taking in Thailand food industry, as well as its significant problem, constraints, challenges, and opportunities, as the basis for laying a course to improve them. Also, by identifying critical success elements in various partnerships, this dissertation aims to conclude by suggesting a policy framework for public-private partnerships in Thailand's food industry so that they can prosper over the long term in Thailand's political and social environment.

## **1.2 Objectives of the Study**

This study aims to study the ongoing public-private partnerships in supporting Thailand's food industry development and to find guidelines for enhancing the collaborations through such partnerships accordingly with the country's development goals i.e. Thailand 4.0 strategy. The key purposes for this study are:

1. To study the development of Thailand food industry;
2. To study the existing patterns of public-private partnerships in Food Innopolis;
3. To investigate problems, opportunity, obstacles, and challenges in utilizing public-private partnership for food industry development under Food Innopolis project;
4. To propose the strategic measures to foster food industry development in accordance with Thailand 4.0 strategy.

### **1.3 Research Questions**

1. How Thailand's food industry has been developed and what progresses have been made in the industry's recent performance;
2. What are the existing patterns of public-private partnership for food industry development under Food Innopolis;
3. What are the problems, obstacles, opportunity, and challenges that public-private partnership in Food Innopolis project are facing, and what are the solutions to such issues that conform to Thailand 4.0 development goals;
4. What should be the public-private partnership strategy in fostering food industry development and what strategic measures should be proposed to achieve Thailand sustainable development goals in accordance with Thailand 4.0 strategy.

### **1.4 Scope of the Study**

This study aims to study public-private partnership in Thailand's food industry i.e. what are the status of the partnership, how public and private sector play their roles in the process, what are the opportunity, problems, obstacles, and challenges in applying such partnerships, and what kind of policy frameworks and guidelines for public-private partnership in food industry should be proposed conforming to Thailand's development plans and Thailand 4.0 strategy.

In the study, Mixed Method research methodology was applied. Data was primarily obtained through Qualitative Method, then, Quantitative Method will be applied for the purposes of re-affirmation and consolidation of findings. Qualitative data would be obtained through documents analysis, seminar and conference attendance, and structured interviews. The total 17 interviews i.e. 5 interviews from government official with administrative positions and 12 interviews from the private businesses from small, medium, and large companies participating in Food Innopolis project was conducted. Then, the findings from qualitative method will be re-affirmed by quantitative data using self-completion questionnaire with the total of 200 respondents of government officials, private sector participants and potential participants in Food Innopolis project.

However, this study aims to study only formal public-private partnerships that endorsed by national government under Food Innopolis project, which is a nation's pilot project initiated by the government to support food industry development under the 20-year National Strategy and Thailand 4.0.

### **1.5 Benefits of the Study**

Academic wise, benefits of this study are to understand public-private partnership in Thailand's food industry including the problems, obstacles, opportunity, and challenges in applying the partnership in the context of sustainable development. It also helps enhance knowledge in public and private management theory in current Thailand context.

Management wise, benefits of this study are the development and improvement of policy framework relating to public-private partnership in Thailand's food industry, as well as the recommendations for practical guidelines to enhance the effectiveness of public-private partnership that conform to the nation's development plans and Thailand 4.0 strategy.

## **CHAPTER 2**

### **LITERATURE REVIEW**

This chapter presents the literature that relevance to the objective of the study on public-private partnership in Thailand's food industry. This chapter comprises of:

1. Definitions of public-private partnership
2. Public-private partnership overview
3. Public-private partnership in theory perspectives
4. History of public-private partnership in food industry
5. PPP in Food Industry: World's Leading Projects
6. Overview of Thailand's Food industry
7. Recent Development Plans and Policy Statements Related to PPP in Thailand's Food Industry
8. Thailand 4.0 Strategy
9. Previous studies and conclusions

## 2.1 Definitions of Public-Private Partnership

It is important to note that there is no universal consensus on the definition of public-private partnership (PPP) (DESA, 2016). Nonetheless, important elements of PPPs can be assembled from the characterization and definitions given by various sources, which help to form the loose concept. According to Department of Economic and Social Affairs of United Nations (UN-DESA), PPPs can be understood as a governance or management mechanism that covers different types of contracts, typically of a long term nature, between government or public agencies and private firms with a wide range of risk allocations, transparency requirements, and financial resources (Ibid). Organization for Economic Cooperation and Development (OECD, 2007) defines PPP as an agreement between one or more public and private entities in which the private finance are mobilized for public ends.

International Monetary Fund or IMF (2004) also suggests that “*there is no clear agreement on what does and what does not constitute a PPP*” but briefly defines PPP as a cooperative arrangement whereby the private sectors provide services and assets that primary provided by government which involve in risk transferring from public to private sector.

The World Economic Forum (WEF, 2005) refers to the concept of PPPs as a business firms and not-for-profit organizations working in partnership with government entities, voluntary or contractually, that endorse the sharing of cost, risk, and joint responsibility in decision making process.

World Bank (2014) stated that PPP is a long term agreement between public and private sector organizations, under which the private firms provide or contribute to the provisions of public goods and services.

Asian Development Bank (ADB, 2008) also published a PPP handbook in the effort of trying to unify the loose interpretation of applying the concepts of PPP. ADB sees PPPs as a device for improving the delivery of public services whereby the private sector’s resources are utilized while retaining an active role for governments to make sure that the national socio-economic goals are achievable. In the handbook PPPs are defines as



“a framework - that while engaging the private sector- acknowledge and structure the role for government is ensuring that social obligations are met and successful sector reforms and public sector investment achieved” (ADB, 2008:7)

The handbook further indicated that PPPs should be designed in a way that allocate tasks, obligations, and risks among public and private sector partners in an optimal way; recognizes that both parties possess comparative advantages relative to each other in executing specific tasks; and by working together, the partnership could generate more value for money or minimize cost while improving performance in goods and public services than by single-handedly handle the tasks.

Meanwhile, the term PPP is also defined differently among scholars. For instance, Jomo and Chowdhury (2009) suggested that PPP is the synergy between public and private entities in the use of resources and the implication of management knowledge, with optimal benefits for both parties, where these goals cannot be achieved at this extent without the other parties. Grimsey and Lewis (2005) highlight that PPP is a space between traditional government procurement and full-scale privatization that may include short-term management contracts, outsourcing contracts, concession, or joint-venture contracts between public agencies and private firms. Forreret al. (2010) defines PPP as an ongoing partnership between public and private sectors in which private sector participated in the decision-making process, the production, and the delivery of public services that has traditionally been provided by government agencies and in which the risk of that production is shared to the private sector.

The underlying perspectives of different schools of thought also reflect the recognitions of PPP characteristics among academics. According to Linder(1999), Neo-liberalist tends to see PPP as a way to use market mechanism to create competitiveness among actors in free market environment, while Neo-conservatism scholars argue that PPP emphasizes the concept of community solidarity civic virtue which is a moral regeneration among public service providers. On the other hand, under context of New Public Management (NPM), the notion of PPP was argued as the concept to downsize state role and promotes privatization. With NPM context, PPPs were often perceived as alternatives to bureaucratic procurement of public services and inefficient state owned enterprises. It was argued that transferring certain

public tasks to private hands, including privatization, outsourcing, contracting out, and establishing a partnership with private sector organizations, is a means to enhance the efficiency of public service provision by decrease the role of government in public administration and *“to reverse previously alleged crowding out of the private sector by state owned enterprises”* (Savas, 1982; as cited in DESA, 2016)

As mentioned above, recent applications of the term PPP in the academic and development communities have been somewhat broader, ranging from formal to informal arrangements among public sectors –whether governmental or non-governmental- and private sectors along with their intermediary partners. Thus the broad definition of PPP is portrayed as a form of collaborative partnership (formal or informal) between the public and private entities (and their associated partners), often with only limited emphasis on the private partner selection process, the direct benefits from the collaboration, and the allocations of cost, profit and risk.

The wide range of PPP contractual arrangements paired with the lack of shared understanding of what PPP really is make the evaluations and generalization of findings about PPP complex. Therefore, it is important to note that this study would like to define PPP, in line with the DESA loosed definition of the concept, as “a formalized cooperative arrangement between public agencies and private sector organizations which established for mobilizing resources or expertise from both partners for the sake of public ends, where investment contributions and risk are shared, and actives roles are played by both parties at various stages throughout the project life cycle”. Specifically, this study focuses on Thailand’s food and agriculture PPPs at the national level with some form of formal contracts and goals that aiming for better quality of food and agricultural productions and distributions beneficial to the public interests. Therefore, family farms or micro/small enterprises that operate in the informal sector will be excluded from this study.

## **2.2 Public-Private Partnership Overview**

Public-private partnerships are not new. The term public-private partnership or PPP was emerged and popularized in the 1970s when neo-liberal scholars began to question the predominantly Keynesian economic paradigm and the role government in

the context of economic downfall. The neo-liberalism then started to blame state incompetency in dealing with public debt instead of ascribing to the market failures (DESA, 2016). Modern PPPs evolved in the UK in 1980s, initially employed for government's projects for urban constructions or infrastructure development while adhering to control the rate of public debt (Budäus and Grüning, 2004; as cited in DESA, 2016).

By the end of the twentieth century the market-oriented system of public service provisions was compelling and governments around the world were all realized that provision of public goods and services required more than a hierarchical command system of management. Under neoliberal regimes and global-spread economic reforms, many governments seek to reduce their direct involvement in service provisions through privatization, a mechanism of transferring ownership of a public function to private sector hands. During this process, private firms will be encouraged to participate in infrastructure and institutions reforms to make them more appealing for private investment. Governments in various countries then thus search for a creative ways in which public and private sector can collaborate to effectively provide quality public goods and services. Attentions have been paid to the use of private firms' business resources and skills through an establishment of partnership between public and private sectors. Since then, there has been a widespread trend of state reducing its own role as a direct provider of goods and services and becoming more as a supporter ensuring equitable distribution and legal environment for market development for effective public goods and services provision. And by the first decade of twenty-first century, more and more welfare provisions are shifted from the hand of public agencies to private firms to foster growth while not having to raised tax or cut major social benefits.

With a premise of market-oriented system, governments, with only limited resources and flexibility, alone cannot effectively manage in today's competitive economy. It requires private sector's dynamism, technologies, capital, managerial skills, entrepreneurship, and other resources to grow in the competitive market. Therefore, the partnership between public and private sector were accepted as a mechanism that more appropriate than the traditional hierarchical system management and that public-private partnership can be seen as a middle ground where the best

features of each partner are integrated (Faulkner, 1997). Several functions of government including social responsibility, equitable distribution of goods and services, job creations, environmental protection, and public accountability has to be sustained, while integrating with private's firms managing skills and access to finance to provide better quality services. In this sense, public-private partnership is a management tool that can be used to protect public interest while not having to jeopardize public finance under market incentives.

Consequently, more and more governments are becoming more aware that coping with today's economy requires giving greater role to a more dynamic and flexible private sector and reducing the size of government involvement. This trend and the growth of private sector reflected in higher inflows of private capital and increasing private sector investment in public service provisions. This cross-boundaries relationship between public and private organizations proved to be a success case in developed countries in the West where government-business transactions are more defined with sound legal frameworks and contracts. On the other hand, the collaborations between public and private sector in developing countries indicated to a different story. In developing countries, where government-business relations is hindered by discrimination, asymmetric information, imperfect competition, and corruptions, disputes are likely to occur and projects will be delayed or terminated. (Pongsiri, 2003). Furthermore, various researches also show that without a stable economic, proper legal framework, and efficient institutional environment, the public-private relationship is unlikely to grow. (Kuttner, 1997; Pongsiri, 2003). This suggest that successful implementation of a public-private partnership requires a large extent on a well-established legal framework, clearly defined agreements and contracts with a proper risk sharing, responsibilities and benefits allocation, and professionalism among officers from both sides.

In other words, the fundamental logic for collaborating through partnership is that both private and public sectors have its own unique skill set and characteristics that equip them with advantages for goods and services delivery. Most of the successful arrangements highlight on the strengths of both partners to established complementary relationships, where the sharing of risks, responsibilities, and benefits between both parties are proper allocated. Theoretically, risks should be transferred to

the parties who have the most efficiency to control over the risky outcomes or to the one who can bear the risks at the lowest cost in order to achieve value-for-money (Pongsiri, 2003). Value-for-money is an important logic for establishing public-private partnership as it is an effective use of public funds on a capital project. Value-for-money can be achieved through private sector innovations and skills in asset design; construction or operational techniques; and from transferring key risks (e.g. cost overruns, construction delays) to the hands of the more efficient partner. Another goal for arranging public-private partnership is to lower the transaction costs, which normally increase accordingly by the frequency of interactions between parties, including the costs of writing, monitoring, and enforcing contracts (Ibid). In theory, transaction costs rise from the fact that market transactions are uncertain and may not be undertaken at the lowest price due to the presence of bounded rationality, opportunistic behaviors, and asymmetric resources allocations or specialized asset possession (Williamson, 1985). Public-private partnership was taken into account as a way to economize transaction costs by reducing the number of interactions between the parties through an establishment of long term contracts that allocates risks, diminish uncertainty, and lessen a chance for opportunism. These underlying theoretical aspects of public and private partnership will be further elucidated in the following topic.

### **2.3 Public-Private Partnerships in Theory Perspectives**

According to Fritz (2004), under PPPs, public sector will be benefitted from private sector's managerial skill, technologies, access to financial capital and other resources that would help increase overall economic efficiency. In general, private firms are more determine to make profit and possess more production efficiency. Thus, when public tasks shifted to private hands, the sense of ownership would push private sector to achieve maximum profit (under some control from government's restriction binding from contracts) under competitive market-oriented environment and finally lead to maximum welfare for the public. Fritz (2004) pointed out that these expected advantages from establishing PPPs can be explained through 1) Property Right Theory; 2) Public Interest Theory; and 3) Public Choice Theory.



### 1. Property Rights Theory

Property Rights Theory assumes that individual will seek the way to maximize self-interest. Property right is usually considered as a form of ownership, the rights to earn and gain income from the property, which serve the maximization of self interests. Property Rights Theory has been purposed as a concept relying on incentives of private owner to operate at utmost efficiency in order to obtain profits, opposing to the notion of public interest, where ownership of the resources or property is shared and the boundary of such ownership is not clear (Coase, 1937). Thus, PPP, a mechanism that transform public interests into a sense of ownership or self-interest of private firms, is believed to increase the management efficiency in order to maximize profit.

### 2. Public Interest Theory

Public Interest Theory assumes that market is uncertain and operates inadequately if left alone. Government, therefore, needs to serve the society as a neutral arbiter and enforce necessary regulations to prevent market failures for the sake of the civil society (Pigou, 1932). Such regulations enforced by the government must represent the demand and interests of the public and allow government to make a decision based on the maximization of welfare, such as by selecting private partners to operate in public service provisions through PPPs.

### 3. Public Choice Theory

Public Choice Theory refers to the use of economic tools to deal with problems concerning political choice (Black, 1948). Public Choice Theory modeled governments as made up of officials who might act to benefit themselves while pursuing public interest, such as by using budget maximizing model, perhaps at the cost of efficiency (Tullock, 1987; Niskanen, 1994). According to Black (1948), Public Choice Theory argues that governments have an obligation to maximize welfare by facilitating a democratic-representative process, whereby competitions between interests group can prevails to constrain the rent-seeking behavior; namely the cons politicians and government officials. This argument implies that governments are not required to provide public services solely by themselves; having private firms compete under free market could be more fruitful and might yield more



profit for the public because the rent extraction is often eliminated. (Buchanan and Tullock, 1962)

Furthermore, the benefits of establishing PPPs can be explained by using several other economic principles; particularly the concept of competition effect; access to private capital; and risk transferring;

The Idea of competition effect claims that the main factor that drives privatization to success is the creation of intense competition among firms in the market. According to competition effect principle, competitiveness enlarges the market and number of firms, causes the firms to develop new products, services, and innovations, which would give customer greater selection. Having more choices in the market will increase the possibility of customer's satisfaction as the larger number of producers usually lowers the price of goods and services, compared to what the price would be in the monopolized markets (Klein and Hadjimichael, 2003);

Access to private capital is another reason for public agencies to engage in PPPs. These days' governments are facing problems of budgeting and limitations on public debt and thus seeking capital resources from firms seems reasonable. However, by participating in such relationship, governments at all times must be aware about the cost of capital (from private sources) which can increase the transaction cost and ultimately lead to the raise of overall price of the project or services.

Risk transferring is also a key factor for establishing PPPs. In most cases, proper risk allocation between public and private partners is crucial for PPP to be successful. Poschmann(2003) categorized risks in PPP into groups of technical risk, construction risk, operational risk, revenue risks, financial risk, force majeure, political risk, environmental risk, and project default. Each type of risk is set to be dealt with different approach and allocation strategy. Normally, private firms are expected to take on financial risk, construction risk, operational risk, and environmental risk, while governments must undertake political risk and revenue risk. However, both parties are responsible for the sharing of project default risk and the risk from unexpected events of force majeure (Poschmann, 2003).

## **2.4 History of Public-Private Partnership in Food Industry**

To meet a challenge of feeding almost 7 billion people today and sustainably feeding 9 billion by the year 2050, agricultural sector and food related industries must learn to adapt new technologies and undergo a transformation of food processing. Safe and nutritious food must be produced using lower resources and bringing life quality to the consumers as well as the farmers. Leaders from around the world are now aware of the need for new approach that requires coordination among historically disconnected stakeholders in food processing system.

In 2010, World Economic Forum published a guideline for sustaining agricultural productions including food security and food safety called The New Vision for Agriculture or NVA guidelines (WEF, 2011). The core principle, defined by the world leaders, of NVA is to recognize the new approach to promote an innovative partnership and network among key actors in agriculture sector and food processing industries in order to achieve sustainability and inclusive development. According to Lisa Dreier, Head of Food Security and Agriculture Initiatives of WEF, the NVA guidelines emphasize 1) the building of, or strengthening, public-private partnership in national level; 2) partnering global and regional organizations to advance food security and agricultural development through multi-stakeholder approaches; 3) the possible refinement and adaptation in other sectors. Nevertheless, the NVA is not intended to fix every problem or a one-size fits all solution for development issues. It was merely intended to share a key success factors found in cross-sector partnerships and to present an alternative approach for states and business to work together for sustaining food security, food safety, and agricultural productions for its people (Ibid).

The Sustainable Development Goals, initiated by United Nations in 2015, also promote cross-sector partnerships as core principle to includes multi-stakeholder, such as states, famers, business firms, and civil society, in a collective effort that generate greater effectiveness than doing it alone (ibid). The so called cross-sector partnership is based on the Market-based approach which believes that market based incentives will bring about efficiency that power a large scale action.

The partnerships developed over the years from the UN guideline are varied in sizes, structures, goals, and context (ibid). However, they were developed on the ground of shared vision and common basis of building collaborative partnership between different sectors, mostly private and public, at the country level. According to a report by WEF and Deloitte Consulting, by combining the core competencies from both parties, public-private partnership is expected to bring about advantages in food industry such as;

- 1) Increased financial, human and technological resources resulting in greater impact on the stakeholders;
- 2) Advanced expertise evolved from the combined knowledge and experience of various partners;
- 3) Development of food and agricultural innovation or management models for both business and governments;
- 4) Deeper understanding of different stakeholders' perspectives, aims, limitations, capabilities, and challenges;
- 5) Advancement of new working models, institutional mindsets, leadership style, or organizational strategies across the sectors.

From these International Organizations influences, many governments around the world are now adopting the idea of public agencies working together with private firms to create sustainability in food productions, securing food safety, and to alleviate food security issues by improve agriculture practices, develop staple crops to be more nutritious and help small holder farmers gain greater access to various production resources. For example:

In sub-Saharan Africa, a multinational team of public and private scientists and researchers are developing biotech bananas, cassava, and maize, with increased nutrition- enhance iron, zinc, and other vitamins- to theses major food crops in the region. Not only working to improve the nutritional quality of crops, but these public-private partnership project are also working on improving cultivation, harvesting, and processing techniques for the famers such as how to prolong the durability for the yielded crops, how to reduce plants deceases, how to increase drought tolerant and pest resistant, and other technology to improve breeding and productivity. These pioneered projects are primarily conducted in Uganda and Kenya, where successful

research could dramatically improve the local small-farmers life as well as millions of people's life in the region (CropLife International, 2012).

In case of Peru, Ministry of Agriculture is paring up with several public companies to offer business development service to small holder watermelon grower. The Program of Support Services to Promote Access to Rural Markets or PROSAAMER offered both financial and technical support to private operators, who previously selected by government, to consult and train watermelon producer in order to produce high-quality watermelons that meet exporting standard. Government of Uganda also undergo similar PPP model to enhance inclusion and access to market for smallholder fresh fruits farmers and processors. By working with private partners, the government aims to boost industrialization and local entrepreneurship through business coaching and training. The business incubation program was hosted by the Uganda Industrial Research Institute, the public research agency, while the private partner, Derekorp – Uganda's leading fresh fruit processing company, operates as an incubate to provide networking support (FAO, 2016).

In Bangladesh and the Philippines, government is cooperating private agencies in developing biotech eggplants that are more immune to local pests and deceases. In the Philippines, in particular, there are also PPP project working to improve market and warehouse facilities, infrastructure constructions, as well as financial assistance to reduce post harvest losses (CropLife International, 2012; FAO, 2016).

In Pakistan, government has used the PPP model to tackle drought prone-areas that are formerly considered unprofitable. By partnering with private company called Zamindara Seed Corporations, the research for drought resist wheat seeds was a success. This resulted in new opportunities for the local farmers in the area to grow and produce basic food crop for trade and for household consume. While in Japan, private company researchers are working with local government, universities and agricultural associations to develop new technologies to boost productivity and profitability of local vegetables, including innovations for new crop varieties and crop protection tools (Ibid).

There are also food related PPP projects at a global level, as a part of a project known as Mega agricultural PPPs; for instance, the International Potato Centre has been collaborating with the U.S. Agency for International Development (USAID) and

some private companies to work on boosting investments in high quality potato seed. The aim of this collaboration is to promote potato value chain, which can help increase the accessibility of the local farmer in Kenya, Ethiopia, Rwanda, Tanzania, and Uganda, to a high quality potato; the International Centre for Tropical Agriculture (CIAT), co-convened by the International Food Policy Research Institution (IFPRI), the HarvestPlus Challenge Program, along with more than 200 food scientists and private sector developers, are working on a mega project to 'biofortify' seven major food crops across Asia and Africa. By combining expertise from each partner, the fundamental goal of this mega project is to fight malnutrition by increase micronutrient in beans, cassava, corn, pearl millet, rice, wheat, and sweet potato. And by working transnationally, this project is expected to achieve economy of scale and faster adaptation throughout the regions (CropLife International, 2012).

According to FAO report (2016), there are four major types of food and agriculture PPPs in developing countries; partnerships for value chain development; partnerships for technology transfer; partnership for building market infrastructures; and partnership for business development services. This classification demonstrates the diversity of partnership models, scopes, and goals. But although varied in structures and goals, the core principles of all partnership are the same; to combine resources and capacities of both public and private sectors in order to obtain economics and social benefits.

From a public administration perspective, there are three main reasons that make public-private partnerships appealing for the policy makers in food related industries;

- Potential to leverage budgeting: low public budgetary is the administrative hindrance facing by most of the governments, especially while maintaining levels of development and sustainability require more and more public investment. With well-defined legal and operational framework, public and private partnerships can generate both economic and social benefits from public investments, which government would have been unable to attain alone due to the lack of resources, skills, or technology.

- Risk sharing: in developing countries, food processing and other food-related industries usually confront with several problems caused by the agricultural issues. For example, food related industries oftentimes have to face with risks of



limited access to agricultural inputs, limited access to land, natural disaster, political interference in agricultural market, along with risks from high transaction cost and other general operational issues. These risks sometimes deter the private sector from investing alone and partnering with public sector can be seen as a mechanism to transfer these risks and provide greater certainty for the business.

- Innovations and market access: for public sectors, engaging in PPPs means access to innovative technology and superior management skill sets. By partnering with private firms, governments have more chance to achieve greater efficiency in delivering food products and services to the public while can still manage to promote sustainable food policy such as improving access to export market for farmers, improving country's food quality and standard, encouraging value chained production, as well as developing domestic industry and preventing environment degradation. At the same time, enrolling in PPPs provide private sector with an access to a greater market and ensuring a consistent supply of raw materials, as well as offering a channel for participation in the policy making process. Indeed, this so call R&D public-private partnership is the most popular PPP among other types of partnership. With more than 200 projects worldwide, they are by far the most documented type of PPP in agriculture and food industry.

However, public and private sector working together as partners is not an ideal solution for every problem. Some scholar criticizes that PPP may lead to a distortion of market conditions and the government subsidize for private sector can cause an unfair first-move advantage for some private companies. The selection process of some PPPs, especially the projects with large scale investment, also raises a question of transparency as well as the risk of land grabbing and land-use rights violation (Oxfam, 2014). Another criticized potential downfall of PPP is the question of effectiveness; while aiming to lower the cost of public service delivery, the complexity of PPP may create high transaction costs and it may take lengthy timeframe to be able to justify the end results. But over time, the experiences from engaging in the partnership and working with different partners may lead participating organizations to develop new skill sets, capacities and institutional strategies that can be used to confront future challenges, especially for public agencies that need to be evolved and adapted for changing needs of its citizens.



## **2.5 PPP in Food Industry: World's Leading Projects**

Food clusters can be found worldwide in both developed and developing world. In developing or emerging economy countries, the food clusters are usually focus on resource and market accessibility, while in Western, developed world, they are typically concentrate on knowledge sharing, innovation, and access to raw materials. According to European Cluster Observatory (as cited in Hansen, 2013), more than 150 food clusters have been identified throughout European region. Of the ten biggest agrifood clusters in Western world, six are located in Europe, three in Canada, and one in Australia.

However, in the past few years, food cluster models are also prominent in Asia, the continent that are responsible for approximately 32 percent of the world's food consuming (Foodpolis Korea, 2017) and indeed play a big role in today's global food market. Success cases relevance to this study with similar model with Thailand's Food Innopolis are the Netherland's Food Valley, the Danish Food Cluster, Ontario Food Cluster of Canada, Weifang Food Cluster of China, and the Foodpolis of South Korea.

### **2.5.1 The Netherlands' Food Valley**

The Netherlands has experienced engagement from private sector in public development since the nation's beginnings in the sixteenth and seventeenth centuries. Nevertheless, formalizing PPP for public services and infrastructure projects arrived to the Dutch political sphere in the 1980s from the United Kingdom's initiatives with private funding in development. As an answer for the nation's budgetary problems, the Dutch government endeavored PPP for a few public projects at the beginning of the 1990s. Unluckily, the designated projects experienced cost overruns and caused disagreeability among policy makers, thus the thought was deserted for future undertakings until the end of the decade.

In 1999, PPP Knowledge Centre was established by the Dutch's Ministry of Finance in an attempt to utilizing PPP as a development tool. The PPP center then became a driven force for PPP policy discussion in the Dutch political foundation

during the time. In 2004, the European Commission published a Green Paper on Public-Private Partnerships and Community Law on Public Contracts and Concessions, which the Netherlands then used as the legal guideline for Dutch PPP and as an accelerator for ongoing PPP projects in many different policy areas, including the Food Valley project. The Netherlands' Food Valley project (Food Valley NL) is a business cluster in agro-food, feed and horticultural industries “where ideas are born, trends are identified and new partnerships are initiated” (Food Valley NL, 2017). Food Valley NL offers:

Science & Technology trends: rich knowledge in developments information in science and technology domains relevant for innovations – including examining of research projects and consortia at a national and European regional-level;

Innovation alternatives: identifying preferably innovation solution choices which are already available or close to launch;

Expertise and capability maps, upon request including matchmaking activities: selecting key specialists, leading institutes and specialized organizations relevant to a specific research scheme;

The Netherlands' Food Valley is located in Wageningen in the Netherlands, where more than 70 food companies from around the world, over 20 research centers, and many educational institutions are located. Surrounded by agricultural raw materials, Food Valley is in the location which is famous for its agricultural technology and is considered as a home to more than 200 manufacturing and processing machinery companies involved in the food production chain (DIP, 2015).

Examples of research and innovation within the Food Valley that led to commercial success were the establishment of Japan's Kikkoman Soy Sauce Research Center and Heinz RDI center. The Food Valley experts have helped Kikkoman Soy Sauce produced products that suitable for European taste and boost the company's sales circulation and helped Heinz, the world's leading ketchup producer, minimize waste during the production process by researching to find a tomato breed that grows in same size and fit perfectly into a factory grinder, reduce the time and cost of tomato harvesting and producing the output (Ibid).

In addition, the Food Valley also focuses on research and development from upstream production to improve the food to suit the specific consumer groups; from

the production of eggs with special properties to help prevent certain eye diseases in the elderly to the production of milk that specifically suitable for cheese production. These examples reflect the potential of enhancing research and technological development and food innovation that is more than once was expected.

As a result, the success of its Food Valley has push the Netherlands to the second largest exporter of agricultural and food products in the World. It is also the second largest in the European Union in private R & D investment. And in addition to contributing up to €48 billion a year (Food Valley NL, 2017), Food Valley NL has become a magnetized magnet that attracts huge amounts of investment into the country. Many countries in Europe and Asia have begun to work on similar projects to enhance competitiveness and strengthen food security and food innovation in the country, whether it be Sweden, China, South Korea or even Thailand.

The key to the success of this model is the link between the public, private and educational sectors, or the "golden triangle" that promotes synergy impact. Food Valley NL highlights the fact that even government piloting is essential, but without collaborations from entrepreneurs in the food industry, the PPP program would be unsuccessful (DIP, 2015). The golden triangle takes the expertise of the various sectors to strengthen each other and transform the knowledge acquired from research and development into new products with increasing value that effectively meet the needs of the changing market. This makes the development of the Dutch food industry jump into the high-tech era that truly driven by innovation and knowledge.

### **2.5.2 Ontario Food Cluster of Canada**

Founded in 2003, Ontario is one of the most competitive food clusters and one of the biggest food processing terrains in North America. With yearly production worth around \$34 billion, from both domestic sales and exports sales, Ontario became the largest food preparing region in Canada (OMAFRA, 2012). Ontario's food processing industry plays a big part as major food source for North American and European markets. Over 200 different kinds of fruit, vegetable and other crops are grown from the local farms, a considerable lot of which are also processed within Ontario.

Ontario Food Cluster was set up with world's leading network of supply chain. More than 3,000 food production companies range from agricultural farms, ingredient manufacturers, specialty food processors, to value-added suppliers are the tenants here. World renowned food companies such as Coca Cola, Pepsi co, Nestlé, Kellogg, Kraft, AB In Bev, and other international food and beverage producers such as Maple Leaf, McCain, Corn Products International, Cargill, Bunge, Archer Daniels Midland, Sapporo Breweries, Pernod Ricard, Molson Coors, Kerry, Puratos, Ferrero, Arysza, Jungbunzlauer, Saputo, General Mills, Unilever and Parmalat are established in the province (Ontario Food Cluster, 2016).

With the location at the center of North America, Ontario is a natural logistic hub for Canada, the Unified States (US) and Mexico markets. The areas and states inside this locale make up around 44% of the aggregate US and Canadian populace; more than 450 million North American purchasers are available from this district (OMAFRA, 2012). Toronto, Ontario's largest city, is only one day's drive far from of the most promising markets in the US and Canada with more than 158 million consumers—making it a fantastic location as a business setting. The naturally strategic location of Ontario is key significance for fast and punctual delivery of agriculture and food shipping and effective entrance into a competitive US marketplace.

There are several important factors fostering Ontario Food Cluster competitiveness, for instance: the continuation to bringing down its corporate tax rate and the reductions of planned tax will lead Canada to be the country with the lowest statutory tax rate among the G7 members (Ontario Food Cluster, 2016); Ontario has a top-positioned business atmosphere with low energy prices, streamlined regulations and a low-risk investment conditions; a diverse human capital with advanced skills and various expertise also adds to Ontario's business capacity. These advantages not only make Ontario continues to grow in drawing attentions from additional food manufacturers to the program, but also attract potential tenants and partners by adding to projects and activities design with expert services and assistance. By becoming a tenant with Ontario Food Cluster, clients will be granted with an access to cutting edge expertise, well-designed programs, extensive infrastructure, a skilled workforce,

advance training, and other supplementary industries all consolidate to bolster the province's food industry.

Supervised by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), the Business Development Branch of OMAFRA is available to support international companies with their investment decision in Ontario. With a group of experienced food production experts, the goal of OMAFRA is to facilitate an effortless move to Ontario as much as possible. During the past decade, foreign direct investment in Ontario was perceived as an international recognition of the gigantic focal points for food related business. Since its first opening in 2003, businesses have spent more than \$120 billion investment in Ontario Food Cluster. And during 2006-2007, corporate profits contributed to Ontario's Gross domestic product rose to 11.6%, well over the previous annual average of 9.9% (Ibid).

Adding to its business appeals, Ontario Food Cluster also offers accessible entrance to NAFTA market worth over US\$17 trillion and a promising trading partnership with the European and Asian food processing companies (Ibid). A generally low-risk investment atmosphere, well-designed streamlined regulations, competitive costs, a multicultural skilled human asset, a multinational business experience, research and development experts, and strategic location for logistics also contribute to Ontario's business attractiveness. This excellent performance can be ascribed essentially to good macroeconomic conditions, a conservative risk appetite, and a solid administrative regime of Canada.

### **2.5.3 Danish Food Cluster**

Denmark's food and agriculture sector is ranked at the third biggest food cluster in the Western world. As of 2014, more than 180,000 employees work in the Danish Food Cluster and responsible for over 20% of the nation's total product exports (Danish Food Cluster, 2014). Many world renowned food entrepreneurs have their production site here, along with the number of research centers, universities, expertise and specialist organizations and smaller growth companies.

Throughout the past decade, mutually beneficial partnerships have been rising and turning out to be progressively ordinary, crossing the division both vertically and horizontally with more than 100 clients from private business, academic institutions,



and government agency. As of 2016, the Agro Food Park, a strategic organization specialized in food processing industries of Danish Food Cluster, has 925 individuals working across over 50 organizations with a total of 33,000 square meters of office space and a research facility. The park also includes 5 hectares of testing fields and 100 hectares of farming areas. The tenants of Agro Food Park range from the small and medium enterprises to some of the largest agriculture and food processing companies in Denmark such as Arla Foods and SEGES (Agro Food Park, 2017).

First opening on 9 September 2009, Agro Food Park is located within the larger business area of Business Park Skejby in Skejby, a northern region in the city of Aarhus, Denmark, the country's second-biggest city with 460,000-square-foot space and more than 80 organizations and their 1,000 workers. Agro Food Park is an international community for RDI and knowledge transferring within the agriculture and food sector and other related technology. The tenants and organizations working in Agro Food Park are all involving in agriculture and food production in Denmark with collaborations with outside organizations, academic institutions, and public agencies to encourage interdisciplinary information sharing and creative solutions. One of the principle reasons for the park existing is to ensure that Danish agrofood companies in the region of East Jutland and countrywide are able to thrive in global marketplace. Key operating goals of the park are innovation and creative sharing, sustainable agriculture and food technology, cultural and societal values consultancy, as well as production advisory on profit and marketing for companies regardless of size (Ibid).

In the next 30 years, aiming to become a self-proclaimed "Silicon Valley for agriculture", Agro Food Park expects to expand an additional area to 3,000,000 square feet to support the growing number of its tenants and clients. The expanded area can support hundreds more companies and thousands more employees. Denmark might be one of the best countries for this aspiring venture, with the nation effective agriculture, often with eco-friendly practices, that already growing enough food to feed a population six times its size, (Ibid). Expansion at the park is now in progress: Arla Foods, Scandinavia's biggest dairy producer, is building the RDI center, and Aarhus University's Department of Food Science will install its establishment by the year 2018.



The park's tenants are already inventing a ground breaking product: one on the future food trend offers larvae snacks in chili and sour cream and onion flavors. Yet, the park's expectation to encourage serious agrarian coordinated effort in an area that circuits rural and urban is the thing that makes it especially noteworthy. Moreover, Denmark also aiming to encourage such innovative development to international arena by recently hosts international delegations from many countries such as Belarus, Canada, and Thailand, who finally come to build up partnership with Agro Food Park members or learn about in-process initiatives (Kirk,2016). Furthermore, since 2013 Agro Food Park has had an incubation environment for start-ups and SMEs. The "Inkubator" is oversees and progressively developed by Agro Business Park. This has brought about 25 new startup companies, who together have generated over 30 million DKK in venture capital (Ibid).

In terms of RDI, Danish food innovation owes a lot to research and technology development centers. Expanding on the innovation exchange endeavors of local academic institutions, food specialist deciphers the most recent research discoveries into viable applications that upgrade the competitiveness of the industry. Danish universities all over the country are open in making their research discoveries and patentable inventions able to be commercialized. To this end, the universities have innovation exchange workplaces, in charge of encouraging collaboration between researchers, businesses and other interested organizations.

Upon request, Danish Food Cluster also offers business consulting service for tenants. Among the numerous autonomous counseling firms in the nation, a few are government endorsed. Danish Technological Institute, for instance, has broad extraordinary skills in meat, food safety, and food packaging. For small and medium-sized companies, AgroTech, a business branch focusing on food technology, offers consultancy services within the areas of food, agriculture, and environment technology. Other organizations for food research center and laboratory include the Knowledge Centre for Agriculture, Pig Research Centre and Danish Dairy Board (Danish Food Cluster, 2014).

For the Danish Food Cluster, the principle of development is about high resource-efficiency, utilization, and renewal of sustainable bio-based raw materials for materials, energy and food and continuation to develop value-added products from

resources. Techniques and frameworks are being created to expand cultivating, farming and forestry yields and to minimize losses and waste along the production chain from the farm to the table (Hubbard, 2017). It is about guaranteeing high yield of food and feed while preventing unnecessary losses of crops in transport from farm to fork, and using reusable waste from the food production to save energy. While the Danish Government has executed legal corrections to make it less demanding for organizations to donate food to charity, an extensive number of private activities are inline adding to lessening food waste from their production.

Sustainability has long been a tradition for Denmark. And with expertise in production of bio-based raw materials for food, animal feed, materials and energy, Danish Food Cluster could help set a worldwide standard for best practice for technological solutions for sustainable intensive production. In the past few years, the Danish food cluster has already exported sustainable technology solutions and know-how to the global. Solutions are now in operation in China, Russia, Vietnam, Nigeria and Ukraine, where there is tremendous potential for proficiency upgrades and efficiency improvements to reduce the production impacts on environmental and climate change (Ibid). Expertise and resource-optimized technology solutions, together with Danish know-how about the food production management of in both conventional and green farming, are the pillars for Danish Food Cluster as a top global knowledge transfer center.

The international activities of the Danish Food cluster are supported by well-functioning public-private partnerships, a well-designed agricultural advisory system, and development focused companies who are not afraid to seize the opportunity for new business offers and growth in international arena. This success of the food cluster is based on a strong public-private partnership culture, mutual collaborations throughout the production chain from the field to the customer, innovative research and technology, and the country's tradition of sustainability in food production with constant focus on resource-optimization and waste minimization. Together with a strong will to encourage sustainability and production efficiency along the global food chain and its impacts on environment and climate, Denmark has become a leading country in this trend-setting, making the Danish Food Cluster top of the list for food industry development model.

#### 2.5.4 Weifang Food Valley of China

The idea of Food Valley of China was started by the mayor of Weifang after his visit to the Food Valley in the Netherlands. Officially launched in August 2012, China's first Food Valley project was set up in Weifang, a city in Shandong. Weifang is a major city in agro-food industry, including cattle ranch, vegetable and fruit plantation, and food processing companies. Surrounded by Shouguang, a prefectural city of Weifang, which the Chinese government has selected to host the annual China International Vegetable Science and Technology Exposition, event regarded as the most important vegetable fair in China, Qingzhou, another prefectural city of Weifang, which is well known for its horticulture production, and Zhucheng, a prefectural city in the south of Weifang that is famous for livestock production and cattle farm, Weifang is then regarded as an important base for producing, processing and exporting of agricultural and food products (The Netherlands Enterprise Agency, 2017).

Food Valley of China is a policy platform set up by the Weifang municipal government with the goal of enhancing efficiency and development of the Chinese food industry. The center area of Food Valley of China is located in Hanting district, situated in Hanting region, covering a zone of 45 km. That conveyed in "One Core, Five Zones and Multiple Points". "One Core" refers to Weifang city with two operating area of 14.23 square kilometers in phase one and 45 square kilometers in phase two. "Five Zones" refers to coordinating capacity regions namely Shouguang vegetables and seed valley; Anqiu standardized base of exporting agricultural products; Xiashan producing and progressing base of organic agricultural products; Zhucheng and Changle progressing base of meat; and Port agriculture for food progressing, distribution parks and research enterprises (Ibid). The Weifang Food Valley of China has additionally been affirmed as a demonstration base for agricultural industrialization by the Department of Agriculture of China.

In essence, Weifang aims for its Food valley to be developed into a center for exhibition and trade, inspection and detection, human resource and talent nurturing, innovation and incubation, brand operation, and cooperation and exchanges (FVC, 2017). It is expected that the recently settled Food Valley of China will provide a

more give a more far reaching stage to coordinated effort amongst China and foreign countries in agro-food RDI and industrialization.

In 2015, the trade and correspondence between Food Valley of China with Dutch Food Valley and Wageningen University (WUR) were strengthened. In September 2016, a collaboration agreement was signed between the two food valleys. And for the next 5-10 years, WUR has agreed to serve as expert for strategic planning Food Valley of China. Moreover, both WUR and University of California Davis, two top academic institutions in agrifood science have indicated great enthusiasm to the Food Valley of China and are expected to assume a dynamic part in information exchange, knowledge transfer, research and innovation, mechanical exchange, and the business development of China's agro-food industry (The Netherlands Enterprise Agency, 2017).

In November 2016, the Sino-Dutch Agriculture and Food Innovation and Training Center were established as the aftermath of the successfully International Food Summit arranged in Weifang (Ibid). These centers represent the official participation between Chinese government with Dutch Food Valley and WUR in developing Food Valley of China as trans-borders food research collaborations.

According to FVC (2017), the Food Valley of China is set to be strategic platform for transformation and upgrading of agro-food industry by providing opportunities for knowledge and productivity development in areas as follows:

1. Knowledge transfer and consultancy service

The matters of quality and quantity are important in agrofood production. There is as yet huge space for Chinese manufacturers to enhance production efficiency and deliver food with safety and quality. Establishing Food Valley of China will be a great policy platform to help Chinese companies learn industrial know-how and utilize knowledge transfer and consultancy services set up by government and business experts.

2. R&D and innovation

The food and agricultural industry have seen quick development in the previous decade. Driving organizations have turned out to be greater and greater in scale and in capital resources. Research, development and innovation are key stakes to keep competitive and profitable. Having cooperated with research centers such as

from U.C. Davis and WUR, Food Valley of China will be able to provide facilities and knowledge platform to serve local clients in scientific research, development and innovation.

### 3. Vocational training

Comparing to higher education, vocational training in China hasn't been sufficiently given consideration in the previous decade. However, this circumstance is changing now for the better as the government has acknowledged that it is critical to educate and prepare local farmers and workers for production development. Besides, human asset and talent training is among the main principle of the Food Valley of China. Consequently, there will be open doors for Chinese manufacturers to have involvement in building a systematic vocational training for the agro-food industry, or resources of specific training programs. The collaboration can be made with vocational schools in the neighborhood or with RDI centers of leading institutions.

### 4. Government support

The Food Valley of China is a strategic platform that Weifang local government set up to upgrade and enhance productivity in local agro food production, and over the long haul to construct a pilot base in China not just to produce safe and high-quality products, but also for RDI. As of now, Weifang local government is taking a main role to manage Food Valley of China and a great deal of funding has been made in infrastructure building as well as favorable policies and subsidies will be applied in the coming years to bolster projects in the valley. These government supports are expected to help a client to increase additional benefit and reduce the cost of production.

After Weifang Food Valley of China has launched, the production from the project generated an annual income in sales around 90 million Yuan with annual net profit before income tax around 61.3 million Yuan for China, showing a promising future for the project.

#### **2.5.5 South Korea's Foodpolis**

FOODPOLIS is South Korea's new industrial cluster focusing on global agrofood trade and innovative researches. With essential goal to foster Korea's food industry by empowering shared development amongst large and small manufacturers,



Foodpolis is intended to encourage joint effort, starting information sharing, and RDI collaboration between government, universities, and private local and international enterprises.

In 2013, the Government of South Korea and the Ministry of Agriculture, Food and Rural Affairs (MAFRA) has begun to advance Foodpolis (Korea National Food Cluster), a project committed to food industrial development based on research, productivity development and facilitating logistics improvement to its neighboring markets for imports and exports. With the country's free trade agreements with more than 47 countries, the ministry has over 60 investment memorandums of understanding signed soon after its first opening, most are major food producers and research organizations such as the Canadian Sunopta, the Japanese Jalux and the Dutch NIZO Research Institute (Food Ingredients First, 2014).

Located only two hours by plane from Japan and China in Iksan, Jeollabuk-do, Foodpolis is set up in strategic location that easily accessible from over 60 countries. Within 3,580,000 square meters of commercialized zone, Foodpolis equipped with six food development centers to support business consulting and RDI in food production namely the Food Quality & Safety Center, Food Functionality Evaluation Center, Food Packaging Center, Pilot Plant, Rental Plants, and Agency for Korea National Food Cluster (Ibid). Focusing on food safety, food processing technology, as well as packing and marketing, these research facilities will provide foreign and local companies in the cluster with technology and expertise based on South Korea's leading information technology. Tenants in Foodpolis will also be granted with several privileges, including three years of national tax exemption, rent reduction, and leasing exemption for up to 50 years (Foodpolis Korea, 2017).

According to the Agency for Korea Food Cluster (2013), Foodpolis is a one-stop service center for business support and consultant. Business support provided for tenant companies range from project proposal consulting, helping to secure local financing and funding, recruiting human resources to appointing a project manager and facilitating a process, particularly through following service platforms:

#### R&D Support System

Foodpolis will provide research and development support system that help business to deal with management techniques, for example, applications, contracts



writing and administration. The support system will also provide services such as expertise matching services through a local and international database and academic institutions network to obtain the technology required by clients.

#### Food Quality & Safety Center

The Food Quality & Center will provide facilities to help tenants and clients to enhance their efficiency and product quality in food production via research and innovation.

#### Food Functionality Evaluation Center

The Functionality Evaluation Center is aiming to improve tenants' and clients' evaluation system on food functionality and food safety. The center also serves as training and consulting service provider specialized in legal process in functional food and food safety standard approvals.

#### Food Packaging Center

The Food Packaging Center is set up to help tenant companies in packaging services and in containment quality control including food protection technology, food analyzing, and food package testing.

#### Preferential Financial Services

Foodpolis financial service and support are services provided for tenants through partnerships with commercial banks and with operating government support funds. While enjoying favorable business loans and management consulting service from major banks, tenants can also enjoy support from government's Foodpolis operating fund in land purchase and in early stage construction.

Settled in the heart of Asia, among 1.5 billion people and fast growing market, Foodpolis has enticed the interest from worldwide food companies. And with the Government of South Korea's enthusiastic support, this national Food Cluster will enable food businesses to operate more efficiently in key Asian markets, which are responsible today for approximately 32 percent of the global food consuming market (Foodpolis Korea, 2017), and bring significant economic growth, creating employment opportunities and tremendous income for the Korean GDP.

Focusing primarily on research, development, and innovation, Foodpolis will improve the overall value and quality of the productivity by upgrading industrial structure and enhancing South Korea's competence and competitiveness in agrifood

production through research collaborations between private, public, and academic institutions. The South Korean government expected that Foodpolis will generate approximately 3.2 billion dollars in added production value and 14,000 new jobs based on economic activity in the various industrial and research facilities. Indirect impacts include the construction activity, generating approximately one billion dollars in activity and 9,000 new jobs by the year 2020 (the Agency for Korea Food Cluster, 2013).

### **Lesson Learn from international food clusters and food innovation projects**

#### **Success factors**

4 factors emerged from the literatures analysis. It illustrates that these factors are important in the design of the marketing activity (the ‘homework’ behind a successful market launch) and the management processing the message and converting it into action. The common success factors identified as most important for the success of various food cluster are as follows

##### **1) Data and Knowledge**

The success of several cases appeared to be rooted in having some sort of superior data and knowledge. This knowledge can be scientific or market and consumer behavior insights, both forms of information that are actively sought by information management system that is effective and unified.

This knowledge can also be more intuitive knowledge and awareness of emerging trends that lead to “doing the right thing at the right time”. Danish Food Cluster provided examples of such knowledge. ProViva probiotic juice, successfully marketed by the south Swedish Skåne Dairy, was developed based on extensive nutritional research, and was consequently the first product officially granted a health claim in Sweden with a successful sale. There are also examples Netherland Food Valley such as the producers of the innovative German-based organic soft drink Bionade had insufficient financial resources for such primary research, but appear to have recognized the macro-environmental trend toward organic and natural food and intuitively found the right approach to their young, urban and educated target market

and eventually have been able to raise funds to produce products that successfully respond to these customer segment. (Aschemann-Witzel et al., 2012)

Collective information on marketing and research will help the government to issue a policy or strategy to stimulate investment in research and development that responds to current consumption and reduces the risk of bringing innovation into commercial sales.

## 2) Media and Publicity

Choosing the best media match or the right combination of media for communication activities is crucial in the publicity to reach the target group of the project and the commercial marketing. Good combination of media and often massive use of various media in a “360 degrees” approach (reaching the consumer repeatedly from different angles) seemed to be important for success (Steiner and Ali, 2010). Favorable media attention and coverage will lead to positive publicity. Positive publicity will also lead to the possible increase number of participants, which is an important measure of the success of the project.

## 3) Diversity of Participating Firms

The presence of small, medium and large firms in the partnership - rather than having just only large company - is proved to be beneficial to the projects in the long run.

Literatures suggest that R&D, which is commonly associated with something that dominantly large companies undertake, is more frequently taking place in small companies. In Danish Food Cluster, through the high share of R&D financed by small food companies, as much as 40 percent of the R&D was financed by companies with less than 50 employees, which is four times higher than national average. Having diverse group of participating operators also contributes to the dissemination of knowledge and innovation across sectors, which help to create variety and thereby enlarging the platform for further partnership selection. Having different size entrepreneur in the partnership also help dissolve process of already established monopolies in some agrofood sector, as seen in Danish Food Cluster where having

small and mediums company in the partnership has increased competition in the meat sector in Scandinavian market (Aschemann-Witzel et al., 2012)

Furthermore, the research of Centre for Market Surveillance of New Zealand (1997) also revealed that organizational barriers to innovation, regarded as major obstacles in the food industry, are more likely found in larger companies. This work indicates that large food companies may be more resistant to change than medium and small companies, whom can adapt and adjust their organizational behavior with innovation faster. There were several reasons why SMEs are more adaptive to innovations (Centre for Market Surveillance of New Zealand, 1997):

- There is little bureaucracy, with a rather simple and focused organic organizational structure,
- Commitment and motivation of the managers is higher; they themselves are active in planning and realizing innovations; they take higher risks and motivate their staff constantly,
- SMEs are more exposed to competition, which forces them to react quickly on changing market requirements,
- The costs for their innovation projects - and especially their overhead costs are mostly lower than in large companies,
- R&D efficiency is much higher; they do not produce know-how that they will not use in the short range,
- SMEs grow through niche strategies and frequently specialize either in their technology or in their orientation towards customers

For most large companies, innovation is often aimed at maintaining or increasing sales of existing products instead of developing new products. This stem from the notion that new products are related to high market insecurity, and they are expensive to develop, as they demand new process technology and high marketing costs (Ibid).

However, in Food Cluster projects focusing on research and development, multinational or large participating firms still play a key role in driving the project. In the case of the Norwegian food industry, large companies perform more R&D (as large companies often do). These larger companies may have more organized transport systems, larger agro-cooperatives connection, formal integration to suppliers

of machinery, or have better financial base and interpretive capability to purchase and utilize market surveillance information in general.

Therefore, it is important that food cluster partnerships must also have appropriate number of small and medium enterprises in the project. As mentioned above, focusing only on cooperation with the major or large companies without emphasizing on partnering with small and medium-sized companies may eventually cause the project its deserving benefits in the long run.

#### 4) Market-orientation skills

*Market orientation*, include attention to marketing, proficiency in marketing, marketing activities, launch activities, and understanding customer or market needs, is important for innovation in food industries. Many innovations are modifications of existing products and are demand driven innovations, i.e., the innovation process has been triggered by retailer demands or by consumer research. Consumer trends in needs and wants with respect to taste, convenience, health, environmental aspects, offer opportunities to food producers. Therefore, a market orientation might contribute substantially to product innovation.

The emphasis on market orientation builds on an assumption that the success of a new product is determined in the market by the customers' perception of the new product. It is therefore crucial to build the understanding of the customers' needs and wants into the process in order to improve the chances of success. More specific success factors which can be grouped under the label 'market focus' are the degree of product superiority (identified from the customer's point of view), the amount/frequency of contact with the market/ customers during development, the degree of up-front marketing, representation of the marketing function in the development process, the amount of market/competitor knowledge, the use of advanced market research techniques, test-marketing, and prototype testing with customers. This combination of improved market intelligence and improved production competences also enables improved market responsiveness in the innovation process (Centre for market surveillance of New Zealand, 1997) which contributes to the long term success of innovative products that suit market needs or achieve commercial success.



## **Constraints**

By reviewing related literatures, constraints in the operation of food related PPP projects in agri-food industry were also identified. There are three main constraints to the implementation of PPP projects: perceptions, competition, risk and risk management.

### **1) Perceptions**

According to Spielman and Grebmer (2006), mutually negative perceptions between the sectors were the most significant impediment to partnership, arguing that real and perceived cultural and ideological differences affect the willingness and ability of public agencies and private firms to partner. This constraint stems from mistrust and suspicion at an individual level: managers and researchers in the public sector often view large multinational firms with suspicion, while researchers in such firms view public agencies as slow, inefficient and resistant to change. Furthermore, the confidentiality and non-disclosure agreements between public and private partners that accompany many partnerships are a significant source of tension because they are alien to public sector researchers and are seen as threatening to public researchers' commitment to knowledge sharing and communication.

Misperceptions may also result from the relative distribution of power and conflicting incentives between public and private entities. The relative distribution of power or influence between partners become an issue especially when public agencies often prefer to be the larger, lead partner in a relationship, while partnerships are established with small, local companies, not multinational firms. When adding to the very distinct incentive structure— profit-maximizing firms and welfare-maximizing public organizations— with respect to the goals of their research— rents from appropriable knowledge versus social benefits from public goods production— identifying common goals in the medium and long term is even more difficult.

### **2) Competition**

A majority of respondents addressed this issue as the most substantive and technically challenging concern in partnership-building, particularly where valuable



intellectual property and financial resources were at stake. The value placed on proprietary technologies held by the private sector, and the value placed on genetic resources held in trust by the public sector, are generating secrecy (or non-disclosure) rather than openness, thereby affecting the exchange of both knowledge and materials.

Competition also expressed in form of financial resources. Funding scarcities have led some public institutions to become more protective of their financial resources. This may be causing some public institutions to exclude potentially constructive partners from their research, fearing that the arrangement could divert resources, generate prohibitive transactions costs, shift attention away from social welfare priorities, or compromise the institution's mandate. Rather than identify new sources of knowledge and financing, public institutions may be responding by looking inward and assuming the full spectrum of research responsibilities— priority setting, financing and execution.

### 3) Risk and Risk Management

Another constraint is the related issue of risk and risk management. The primary risk facing both public and private actors arises from the potential for misuse of valuable intellectual property. Several private firms expressed concern over the financial and reputational liability that could result from the controversial use or abuse by public sector partners, farmers and other end-users, or third parties who somehow gain access to the intellectual property.

Concerns over the reputational liability resulting from private firms that obtain intellectual property rights over products derived from genetic resources held in public trust by public institutions were also cited. The reputational risks of associating with multinational firms and controversial technologies were also significant, and could attract unwanted scrutiny from staff, colleagues, watchdog organizations, the media, or the general public, resulting as delayed operation in some cases.

Spielman and Grebmer (2006) suggest that many of these constraints can be overcome through a variety of policy mechanisms and organizational strategies. Public and private actors can find common interests when policies are designed to create incentives that make R&D more feasible or attractive. Competition and risk can

also be managed through creative structuring of partnership arrangements, and minimize costs through effective project management. Finally, public institutions and private firms can improve mutual perceptions through increased dialog and greater disclosure of information on partnerships and partnership-building.

## **2.6 Overview of Thailand's Food Industry**

Often referred as a “food basket of Asia” and “kitchen of the world”, Thailand is known for being one of the largest producers and exporters of food in the world. It is one of the few countries in the world that has capacity to produce food far more than domestic demand, with the rate of food exports has exceed the rate of food imports by a broad margin. From 1990s onwards, Thai food products are widely accepted for the consistent in quality and safety standard. Many developed nations, such as the United States, Japan, European Union countries, Canada, and Australia, with higher food criteria and safety standard, are among major clients who regularly import food products from Thailand (TIR, 2016).

### **2.6.1 Development of Thai Food Industry**

Food Industry refers to the industry surrounding a processing, preparing, preserving, packaging, distributing, and serving of food and beverages, which aims to produce large amount of productions with quality, standard, and safety, as well as to preserve and process agri-products from crops, livestock, and fishery. (Food Network Solutions, 2017)

Thailand industry sector was not a main player in the country's economy before the 1960 since most of productions were carry out by State Enterprises. However, after the founding of the National Economic and Social Development Board (NESDB) in 1959, the Thai Board of Investment or BOI was founded to serve the increasing support of government to enhance the importance of private sector and industry sector in the country's economic development accordingly with the first National Economic and Social Development Plan (NESDP) that was announced in 1961 (Ibid).

Food industry is among the first industries that received concrete support from the government under NESDP due to the country's competitive advantage on natural

resources and agricultural production and the fact that food processing at that time required less advance technology comparing to other heavy industries. The development of food industry has also positively impacted to growth of its supporting industries such as those involved in packaging process.

According to The Federation of Thai Industry, Thai food industry consist of 12 subsectors as follows (NFI, 2002):

- 1) Meat and meat by-products: from pork, beef, buffalo, chicken, duck, goose, poultry, goat, lamb, crocodile, frog, turtle, snapping turtle, and bird's nest, in form of fresh meat, frozen, or processed such as sausages, meatballs, dried meat, or shredded meat.
- 2) Fishery products: including seafood such as fish, shrimp, prawn, shellfish, crab, squid, octopus, sea cucumber, jellyfish, and their processed products and edible by-products e.g. frozen seafood, canned seafood, and dried seafood.
- 3) Vegetables and fruits: in forms of fresh, dried, preserved, and pickled. Fruits and vegetable juices, seaweed, fresh onion, fresh garlic, fresh pepper, and nuts are also included in this group.
- 4) Grain, cereal, and flour products: such as all-purpose flour, corn starch, tapioca starch, wheat flour, rice noodle, rice vermicelli, grass noodle, and instant noodle.
- 5) Spices and seasoning ingredients: including garlic powder, dried pepper, cardamom, clove, cinnamon, mace, coriander, turmeric and other spices, and seasoning sauces and ingredients such as fish sauce, soy sauce, ketchup, chili paste, shrimp paste, seasoning powder, curry paste and curry powder.
- 6) Sugar and candy: including raw sugar, white sugar, granulated sugar, syrups, honey, molasses, candies, and chewing gums.
- 7) Milk and milk products: such as fresh milk, yoghurt, drinking yoghurt, milk powder, condensed milk, cream, butter, cheese, ice cream, and other products made from milk, either from cow, buffalo, goat and others.
- 8) Beverages: for instance; alcohol and non-alcoholic drinks, drinking water, purified water, mineral water, soda, fruit flavored water, artificial juices, ice, fountain drinks, energy drinks, and soymilk.

9) Tea, coffee, and cocoa: consisting of raw coffee seeds, instant coffee, coffee drinks, dried tea leaves, instant tea mix, tea drinks, cocoa seeds, cocoa mix, cocoa drinks, and similar products including chocolate.

10) Oil and fat products: from vegetables such as palm, peanut, soy, sesame, sunflower seed, and from animals, both as raw and processed products.

11) Animal feeds: including concentrate feed and completed feed products, fodders, hay, straw, silage, feed grain, food processing byproducts, and compound feed among others.

12) Supplementary food and others: such as products of microingredients e.g. vitamins, minerals, and antibiotics, premix food, and medical food.

Prior to the implementation of Thailand 4.0 strategy, when consider Thailand's economic policy along with its production structure, the country's industrial development can be divided into 5 phases (Thammanawan, 2003):

Phase 1 (1961-1971), under the implementation of the country's first and second NESDP: Thailand's development goals at that point were set to achieve by industrialization and Import Substitution production policy in order to lessen dependency on other countries. Thai government also expected that an industrial development would help fixing the deficit balance. To support industrialization, government had launched several policies and incentives, both tax and non-tax to help incubate the starting of several industries including in food and agriculture sector, as well as provided infrastructure to facilitate the endowment of production technology and internal market.

Phase 2 (1972-1981), under the third and fourth NESDP: during this phase government started to emphasize on Export Promotion policy, due to impact from the rapid growth of industry sector that led to the import of oil and production capital from abroad and caused deficit budget. Policies which were implemented throughout this phase lies heavily on tax incentives to reduce the import of production resources and encourage foreign investment in the country. However, overall importation of goods and services at that time was not developed as well as the government had hoped. All in all, the basic infrastructures were not yet suitable for such development to thrive.

Phase 3 (1982-1991), under the fifth and sixth NESDP: the guideline for industry development mainly aimed to enhance the efficiency of overall production, encourage productions for export, and promote small-sized manufactures and industries at the regional level in order to support income distribution and increase employment rate at the local and regional level.

Phase 4 (1992-1996), under the seventh NESDP: during this phase the government was emphasizing on taking care of economic issues from income distribution and environmental problems stem from industrial productions, while still targeted to enhance the country's industrial production capabilities and standardization driven industrial growth.

Phase 5 (1997-2016), from the eighth NESDP onwards: under the eighth NESDP, Thai government put their emphasis on human resources development as a basis for the country's recovering from economic crisis. Then, under the ninth to tenth NESDP, the philosophy of sufficiency economy was highlighted at all level of development schemes and has been used as the key principle for economic and social development until today. Later, under the eleventh NESDP, prior to the initiation of Thailand 4.0 strategy, development strategies were set to promote human capital development to create a knowledge-based economy to support the enhancement of research, technology, and innovation in the country's key industries that conform with the strategy of Thailand 4.0

From the past 20 years, food industry has been playing an important role in Thailand production structure; its demand for domestic consumption and for export market remains the highest among other industries throughout the decades. Although perceived as a basic industry that has low market value per unit, food industry is continuing to expand and became one of the country's key industries that enjoys growing demand from domestic and international market. According to Thailand Research Fund (2009), food industry and its linkage industries have the highest production inducement, highest employment, and highest employment inducement among other industries; over 88 percent of the country's employment is in agricultural sector and the rest lies on the linkage industries throughout the production chain.

However, since the trends international trade has been changing tremendously, a few changes in production standards and customer's expectations have forced the



Thai manufacturers to adapt and face several challenges and issues such as (NFI, 2002):

The food industry becomes more vulnerable due to the continuous change in international standardization, regulations, and guidelines set by Western trade partners and international trade institutions. These ongoing changes not only oftentimes negatively impact the Thailand's food export market and customers, but it also affects the Thai manufacturers who have to keep up with the constant changes in their way of production.

Lacking information leads to lack of customers' confidence. Due to the fact that most of the Thai manufacturers are small-sized productions, keeping up with constant changes in international trade regulations and standard can be burdensome. Government must acknowledge this challenge and ensure that Thai food products are up to the standard set by leading customers namely Japan, the United States of America, and European Union before it interfere with Thailand's production competitiveness.

The lack of confidence may lead to the problem of production relocation, whether it is foreign investors seeking production base in Thailand or Thai investors seeking for location to invest in other countries, Thailand will lose its opportunity from the lack of investors' trust.

The lack of clarity in problem solving, and the lack of direction in production development, the lack of industry's readiness, and the lack of country's negotiating power by allowing foreign countries to lead the way in standardization can weaken competitiveness of the industry, especially when 11,607 factories from 12,027 food factories in Thailand are small and medium-sized manufacturers who need more time to adapt and to enhance their potential compare to large or international manufacturers.

Not only that domestic manufacturer has to develop and improve the quality of their products to meet international standards, they also have to compete with imported products from foreign manufacturers. With the lack of strong mechanism and auditing standard, this "nondiscrimination" trade principle could lead to "domestic market free access" issue that could damage Thai entrepreneurs and increase the import volume.

Most overseas agencies raise Food Safety issue as an excuse for tighten their standardization and could be used as a channel to dominate Thai domestic market. Although Thailand has been focusing on human resource development since the previous National Economic and Social Development Plan, but the outcome has not yet been achieved to concretely help the industry deal with this challenge.

The export value of Thai food products in the future will be reduced. Thailand has a minimum export value of more than 400,000 billion baht a year. To contribute to the enhancement of safety standards, Thai government must create a system for equivalence production. If not, the failure to adapt and comply with international standards will result in a reduction in exports and national income.

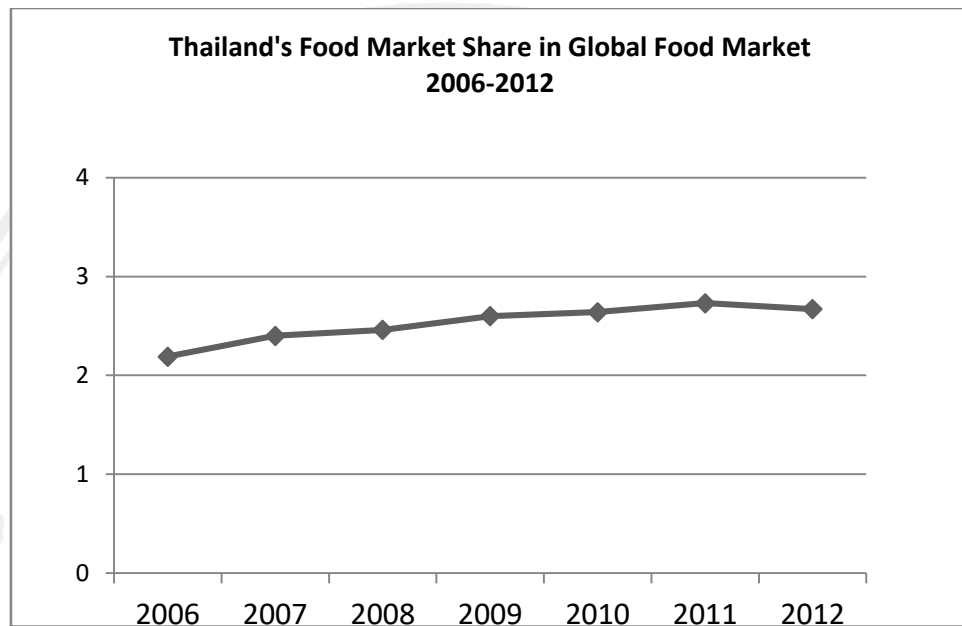
These challenges and issues are awaiting the acknowledgement from both the private and public sectors in order to fix them. The need of establishment of policy framework and both short term and long term strategy to enhance production capabilities and industry competitiveness is therefore required. For this reason, Thailand's public and private sectors must collaborate and should look at the implementation of agricultural and food processing policies in order to foster the industry to grow and to adapt to the changing dynamics of global trade with more intense competition, including the strategic framework for food research and how to utilize the scientific researches as guidance to accelerate development of the agricultural and food industries in Thailand.

Previously, the research on Thai food is not linked to the national development framework due to the fact that there was no clearly defined agency responsible for food research strategy. However, when the 20-year national strategy has been reviewed and strategy for Thailand 4.0 has been initiated, the food industry has been accentuated as a major industry that needs to be seriously developed. Thailand 4.0 strategy defines Food Innopolis as an agency or a super cluster responsible for industrial development, especially by research, technology, and innovation.

### **2.6.2 The Industry's Recent Performance**

Ranked at the world's 5<sup>th</sup> largest exporter of overall food, Thailand is the world's leading exporter and processors of livestock, canned and frozen seafood, fruits, and vegetables; standing in the world's 6<sup>th</sup> in rice producers, the 1<sup>st</sup> in canned

pineapple export, the 4<sup>th</sup> in sugar cane processor, and the 5<sup>th</sup> for shrimp export (Juslaws and consult, 2016). In the first quarter of 2016, the total value of the country food exports reached USD 6.8 million (THB 239 million) with the impressive growth rate of 9.5% compared to the same timeframe in 2015 (Ibid).



Source: National Food Institute, Ministry of Industry, Thailand.

Given the robust role of Thailand in the world's food marketplace, it is not surprising that food industry is one of the biggest contributors to Thailand's economy. The industry contributed over 23% to the country Gross Domestic Product (GDP) in 2015. There are more than 10,000 Thai and multinational food processing factories in Thailand, which around 90% are SMEs, and employ around 1 million people in the workforce.

According to BOI, 6 major subsectors in Thailand's food industry are fishery products, rice and cereal, meat product, fruits and vegetables, sugar, and seasonings and ingredients. In 2014, Thailand exported around US\$31 billion of food products and distributed to over 200 countries globally, of which are major clients such as the United States, China, Japan, European and ASEAN countries. Important productivity on key subsectors are (OIE, 2010; BOI, 2015):

Fishery products that are important for export market are canned tuna, which accounted for approximately 55% of overall production capacity in the subsector, followed by fresh shrimps, frozen shrimps, and processed shrimp products. In 2014, Thailand exported 1.4 million tons of fishery products with a value of US\$6.4 billion; 37% of which are canned tuna, followed by shrimps at 32% of total subsector exports.

Rice and cereal products are mainly comprised of rice, cassava starch, and other cereal grains such as tapioca, coffee, soy beans and soy bean byproducts. Thailand exported around 12 million tons of cereal products in 2014. The major product, which accounted for 93% of total subsector export value, was rice.

Meat products or livestock products export was worth US\$2.9 billion in 2014. Chicken was the main export product that accounted for US\$2.3 billion or 78% of the total livestock export values.

Fruits and vegetables including canned, frozen, and preserved products accounted for approximately US\$3.1 billion worth of export in 2014. Major fruit products were canned pineapple, longan, and durian, which comprised for more than 50% of the total fruit export. Corn was a major vegetable export that accounted for 35% or US\$222 million from US\$629 million of total vegetables exports.

Sugar and other seasonings product were also brought the country to global prominence position. In 2014, Thailand produced more than 12.7 million tons of sugar which around 6.5 million tons of the total production was for export market. Other important seasonings and ingredients export annually were chili sauce, instant curry paste and powder, fish sauce, oyster sauce, soy sauce, and tomato sauce.

Moreover, due to the changing trends of lifestyle from overseas market, Thailand has successfully developed various ready-to-eat frozen products that mainly distributed to the United States, Japan, The Philippines, and Cambodia (BOI, 2015). The international as well as domestic demands for ready-to-eat products are continuing to grow and the manufacturing sector is expected to thrive as a new lifestyle change demand for faster and more convenience way of food consumption.

Another manufacturing sector that is growing tremendously over the last few years is the halal food sector. The demand for halal food production is partly increased because of Thailand entering to ASEAN market where Muslim is the majority of ASEAN population. According to Thailand's National Food Institute (NFI), Thailand

is currently the leader of Southeast Asian countries for halal food producer, the value of halal food exports in 2015 was skyrocketed to US\$6.1 billion with 5.1% grow rate from 2014. The Thai government is now planning to boost halal food production by laying out a set of strategies aimed to enter to new halal food markets in the UAE, Saudi Arabia, Egypt, Nigeria, Iraq, and China. Expansions strategies focus on the development of Thailand's southernmost provinces as a main production based for halal products in Asia (Ibid).

Based on the report of National Food Institution's Food Intelligence Center (as cited in TIR, 2016) Thailand have 4 key strengths that place the country in such strong position in global market place. Firstly, Thailand has year-round growing seasons for varieties of crops, which provides food processing industry with fresh ingredients all year round; secondly, most Thai manufacturers possess unique expertise and decades of experiences in the industry, which helps them to embrace the processing and efficiency techniques; thirdly, the Thai workforce in the food industry is considered higher in quality with competitive wages, thus there are many worldly recognized food companies operating based in Thailand such as Dole, Coca Cola, Mckey Food, Tep Kinsho Foods, Pepsi Co., Del Monte, Kratft Foods, and Nestle.

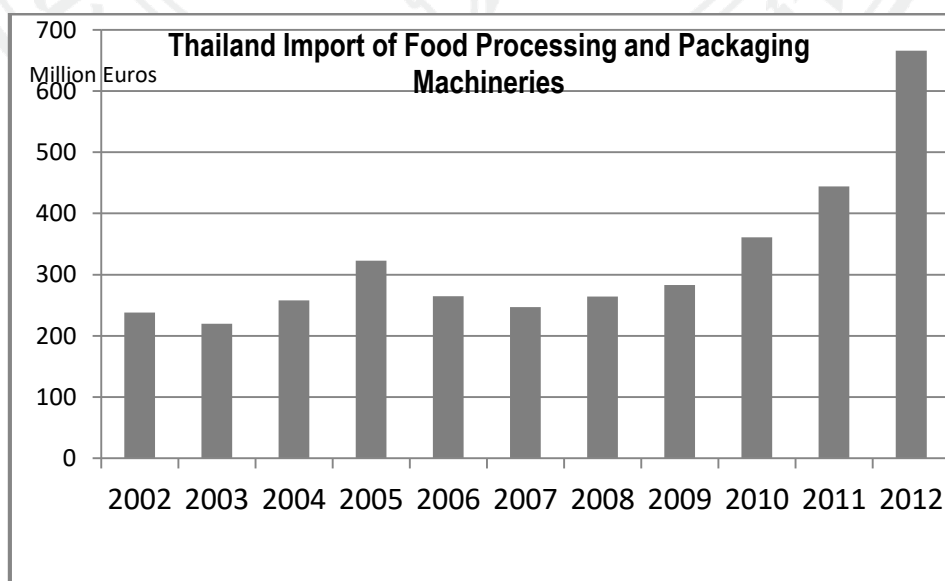
Numerous trainings regularly provided by government for the workforces also ensure that laborers are equipped with up-to-date technologies and skills; finally, Thai food products are known to be compatible with Western high food quality criteria and food safety standards. Even though Thailand may not offer the lowest production costs, but many corporations still prefer to have their production based in Thailand due to its competitive advantages of good quality raw materials and the country's consistency with respect to safety standards. Besides, Thailand also is known for its advantage of geographic location. Thailand located in the central among ASEAN countries, surrounding by Laos, Myanmar, Cambodia, Malaysia, with land routes to China, Vietnam, and ports to Singapore and Indonesia. The logistic facilities such as airports and ports also offer investors and manufacturers with north-south and east-west corridors that link Bangkok to the world.

However, as a result of global economic growth and recent development, new challenges for Thailand's food processing have emerged. Increased incomes and living standards of Thai farmers which led to the increasing of the costs of food and



agriculture production, along with growing competition from neighboring countries e.g. Viet Nam, Cambodia, Laos and Myanmar, has made it more difficult for Thailand to offer low prices on the global marketplace. In response, Thai government has been trying to shift the food production towards a higher value chain to stay competitive. On the other hand, producing higher value food requires upper production technology that comes with higher cost. Most inventive equipment and most food processing machineries are imported and thus increased overall annual national expenditure.

With support for research and development (R&D) from the government, Thai manufacturers were able to locally produce food processing machinery such as individual quick freezers, canned tuna and shrimps processing machineries. Nevertheless, most food processing and packaging machines are imported from abroad, mainly from Germany, Japan, China, and Italy. The value of imported machineries has been increasing over the last 10 years. According to the Iron and Steel Institution of Thailand (as cited in BOI, 2015), Thailand imported more than US\$245 million worth of food processing machines and another US\$456 million for packaging machineries in 2013 alone. As food industry expands, investments in higher technology and upgrades in manufacturing equipments are thus rising. And even such demand is mostly met from abroad, researching for innovation for locally developed and produced machinery is crucial too; at least and lower the cost for high technology equipment and knowhow and to decrease national expenditures.



Source: The Mechanical Engineering Industry Association Export Statistics, 2013

Therefore, throughout the past decade, Thai government have been trying to harness innovations and research technology to develop the industry trajectory into the competitive future, not only to deal with higher production cost, but also to lower the overall national expenditure from importing food processing technology and machineries.

According to the Oxford Business Group Report (as cited in FAO, 2013), Thai government is undertaking a long list of R&D projects to deal with the problems of low yields and diseases risk that most of the small Thai farmers are facing. The R&D effort includes the development of crop seeds, post harvest processing, greenhouse farming, preservation method, packaging technology, quality assurance, and

“Higher quality corn, cucumber, chili and tomato seeds have been developed and are set to be exported under a Thai brand name. New types of virus-resistant prawn feed and tiger prawn broodstock have also been created. Functional food research has also been progressing, with discoveries in nutraceutical foods, probiotics, herbal medicine and pharmacogenomics”.

There are also R&D project in food processing infrastructure such as the development of lower cost poultry houses with energy-efficient air flow system and the development of test kits for plant diseases examination, which are both partly funded by government and private sector companies.

The recent development plans from the government e.g. National Economic and Social Development Plan (NESDP), Thailand 4.0 policy, and Food Innopolis project, underline the need for food industry to advance on a foundation of science and technology. These development plans also highlight the use of PPPs as a means to modernize the nation's food processing industries, for instance, by sharing in large financial outlays and by managing or providing expertise for research and development projects. In essence, PPPs are promoted as one of the key strategies to support value chain management, promoting technology transfer, research and development, as well as using PPP as a means to alleviate the unfairly depreciation of agricultural products from small scale farmers in the market. (NESDB, 2016)

## **2.7 Recent Development Plans and Policy Statements Related to PPP in Thailand's Food Industry**

### **2.7.1 National Economic and Social Development Plan (NESDP)**

NESDP is the national development plan which set a range of targets for various sectors including agriculture and food related sectors. Produced by the National Economic and Social Development Board (NESDB), the first NESDP ran from 1961-1966 and the current NESDP is the 12<sup>th</sup> NESDP that will cover the development plans and goals for the year 2017-2021. The importance of sustainable growth and development of agriculture and food sectors was highlighted in both the current and last NESDP.

From 2012-2016, the 11<sup>th</sup> edition of NESDP addressed several aims and goals to make agriculture “the main source of the country’s income and food security” and included as one of the six dimensions of resilience economy that “based on knowledge and technological advancement”. The 7 key development strategies outlined in the 11<sup>th</sup> NESDP are: promoting a just society for all; developing human resource and promote lifelong learning; balancing between food and energy security; creating a knowledge-based economy; strengthening economic and security cooperation with fellow ASEAN member countries; and sustaining natural resources and environmental preservation. Under each strategy, there were number of measures and procedure schemes to guide the course of action. Among other several key measures, the last NESDP has referred to cooperating between agriculture, food, and service sectors to increase the relative share of the overall economic output as one of the targets for national development strategies.

Moreover, in 11<sup>th</sup> NESDP there were also references to PPPs as a tool to balance between food and energy security (NESDB, 2016), such as using PPPs to: improve agricultural productivity and value chain development; promote job and income security for Thai farmers; ensure that the management of agricultural industry are matched and balance with energy production; utilize science, research, technology and innovation to enhance knowledge-based economy; promote the use of R&D to increase food and agricultural productivity for economic growth and long-term

competitiveness in global market place; improve and develop infrastructure and logistics systems through private sector partnership.

However, follows the 11<sup>th</sup> edition NESDP, the 20-Year National Strategy was enacted by the Thai government. This long-term development direction for Thailand was drafted concordantly with United Nation's Sustainable Development Goals and aimed to lift the country from 3 growth traps: middle income trap, inequality trap, and imbalance trap. The 20-Year National Strategy is expected to help Thailand achieve sustainable stability, wealth, and development. Sometimes referred as the 6-6-4 plan, the 20-Year National Strategy covers 6 policy areas, consists of 6 key strategies, and 4 supporting measures.

Six policy areas covered in the 20-Year National Strategy are: 1) security, 2) competitiveness improvement, 3) human capital development, 4) social equity and equality, 5) green development, and 6) rebalancing and public management improvement. Under these policy areas, six primary strategies to foster growth include: 1) enhancing human capital potentials and capabilities, 2) building just society and reduce social disparities, 3) enhance overall economic competitiveness and sustainability, 4) promote sustainable and green development, 5) generate national's stability and prosperity, 6) enhance public sector efficiency and promote good governance. In addition, to guide course of action, four supporting measures were assigned covering in development of infrastructure and logistics system; science, technology, research and innovation; urban, regional, and economic zones planning; and international cooperation to sustaining growth (Government Public Relations Department; 2016)

The current edition of NESDP (the 12<sup>th</sup>, for 2017-2021) thus mapped out in line with the National 20-Year Strategy in order to guide the first five years of the policy implementation. In accordance with the 20-Year plan, 12<sup>th</sup> NESDP focuses on 10 primary strategic approaches to:

1. Enhance and improve potential of the country's human capital
2. Bring about social justice, equity, and equality
3. Strengthen economic and national competitiveness
4. Promote green growth and sustainable development
5. Sustain national stability for wealth and growth

6. Improve public management, promote anti-corruption and good governance
7. Develop infrastructure and logistics systems
8. Promote development of science, technology and innovation
9. Develop urban, regional, and economic zoning
10. Push forward international cooperation for development

Furthermore, the 12<sup>th</sup> edition of NESDP is continuing to highlight the importance of PPPs as a driver to achieve several development goals. There are 4 key strategies related especially to food and agriculture sectors, and PPPs are included in an action plan under each strategy. The key strategies for food and agro-industry are: strengthen farmer's institution and improve farmers' living standard; improve efficiency in food and agricultural production and management throughout the supply chain; increase industry's competitiveness by R&D and innovation; and adjust the management of food and agriculture production to balance with the environment preservation sustainably.

Under these strategies, PPPs are underscored as guidelines to:

- Improve agricultural productivity and value chain development;
- Promote collaborations between medium and large private companies and small holder farmers to enhance income and supply chain stability;
- Develop a national standard for food and agricultural product quality and safety;
- Improve the post-harvest management, as well as packaging design and final product quality control;
- Promote the transferring of farm certification and licensing procedures to government approved private organization;
- Develop market infrastructures and logistics systems via private partnership;
- Promote cross-sector investments within the frame of responsible agricultural investment;
- Promote E-Commerce market for food and agricultural products;



- Encourage cooperation between government and private firms, at local and at international level, for knowledge and technology transfers in water and other natural resource management.

Both 11<sup>th</sup> and 12<sup>th</sup> NESDP show that the most recent policy focus, especially in food and agro-industry, have been centered on research and development through the collaboration of PPPs. These partnerships often involve public agencies aiming to accomplish policy goals, while sharing risks or bearing financial burden with private firms. The increased awareness of utilizing cross-sector technology, knowledge, and risk sharing between private and government entities are also recognized in other nation's key development plans such as the policy framework of the Ministry of Agriculture and Cooperatives (MOAC), as well as in the organization goals of the National Science and Technology Development Agency (NSTDA).

### **2.7.2 The Ministry of Agriculture and Cooperatives Policy Framework**

MOAC's policy, before 2014 interim constitution of Thailand was enforced by the National Council for Peace and Order (NCPO), falls under the Public Administration Plan, Directive Principles of Fundamental State Policies under the Constitution of the Kingdom of Thailand, B.E. 2550 (2007), has included 3 main strategies for agro-industry the "restructure the economy of the agricultural sector". These strategies are:

- Promoting the development of farmers and agriculture institutes;
- Developing production to increase food and agricultural productivity;
- Developing fundamental factors and missions of the industry

MOAC's course of action under these strategies includes guidelines to promote and strengthen farmers' institutes by enhancing production and management efficiency and assisting with marketing for agriculture products; to increase the production profits, value-added processed foods, as well as reliable food safety standard and inspection process must be appointed; and lastly, to improve industry's overall efficiency, the development of water resource management and irrigation technology must be initiated. According to MOAC, PPPs are also suggested as a management tool, particularly in R&D steps, to ensure the success of its policy goals.

After NCPO took the legislative powers in 2014, the MOAC has push forward the “Single Command” policy as a booster for agricultural sector reform. Under the Single Command policy, the Minister of Agriculture Cooperatives Gen.Chatchai Sarikulya declared 6 keys strategies to yield concrete outcomes in the sector reform, these 6 strategies are:

- Zoning a proper usage of cultivation areas;
- Decreasing production cost to enhance competitiveness;
- Promoting large agricultural plots system;
- Encouraging organic farming;
- Establishing agricultural knowledge development learning centers;
- Setting up agricultural production banks in addition to cooperative

Under theses key strategies, several operational measures such as the implementation of Agri Map for a proper usage of different resources to suit cultivation and marketing, and the implementation of technology for farm management and market access improvement have to be put into place. In addition, private firms doing business in food and agricultural sectors were also encouraged to collaborate with public agencies to achieve national sector reforms. Mutual understanding in terms of development goals between public and private parties must be made. And PPPs, especially in R&D, technology transfers, and improving market access and facility are being promoted.

The Single Command system requires every agency under the MOAC to work as appointed by the reform strategies on their local areas. All provincial offices and officials are expected to cooperate with the Single Command system, but allow to make adjustments to their operation procedures to focus on an area approach that suit local resources and cultivation environment. To support this operational format, government has also set up public agencies to support R&D and production management for Thai farmers and enterprises in food and agro-industry. Two of the most important agencies providing these services are the National Science and Technology Development Agency (NSTDA) and the National Center for Genetic Engineering and Biotechnology (BIOTEC).

### **2.7.3 The National Science and Technology Development Agency (NSTDA) and the National Center for Generic Engineering and Biotechnology (BIOTEC) policy statements**

NSTDA and BOITEC are government agencies that are founded to support R&D in Thai food and agricultural sectors as a one-stop solution center with services such as technology and technical services, financial services, human resource development and training services, and business support consulting for production, marketing, and licensing services.

NSTDA is an agency established under the Ministry of Science and Technology (MOST) to promote investment in technology and innovation through PPPs for all sectors, including several in food sector. The organizational missions of NSTDA, which were set up to execute policy initiated by the National Science Technology and Innovation Policy Office (STI), highlight specifically on R&D, technology transfer, human resource development, and science and technology infrastructure development. By working with universities, private clients, and other public agencies, NSTDA has been growing fast and successfully in term of achieving its missions. With nearly 200 patents applied in 2010, the agency generated over USD30 million in co-investments with private partners (FAO, 2013). In 2016, more than 80 private companies are working with NSTDA researchers and over 500 projects are being developed. Most of the projects are multi-sector co-invested technology and innovation researches, several of them are with international companies.

Under NSTDA, BIOTEC is one of four technology centers that operate as a research institute for food and agricultural development. With more than 30 laboratories, 7 research centers in major universities, and over 150 scientists, BIOTEC is known as a leading research institution in Thailand and among Southeast Asian Nations (ASEAN). BIOTEC main purpose is to conduct R&D researches in various areas ranging from agricultural science, food processing innovation, environmental science, to biomedical. According to public archive, BIOTEC has 6 strategies to foster innovations and yield concrete outcomes in promoting biotechnology: 1) promote the transferring of technology between public and private sectors; 2) promote

public policy for investment towards biotechnology development; 3) develop security code of conduct and inspection systems in biotechnology application; 4) develop human resource in biotechnology; 5) promote the application of biotechnology and innovation in local communities; and 6) building partnership and network with regional and global partners for knowledge sharing and technology transfers. With tasks covering a wide spectrum, BIOTEC requires large amount of funding. In addition to government funding, BIOTEC's income comes from revenue from providing services, and non-governmental funding such as from private foundations' contributions and international funding agencies.

To support NSTDA and BIOTEC, in 2002 Thai government also established the country's R&D hub known as Thailand Science Park (TSP). To promote innovation development and R&D activities in Thailand's major industries, TSP was designed as ecosystem to encourage and support R&D linkage between government and private sector. With four national research centers and over 70 corporate tenants, of which 30 percent are international companies, and 2,000 full time researchers, TSP is now the largest fully-integrated research and development hub in Thailand, where private tenants can gain access to government's highly-skills personal and lab facility.

According to Dr. Sanat Wongthawethong, TSP's Director for Sales and Key Account Management Division, one of the major clusters in TSP research scheme is food production and food processing technology. Asia Food Technology Center, specialized in food preservation technology, and Food Innopolis are among other government projects that aim to position Thailand as a global food hub. Moreover, to promote R&D through public and private partnership, private companies in food related industries, who wish to collaborate with NSTDA, BOI, and TSP, will thus receive various privilege and incentives, such as exemption of income tax and permission to own land and facilitation on granting work permits and visa.

#### **2.7.4 Food Innopolis Project**

Operating under NSTDA, and located within TSP, Food Innopolis is government funded one-stop solution center for research, development, and Innovation (RD&I) service to private investors. With approximately USD 283.8 million in funds, Ministry of Science and Technology has prompted Food Innopolis

with resources availability comprise of 3,000 researchers, 10,000 students in Food Science and Technology, 9,000 food factories, 150 food research laboratories, 20 pilot plants, and 70 universities as partners (TIR, 2016). The key goal of Food Innopolis is to create a linkage between public and private sectors, from large, international companies, to SMEs and startups companies in the country, in order to support innovations and value added in food supply chain, as well as to support other industry reform measures indicated in Thailand 4.0 policy.

As stated by Ms. Sutheera Arjcharoen, Business Development Manager for Food Innopolis, the project emphasizes on 3 key areas: healthy food, value added food, and food innovation. In fostering development and competitiveness in Thailand's food industry, the scopes of the project's mission were:

- 1) To support food innovation and technology in
  - food products and processing development;
  - packaging and logistics system development;
  - food production and auto-engineering manufacturing development;
  - research consulting and human resource development
- 2) To support food safety standards and inspection systems development by
  - setting up a one stop service for food safety information;
  - providing inspection service for food quality and safety in accordance with global standard;
  - building service network with international food inspection agencies;
  - facilitating for food safety licensing and patent granting
- 3) To provide infrastructure for research laboratories and innovation centers
- 4) To provide business consulting and marketing services such as startup business incubation service, human resource training, marketing survey, and intellectual property protection.

Moreover, as Food Innopolis belongs to one of the BOI's super cluster (as stated in Thailand 4.0 policy statements), BOI thus also offers wide range of tax and non tax incentives for private partner in food industry. Tax-based incentives include the exemption of corporate income tax for up to 8 years, with additional 50% reduction for 5 years, special accelerate depreciation rate for R&D machineries and



equipments, and 300% tax deduction for R&D expense. While non-tax based incentives include of legal privileges for international companies to own land, as well as special facilitation on visas application and work permits procurement.

## **2.8 Thailand 4.0 Strategy**

Thailand has been implementing strategies for social and economic developments for decades. The first development model or Thailand 1.0 strategy was designed to promote traditional agriculture and utilizing country's natural resources and biodiversity as a driven force for development. Then, in era of modernization, Thailand 1.0 was replaced by Thailand 2.0 model. Under Thailand 2.0 model, light industries were promoted by government, particularly for import-substitution policy. Later, Thailand 3.0 model was enacted to support the growth of heavy industries such as productions of electronic products, vehicles parts, and petrochemical industry. Under Thailand 3.0 model, production for export was emphasized to generate national income. Policies to enhance production efficiency and basic services were highlighted, and industrialization was a main focus for years.

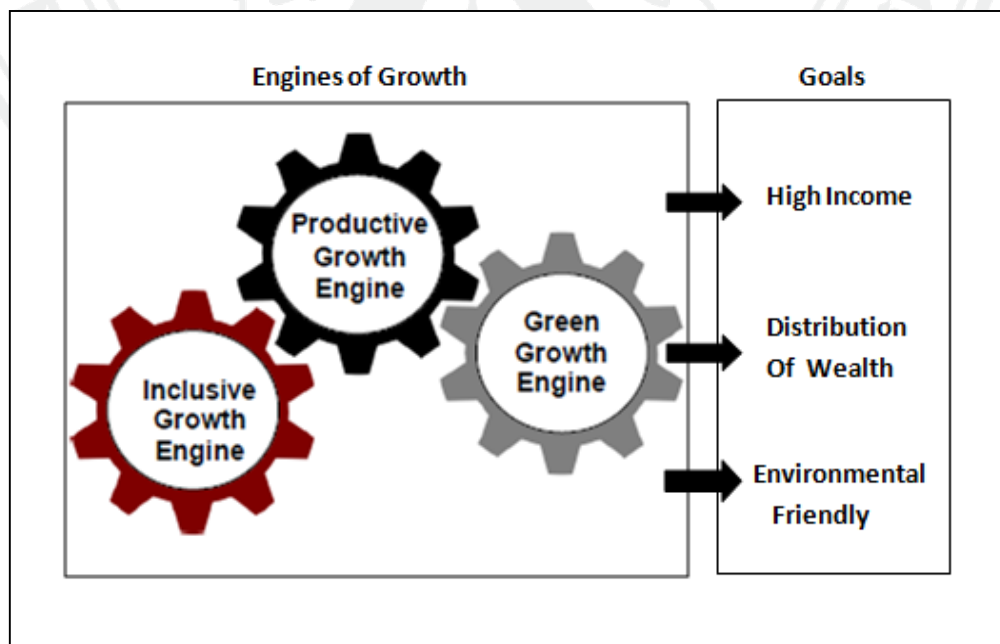
However, a decade of Thailand 3.0 model has left the country with several development issues. Firstly, Thailand is now facing traps of developing country; the Middle-Income Trap, the Imbalance Trap, and the Inequality Trap. Secondly, according to IMD and WEF, Thailand was marked as a country with low National Competitiveness, especially in science and technology. Thirdly, as stated by World Bank, major indications for development, such as public investment in R&D, basic infrastructures for science and technology, and public management efficiency, were lacked in Thailand as well (MOI, 2016). Besides, the performance of industry sector in the past 10 years has also been dropping. With only average 3 percent GDP and 2 percent in investment growth rate annually, the industry sector is suffering from industrial regression and obviously incapable for achieving the 20 Year National Strategy goal of becoming a developed country by the year 2036. Consequently, to resolve these crucial setbacks, the government decided to carry out the Thailand 4.0 model; not only to boost the nation's economic performance, but also to shift the development paradigm from efficiency-based focus to sustainable growth.

Thailand 4.0 model was designed to adjust the nation's economic structure from efficiency drive economy to innovation drive economy, particularly in three key dimensions: 1) Production of commodities must be developed to innovative production; 2) economy must be driven by technology, creativity, and innovation, instead of industry sector; 3) rather than commodities production, service sector must be emphasized (Ibid).

Accordingly, the restructuring process also requires transformations of four major industrial principles. Firstly, there must be transformation of traditional farming to smart farming, managed and guided by technology, with farmers' entrepreneurship. Secondly, Traditional SMEs, usually depending on government support, must be transformed to Smart Enterprises, Startups Business, or Innovation Driven Enterprise (IDE). Thirdly, Traditional services with lower value-added must be transformed into High Value Services. And lastly, labor forces must be developed from unskilled to skilled labor.

### 2.8.1 Thailand 4.0 Engines of Growth

To transform Thailand into innovation driven economic nation, Thailand 4.0 model has mapped out three engines of growth as a driver for the country's development (Ibid).



1. **Productive Growth Engine:** the productive growth engine was designed to elevate Thailand from Middle Income Country to High Income Country by utilizing science, technology, and innovative thinking, particularly through PPPs, R&D development, business incubation, and public new management.
2. **Inclusive Growth Engine:** the inclusive growth engine aimed to increase equal and inclusive participation from public, private, and civil society in national development plan by urban and suburban community development, promote social enterprises, and develop workforce technological skills and knowledge, etc. this inclusive growth engine was expected to eradicate the root causes of inequality trap that the country is facing.
3. **Green Growth Engine:** the green growth engine comprises of policies to shift the industry sector's idea of Cost Advantage to Lost Advantage, which was rely heavily on environmentally friendly and resources preservative productions, in order to overcome the nation's imbalance trap.

The three growth engines as mentioned above were designed to convert the country's comparative advantages, biodiversity and cultural diversity, onto competitive advantages in global market. And by utilizing science, technology, innovation, and creative thinking into the nation's production and management, Thailand 4.0 model is expected to transform former structure of industry sector to the new and developed manufacturer. Under Thailand 4. 0, Thai industries must reconstruct their production systems and remodel their management way of thinking.

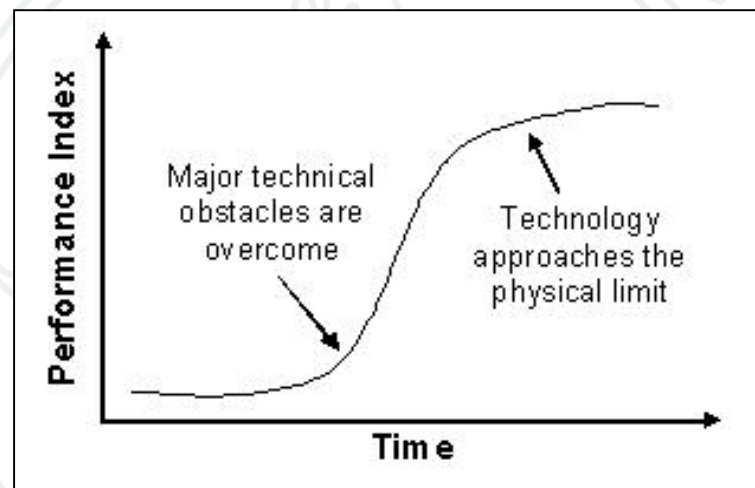
### **2.8.2 The Industrial Restructuring Program**

Industrial restructuring program emphasizes on industries that possess high production technology and has potential for technological and innovation development.

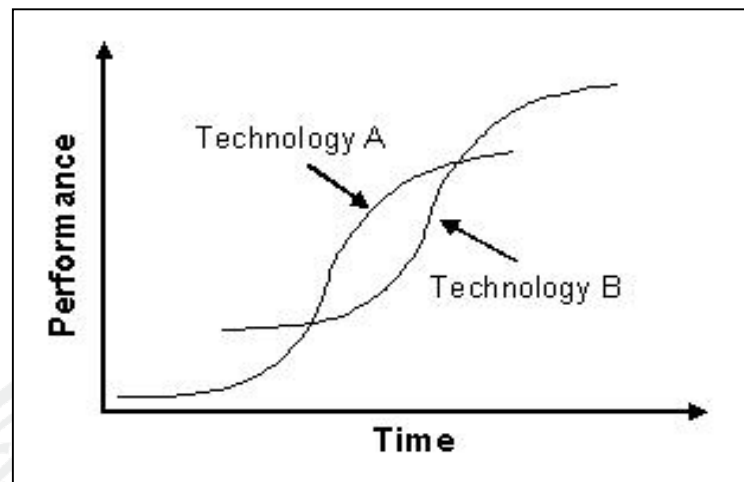
Generally, technology and innovation have a lifecycle that can be portrayed using an S-Curve graph. An "Innovation S-Curve" is used to determine or analyze an industry's performance at different stages regard to time and effort. It also helps to

understand the growth of technology or innovation regarding to the efficiency and cost to boost the technology in different period of time; the stage of introduction, growth, and maturation.

In the early stage, large amount of money and resources are spent on boosting the new technology. Then, as the technology expands and knowledge accumulates, innovation reaches a certain adoption level and rapid growth will take place. Finally, technology or innovation starts to approach its physical limits, the gain from time and effort span yield lower performance while higher cost or resources are required to overcome technical obstacles (Scocco, 2006).



To survive, new innovation or technology must be initiated in parallel to create a new S-curve. The new S-curve, shifted to the right of the original one, will possess higher limit and continue to mature as a new driver for the next technology to come, as the figure below shows.



Similarly, for the continuity of country's industrial development, the new technology and innovation or the new S-curve must be launched. Under Thailand 4.0 model, major industries were classified according to their potential to develop innovatively into strategic 3 groups: the First S-Curve industries, the New S-Curve Industries, and the 2<sup>nd</sup> Wave S-Curve Industries (MOI, 2016).

The First S-Curve industries are the country's former key industries that used to generate large amount of economic contribution but are approaching to their physical limit and facing with the reduction of growth rate. Without production development in science and technology, industries in this group could be confronting with low competitiveness in global market place. The industries in this group comprise:

- Modern automotive industries such as production of parts for hybrid vehicles, electric vehicles, and plug in hybrid electric vehicles (PHEV);
- Intelligent electronics industries such as production for sensors, electronic controlling devices, Smart homes, CCTV, and wearable devices;
- High value service and health tourism industries such as long stay services and medical tourism;
- Agriculture and Bio-technology industries such as the production for natural active ingredient, and natural rubber products;
- Food processing industries such as the production of functional foods, food supplement, and food innovation.



By further develop the production design, these First-S-Curve Industries are expected to generate short-term and mid-term growth for the economy under Thailand 4.0 model.

The New S-Curve industries are industries with intensive use of technology and innovation in the production process. Industries in this group are believed to have high potential to grow and expected become the new generation of industries that bring about main source of income for the country. Industries considered as new S-Curve are:

- Robotics industries such as medical robotics, auto-robotics machines and devices in heavy industry production;
- Aviation and Logistics industries such as Maintenance Repair and Overhaul (MRO), Time Sensitive product manufacture, Drone, and aviation institutes;
- Bio-fuels and Bio-chemical industries such as production for bio-chemical, bioplastic, bio-fuels, and bioeconomy development;
- Digital industries such as production for embedded software, enterprise software, digital content, cloud computing, cyber security, Internet of Thing, Smart City, and E-Commerce services;
- Medical Hub related industries such as productions of biologic medicines, biosimilar products, herbal products, and Thai traditional medical products.

These new S-Curve industries, although possess high potential in growth rate, are still in its introduction stage, where large amount of resources are required to boost the progress. Thus, support from government is crucial. If succeed, the outcome is expected to generate approximately 30 percent of targeted income per capita in the next 20 years.

The third group of industries is considered needing reformation. These 2<sup>nd</sup> wave S-Curve industries are mostly traditional production manufactory that facing lower rate in growth with limited technological adaptation. These 2<sup>nd</sup> wave industries include textile and garment industry, leather industry, jewelry industry, metal

industry, glass industry, ceramic industry, mortar and cement industry, lumber industry, and petrochemical and plastic industry.

Under Thailand 4.0, these 2<sup>nd</sup> wave S-Curve industries must be reformed and integrated into new groups of industries as follows

- Textile and garment industry, leather industry, and jewelry industry must be reformed and merged into “fashion industry” to produce creative clothing, functional wear, sportswear, medical and nanotech wear;
- Metal industry, glass industry, ceramic industry, mortar and cement industry, along with lumber industry must be reformed and merged into “material industry” which aimed to produce composite materials, environmental friendly and sustainable materials;
- Petrochemical and plastic industry must be reformed and improved traditional production to be more clean and sustainable.

In addition to restructuring and strategically reorganized key industries, five core technologies that will be used as tools to transform the country’s Comparative Advantages to Competitive Advantages and will be employed as driven forces for science and technology development for industrial reforming were also indicated.

The core technologies utilized in Thailand 4.0 industrial reforms are classified into five groups with expectation to enhance 10 industry clusters and 13 startups as follows:

Core Technology	10 Industry Clusters	Startup
Food, Agriculture, and Bio-technology	Food processing, Agriculture and Biotechnology	<ul style="list-style-type: none"> <li>• Foodtech</li> <li>• Agritech</li> <li>• Biotech</li> </ul>
Health, Wellness, and Bio-Medical	Medical Hub	<ul style="list-style-type: none"> <li>• Healthtech</li> <li>• Meditech</li> </ul>
Smart Devices, Robotics, and Mechatronics	Robotics, Modern Automotives, and Aviation and Logistics	<ul style="list-style-type: none"> <li>• Robotech</li> </ul>
Digital, IoT, Artificial Intelligence and Embedded Technology	Digital and Intelligence electronics	<ul style="list-style-type: none"> <li>• E-Commerce</li> <li>• E-marketplace</li> <li>• Edtech</li> </ul>
Creative, Culture, and High Value Service	Tourism	<ul style="list-style-type: none"> <li>• Designtech</li> <li>• Traveltech</li> <li>• Lifestyle Business</li> <li>• Service Enhancing</li> </ul>

Source: Ministry of Industry, 2016

1. Food, Agriculture, and Bio-technology, focus primarily on industry clusters of food processing, agriculture and biotechnology, and biofuels and biochemical products, to support Agritech, Foodtech, and Biotech startups;
2. Health, Wellness, and Bio-Medical, focus primarily on medical hub related industries that help boosting Healthtech and Meditech startup business;
3. Smart Devices, Robotics, and Mechatronics, focus primarily on robotics, modern automotives, and aviation and logistics industry clusters, in order to develop Robo-technology startups;
4. Digital, IoT, Artificial Intelligence and Embedded Technology, focus primarily on industry clusters of digital and intelligence electronics production, to

support the growth of E-Commerce, Edtech, E-Marketplace, IoT, and Big Data management startups;

5. Creative, Culture, and High Value Services, focus primarily on tourism industries, in order to help Designtech, Traveltech, Lifestyle business, and service enhancing startups to grow.

### **2.8.3 Food Industry Development Strategy**

As described above, Food Industry not only is one of the key First S-Curve industries but also included in a core technology that crucial for Thailand industrial development process. This is not surprising since food and agricultural sector have always been Thailand's Comparative Advantage and have been covered in every edition of NESDP since the first edition was enacted back in 1961.

According to Thailand 4.0, three primary strategies to develop and enhance science, technology, and innovation in food industry are:

1. Promote industry transformation to innovation driven production: the goal of this strategy is to increase production and management efficiency in food industry by utilizing science, technology and digital devices, as well as encouraging the founding of Innovation Driven Enterprise ( IDE) , within framework of green and sustainable production. This strategy comprises of three key tactics which are:

- Enhancing standard, productivity, and innovation;
- Enhancing Innovation Driven Entrepreneurship;
- Strengthening collaboration network among members in the industry

2. Adjusting layout for the industry reform: the goal of this strategy is to improve the ecosystem and environmental layouts to support industry reform, especially under public realm where investment for R&D must be heighten and support for technical adjustments must be enhanced. This strategy comprises of three key tactics which are:

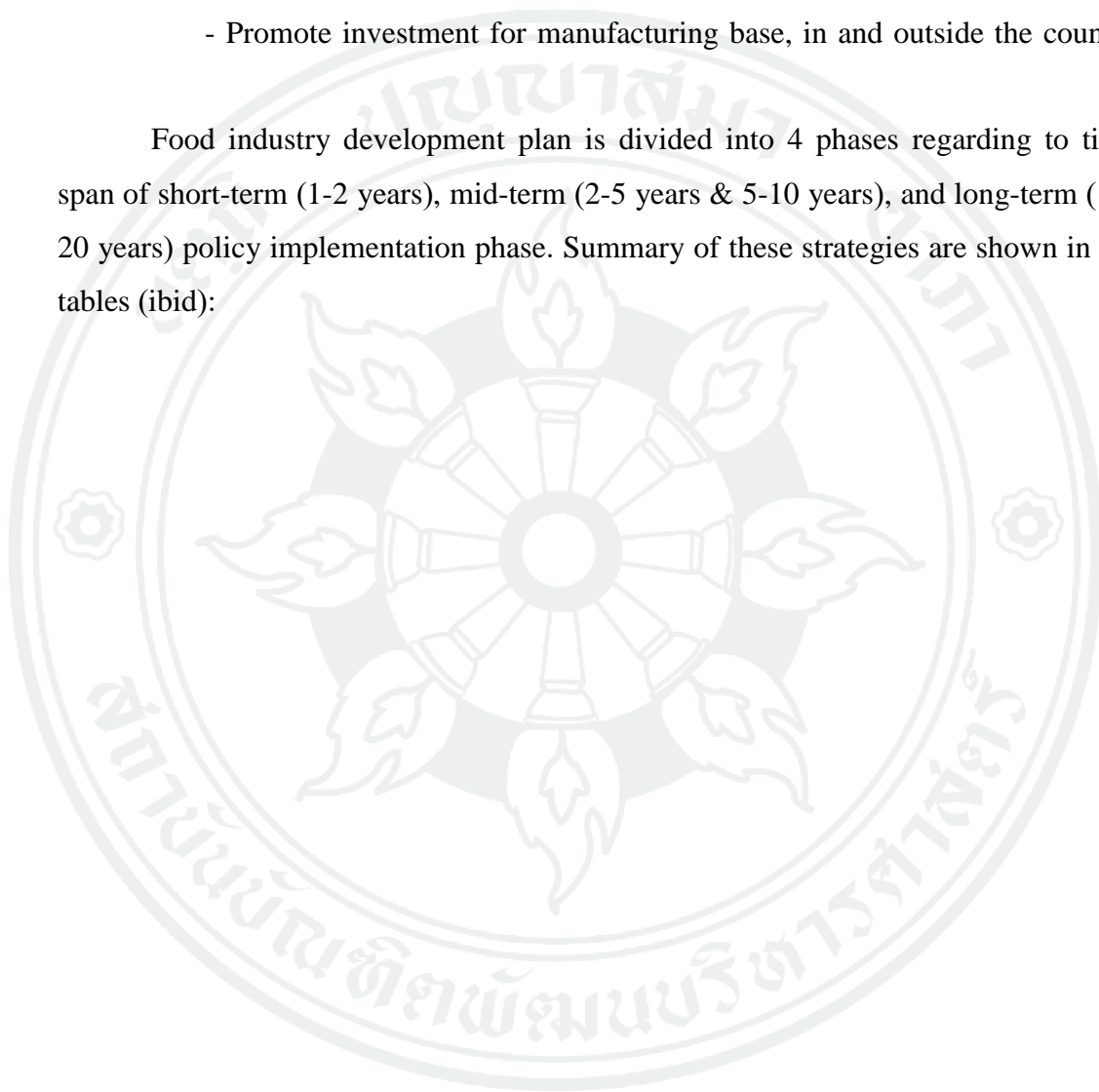
- Developing agile government agency;
- Developing infrastructure for business ecosystem;
- Re-skilling human capital and improve workforce potentials

3. Connecting Thai food industry to global economy: the goal of this strategy is to encourage new production design that match with global demand, by

transforming traditional supply chain to modern value chain correspondingly with international requirements and standards. This strategy comprises of three key tactics which are:

- Integrating Thai food industry to global value chain
- Connecting Thai products to global market by using digital technology
- Promote investment for manufacturing base, in and outside the country

Food industry development plan is divided into 4 phases regarding to time span of short-term (1-2 years), mid-term (2-5 years & 5-10 years), and long-term (10-20 years) policy implementation phase. Summary of these strategies are shown in the tables (ibid):





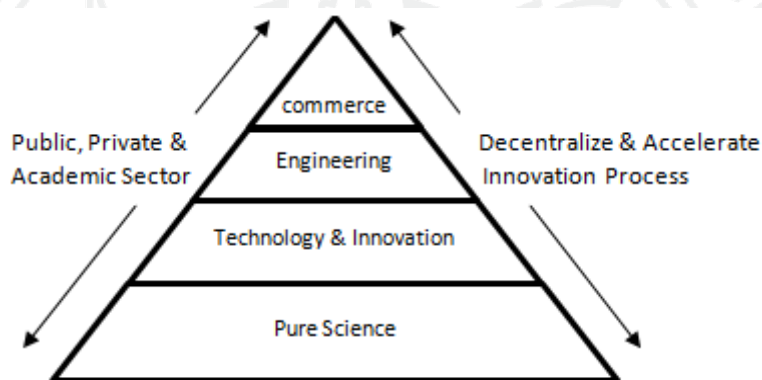
Strategy		1-2 years	2-5 years	5-10 years	10-20 years
1. Promote Industry Transformation	1.1 Enhance Standard, Productivity and Innovation	<ol style="list-style-type: none"> <li>1. Map out productivity plan</li> <li>2. Utilize innovation into production lines</li> <li>3. Promote good governance for productivity enhancement</li> <li>4. Set up production standards</li> <li>5. Enhance productivity process</li> </ol>	<ol style="list-style-type: none"> <li>1. Promote use of Robotics and automation equipment</li> <li>2. Promote standardization throughout the industry</li> <li>3. Promote green and environmental friendly production</li> </ol>	<ol style="list-style-type: none"> <li>1. Enhance pilot enterprises to leading R&amp;D firms at regional level</li> <li>2. Promote green industrialization</li> </ol>	<ol style="list-style-type: none"> <li>1. Enhance pilot enterprises to leading R&amp;D firm at global level</li> <li>2. Promote Thai brands as World class products</li> <li>3. Promote low carbon industry</li> </ol>
	1.2 Enhance Innovative Driven Entrepreneur (IDE)	<ol style="list-style-type: none"> <li>1. Strengthen food industry to “new warrior” industry</li> <li>2. Promote IDE and Startups</li> <li>3. Promote Smart SMEs</li> <li>4. Establish system integrator business</li> <li>5. Develop SME rescue center and Cultural Industrial Village</li> </ol>	<ol style="list-style-type: none"> <li>1. Promote accelerator for Startups</li> <li>2. Support Startup entrepreneurs for skill development</li> <li>3. Strengthen IDE</li> <li>4. Support the growth or Smart SMEs</li> <li>5. Promote industrial networking</li> </ol>	<ol style="list-style-type: none"> <li>1. Promote Thai entrepreneur in global market</li> <li>2. Connect Thai entrepreneurs to global high value chain</li> </ol>	<ol style="list-style-type: none"> <li>1. Encourage Thai entrepreneurs to become World-class company</li> </ol>
	1.3 Strengthen Collaboration Network	<ol style="list-style-type: none"> <li>1. Promote association for small holder business</li> <li>2. Connect associations to MOI database</li> <li>3. Promote inclusive growth</li> </ol>	<ol style="list-style-type: none"> <li>1. Connect small farmers to large companies</li> <li>2. Connect firms throughout the supply chain</li> <li>3. Promote PPPs</li> </ol>	<ol style="list-style-type: none"> <li>1. Connect Thai firms to regional industrial network</li> </ol>	<ol style="list-style-type: none"> <li>1. Connect Thai firms to global industrial network</li> </ol>

Strategy		1-2 years	2-5 years	5-10 years	10-20 years
2. Layout for Industry Development	2.1 Develop Agile Government Agency	<ol style="list-style-type: none"> <li>1. Restructure government agencies for efficiency</li> <li>2. Set up standardize agencies for unity in standard setting</li> <li>3. Improve government management system suitable for industry reform</li> <li>4. Adjust legal and technical agencies to support change</li> </ol>	<ol style="list-style-type: none"> <li>1. Reengineer Functional Unit to Agenda Unit</li> <li>2. Adapt public role from regulator to facilitator</li> <li>3. Set up One Stop Services agency</li> </ol>	<ol style="list-style-type: none"> <li>1. Restructure Thai bureaucracy</li> </ol>	<ol style="list-style-type: none"> <li>1. Implement public sector restructuring plans</li> <li>2. Connect government agencies into One Stop Service</li> </ol>
	2.2 Develop Infrastructure for Ecosystem	<ol style="list-style-type: none"> <li>1. lay out infrastructure for Smart SME Estate</li> <li>2. Promote collaboration among R&amp;D and standardize agency</li> <li>3. Set up Industry Transformation Center and World Food Valley</li> <li>4. Develop digital infrastructure</li> <li>5. Set up intermediary agency for conflicts settlements</li> </ol>	<ol style="list-style-type: none"> <li>1. Develop infrastructure for industry reform</li> <li>2. Enhance digital infrastructure throughout the country</li> <li>3. Develop service provider to One Stop Service</li> </ol>	<ol style="list-style-type: none"> <li>1. Improve digital infrastructure to global standard</li> </ol>	<ol style="list-style-type: none"> <li>1. Enhance Special Economic Zones to regional trade and investment hub</li> </ol>
	2.3 Re-skill Human Capital	<ol style="list-style-type: none"> <li>1. Re-skill HC for ICT utilization</li> <li>2. Re-skill workforce in technology adaptation</li> </ol>	<ol style="list-style-type: none"> <li>1. Promote R&amp;D experts</li> <li>2. Set up int' network for HR development</li> </ol>	<ol style="list-style-type: none"> <li>1. Enhance workforce development network into regional HC hub</li> </ol>	<ol style="list-style-type: none"> <li>1. Produce high skill human capital to global market</li> </ol>

Strategy		1-2 years	2-5 years	5-10 years	10-20 years
3. Connect to Global Market	3.1 Integrate to Global Value Chain	<ol style="list-style-type: none"> <li>1. Promote Thai entrepreneurs at global level</li> <li>2. Connect Thai entrepreneurs to World's leading food companies</li> <li>3. Connect the country's value chain to ASEAN members' value chain, especially in Future Food and Biotech</li> <li>4. Enhance the industry standard to global standard</li> </ol>	<ol style="list-style-type: none"> <li>1. Promote collaboration between Thai entrepreneurs and World Class brands</li> </ol>	<ol style="list-style-type: none"> <li>1. Support Thai entrepreneurs as global suppliers</li> </ol>	<ol style="list-style-type: none"> <li>1. Develop Thai food industry into global industrial chain</li> </ol>
	3.2 Connect Product & Market	<ol style="list-style-type: none"> <li>1. Promote the use of IT for international communication between Thai and foreign entrepreneurs</li> <li>2. Promote E-Market Place</li> <li>3. Promote E-Payment system development</li> </ol>	<ol style="list-style-type: none"> <li>1. Enhance the number of entrepreneurs in digital marketplace</li> <li>2. Promote the use of E-Payment among Thai entrepreneurs</li> </ol>	<ol style="list-style-type: none"> <li>1. Improve security system for E-payment</li> <li>2. Digitally develop logistics system</li> </ol>	<ol style="list-style-type: none"> <li>1. Capable of effectively utilize digital devices for communications between local and global networks</li> </ol>

#### 2.8.4 The Role of Public and Private Sector in Thailand 4.0 Strategy

In order to achieve development goals, it is crucial that every stakeholder in the industry's supply chain must be actively cooperated. From raw material provision, production, service, to distribution, every actor involving must integrate and work with each other to help enhance the level of efficiency throughout the food industry sector. Hence, the main role in development process is not exclusively rely on public sector, but private sector, service sector, academic institutions, along with civil society have to adjust their role and provide their unique expertise into the process. Thailand 4.0 process of industry development comprise of 4 key cooperative phases: Pure Science, Technology and Innovation, Engineering, and Commerce.



Cross-sector Collaboration for Development in Thailand 4.0

1. **Pure Science phase:** Pure Science phase is the beginning phase for science and technology development, which emphasizes on improving knowledge and support R&D in basic sciences in order to enhance industry development to the next phase. Under this phase, Ministry of Science and Technology, academic institutions, research agencies, Ministry of Education, and Ministry of Agriculture and Cooperatives are appointed as primary organizations driving development plan.

2. **Technology and Innovation phase:** This phase underscores the utilization of scientific knowledge to create new technologies and innovations that would help enhance the industry's efficiency and competitiveness. Key agencies assigned as a front row players are Ministry of Science and Technology, academic institutions, and Ministry of Labor and Social Welfare.

3. Engineering phase: An Engineering phase refers to an application of invented technologies and innovations to the production process. Under this phase, Ministry of Industry is assigned as a key agency to ensure that overall production procedure will be carefully planned and designed to employ appropriate technology while minimize the use of natural resources.

4. Commerce phase: the final phase refers to the commercialization of technological developed goods and services to generate national income. Market infrastructure, marketing strategies, distribution and logistics systems, as well as public relations must be enhanced. Throughout the Commerce phase, Ministry of Commerce will be appointed as key organization to carry out the strategies alongside with private firms, financial institutions and banks to ensure the favorable outcome of the development plan.

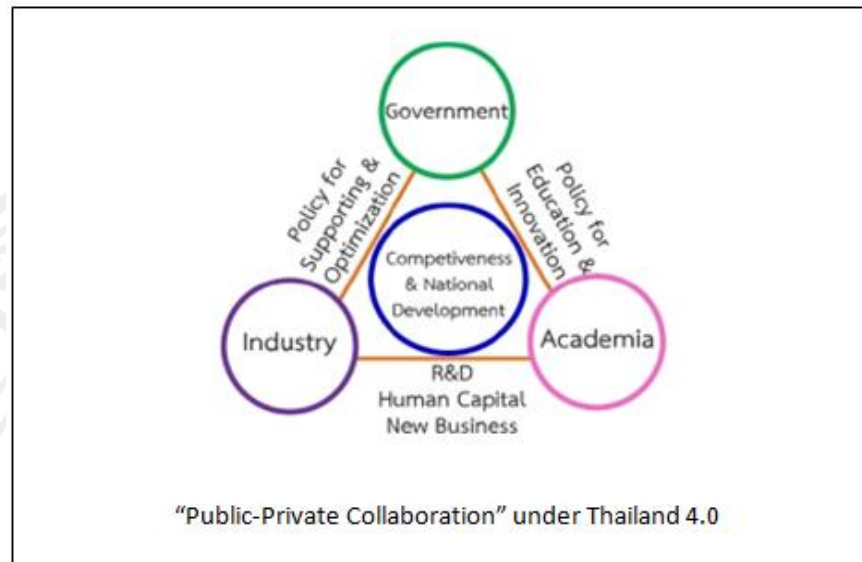
As outlined, these strategies for food industry development can be seen as a linkage between cross-sector stakeholders, utilizing different types of expertise provided by private firms, financial institutions, banks, universities, civil society, and public sector or government support role as a facilitator, to strengthen the industry's capacity throughout the supply chain.

In addition, cross-sector partnership is also highlighted in the concept of "Pracha Rath" or "Civil State" through "Public-Private Collaboration" mechanism. Under Civil State approach, the Thai government has combined Public-Private Partnership and Thailand 4.0 strategy to support industrial development, whether for productivity improvement, global market entering, or research for innovation. In his national address on the program "Return Happiness to the People" on 1 July 2016, the Prime Minister General Prayut Chan-o-cha stated that in achieving the goal of Civil State policy, a voluntary cooperation from all sectors, public, private, and civil society, is needed to move the country forward to "Stability, Prosperity, and Sustainability" (Government Public Relations Department, 2016).

By providing their unique expertise and competence, contributions from all sectors are expected to help accelerate the industry's technological development. With help from government on facilitating legal framework, infrastructure development, and global market access, private sector can provide their expertise on R&D,



investments, and human capital development, while academic institutions and research agencies may contribute on knowledge enhancement, labor re-skilling, and technology transfers.



Source: Ministry of Industry, 2016

## 2.9 Overview of PPP in Thailand

Variations of public-private partnerships (PPPs) have been customarily practiced in Thailand for many decades, often in infrastructure projects or long-term public services focusing on cost-effective operations. In these projects, the private sector will participate in various activities including construction, operation and maintenance, financing, and provide necessary service throughout the contract period. Therefore, PPP is seen as an important means for the state to develop infrastructure and improve public service as seen in the National Economic and Social Development Plan, National strategy, and policies of government agencies, where the importance and promotion of PPP have been addressed.

In general, PPP operations in Thailand are often contracted by the public and private sectors to co-invest in long-term projects and transfer risks in the construction and operation of public services to the private sector depends on the ability to manage risks between public and private partners. While the government may have to pay unitary payments to the private sector, the private sector may have to pay a share of

revenue to the public sector. Private partner may also be fined and not paid for state services if the service standard does not comply with the contract. Therefore, the details of the PPP agreement are very important.

Prior to 1992, the approval of any PPP infrastructure project depended on discretion of the relevant ministers. There was no specification of procedure since regulations and qualifications related to concession or approval of any infrastructure projects. Thus, it can be understood that the details of those matters are solely in the relevant ministers' discretion. This caused corruption during the process of approval by politicians. Then, for the purpose of diminishing severe corruption situation, the regulation solely focus on PPP project was enforced. The Private Participation in State Undertaking B.E. 2535 (the "PPSU Act") was enacted to be a legal framework regarding concession of the state in private sectors. Unfortunately, this act had a number of drawbacks such as no procedure of procurement and contract amendment, lacked clear-cut criteria addressing matters of scope, duration and authority with regard to initiating and implementing PPPs, and thus seen as ineffective to facilitate accomplishment of the PPP project. It has been effective for about twenty years and was terminated in 2003. As a result, on April 4th, 2013, the government then enacted the Private Investments in State Undertakings Act B.E. 2556 (2013) (the "PISU Act").

### **The Private Investments in State Undertakings Act B.E. 2556 (the PISU Act)**

Came into effect on April 4th, 2013, the PISU Act explicitly remarked that Thailand is in need of infrastructure constructions and various other forms of public services. The same imperative is echoed in many other state publications addressing the state policy stated in the Constitution, development goals and plans. Drafted from this vantage point, the PISU Act promotes private participation and attracts private investors by offering transparent, streamlined accountable procedures in relation to PPPs to be taken into account in any risk-benefit analyses. The essence of the the PISU Act, as amended from the PPSU Act, is summarized below.

- 1) Abolition of The Private Participation in State Undertaking Act B.E. 2535
- 2) The PPP Committee was established as an agency responsible for performing the duties directly under this law.

3) The first Strategic Plan for Private Participation in State Undertaking for the years 2015–2019 was published by the Committee (the PPP Strategic Plan). This strategic plan lay out the systematic, five-year plan that comply with the National Economic and Social Development Plan, titled ‘Project Pipeline’, comprehensively identifies all development focus areas and the respective state agencies responsible for its implementation, otherwise known as host agencies. The PPP strategic plan also includes the newly developed Fast Track regime which enables the government to productively use innovative PPP instruments as mechanisms in carrying out various infrastructural projects in Thailand.

4) Rules and procedures for PPP project were outlines, starting from the process of project proposal, project implementation, and project oversight and monitoring.

5) The determination of the value of projects to be implemented under this law, in addition to projects worth one billion baht or more, can be set by the Ministerial Regulation instead of A Royal Decree as in the old law.

6) Reduced unnecessary steps and timelines for operational clarity. The process of proposing the matter to the Cabinet is reduced to only one step at the final project approval. The clearer timelines for each step lead to faster implementation of the project operations.

7) Procedures in case of the need to amend the contract are revised.

8) The "PPP Promotion Fund" was established to support the development of strategic plans and support for state agencies in proposing projects in line with the PPP Strategic Plan as well as the preparation of the study, project analysis, and to hire consultants.

9) The penalty in the case of the provisions set is violated by a committee established under this law was imposed (imprisonment for up to three years, or a fine not exceeding six hundred thousand baht, or both)

As seen above, the PISU Act is composed in a way that a series of ancillary laws could ensue after its enactment. These can manifest in the form of a Notification issued by the State Enterprise Policy Office (the Office), a Notification issued by the Public-Private Partnerships Policy Committee (the Committee), or a Ministerial Regulation. When prescribed to applicable areas of the PISU Act, these notifications

and regulations serve to clarify some of the rules governing certain procedures in relation to PPPs. Having a certain and efficient PPP law could persuade the private investor to invest in the public service project. And as a result, this would benefit substantially to the nationwide.

Since the PPSU Act was not imposed the secondary rule regarding process to propose the PPP project, the PISU Act was then stipulated that the proposed project must have the following details:

- 1) The host agency conducts feasibility study and analyzes the details of the project.
- 2) The host agency hires advisor to formulate a report and analyze the project and then submits the report to the responsible ministry. The responsible ministry has to complete the consideration on the report within sixty days from the submission date.
- 3) The host agency proposes such report to the State Enterprise Policy Office (SEPO). The SEPO, then, deliberates and delivers its opinion to the PPP Committees. Besides submitting the report to the SEPO, the comment from the National Economic and Social Development Board and related organization is also required.
- 4) In the case of utilizing the public budget, the commentary from the Bureau of the Budget is needed to submit along with comment from the SEPO.
- 5) In case of the project required public budget or guarantee by the Ministry of Finance, after approval from the PPP Committee, the PPP project shall be sent for approval from the Cabinet
- 6) After approved by the PPP Committees or the Cabinet, the host agency formulates a draft invitation to tender for private investment, draft terms of reference and draft private investment contract.

However, there are some obstacles in producing the feasibility assessment of the project implementation under such regulations. Due to time consuming process on obtaining a budget allocation and recruiting consultants to provide advice and provide feasibility studies on project impacts, it may take more than a year for Government Budget Bill to be enacted. Therefore, "PPP Fund" is set up with a government subsidy of 500 million Baht to resolve the delay issue and to facilitate the project approval, as

well as to support for strategic planning, and the study and analysis of the project. Under this law, there are two types of funds allocation:

- Grant for survey and preparation of the PPP project in government affairs, according to government strategic plan, hearings from government agencies and the public concerned in strategic planning, and hiring an office advisor to do so.

- Lending and repayment funds for the Selling Fees, the auction fees, document evaluates fees, the investment proposal fees, and the signing fee of the joint venture contract. This type of lending fund must be repaid within 14 days from the date of receipt of the fee until the loan is fully paid.

In addition, to generate interest and attract private investors to participate in the government projects, the Public-Private Investment Strategic Plan for 2015-2019, under the five-year framework, was approved by the Cabinet on May 26, 2015 and came into effect on June 10, 2015.

### **The Public-Private Investment Strategic Plan for 2015-2019**

This systematic, five-year plan comprehensively identifies all development focus areas and the respective state agencies responsible for its implementation. The essence of the Public-Private Investment Strategic Plan for 2015-2019 includes:

1. The Strategic Plan imposes the government to have the public private investment strategic plan which indicated the five-year plan on PPP projects. This plan must follow to the Constitution and Economic and Social Development Plan. In order to establish this plan, it is required public hearing. This plan is binding all relating governmental bodies to purpose and initiate projects coherent to the strategic plan. It is a tool of the cabinet and PPP committees to evaluate each project.

2. Under PISU Act, there must be an appointment of the PPP Committees whom the Prime Minister is the president and the Minister of Finance is the vice president with fifteen other committees. The PPP Committees have responsibilities to arrange the strategic plan and purpose to the cabinet as well as approve the PPP project. Moreover, the committees have a duty to issue the rules and regulations regarding the PPP and to consider legal issues relating to PPP projects. In addition, the PPP Committees have power to indicate qualification of prohibited private sectors or advisors



3. The SEPO is designated to be a secretary of the PPP Committees and have responsibilities to prepare draft rules and procedures for private investment in State Undertaking in projects having a lesser value than the amount stated in the Act for submission to the Committees, prepare draft monetary or fiscal measures or approaches for supporting private investments in State Undertaking for submission to the Committee, report problems and obstacles arising from the implementation of this Act to the Committee, and formulate a draft Strategic Plan for the Committee's approval.

4. After the PPP contract was executed, the Responsible Minister shall designate a supervision committee to monitor and supervise the PPP project to follow the terms and conditions of the PPP contract and report the outcome to the Responsible Minister. Interestingly, if the Host Agency fails to comply with the PPP contract, the supervision committee shall report to the Responsible Minister as for ordering the Host Agency to comply as such. It should be noted that the PISU Act has no measure to protect the rights of the private party when the Host Agency defaults.

5. In order to conduct feasibility study, the budget for feasibility study usually derives from state budget which takes time to acquire, so that the new law imposed the establishment of the PPP Fund under the Ministry of Finance. This fund will support the PPP project according to the strategic plan to hire the consultant to conduct the feasibility. As a result, such fund becomes an important tool to help the achievement of PPP projects.

6. The host agency has a duty to plan the measure after the expiration of the contract. This must be purposed five years prior to the expiration date. In the case that the Cabinet suggests the private participation to be continued after expiration, it has to follow the procurement rule under the PISU Act again.

7. Since the PPSU Act was not imposed the secondary rule regarding evaluation of PPP project, so that the governmental bodies avoid the PPP processes by separating projects in order to decrease value of each project. As a result, the PISU Act was stipulated the guideline to assess the value of projects. Moreover, there are sections concerning process to the project value less than one billion Baht as well.

8. Measures for Transparency by prohibiting the conflict of interests of directors from both the public and private sectors were established to avoid the

exploitation of private partners with government agencies. If there is a violation, there will be penalties either imprisonment or fine or both.

9. Under the Strategic Plan, a means to fast-track PPPs was layout. Termed the 'PPP Fast Track', once implemented, the system would expedite the project introduction phase from two years to a mere nine months.

10. Standard Terms for PPP project was revised to be more prudent and to protect the interests of the government more effectively. The content of the contract to be executed under these terms and conditions will vary depending on the type and nature of each project.

After the adoption of the PISU Act in 2013, the PPP project in agri-food sector has increased. There are five major projects that were successful in the implementation in accordance with the mechanism of the PISU Act. The projects are Uniseeds project, a project to create a disease resistant okra seed variety; B.Inter project, a project to design and install air control fans in poultry feeding houses; Mirt Phol project, a project to develop a test kit for the detection of white leaf disease in sugar cane; Biogas project, a project to promote biogas technology in integrated slaughterhouses; and Yield Trails project, a project to multiple hybrid corn yield trials. The overview of such projects and its partnership is in the table below. (FAO, 2013)

Case	Purpose	Public Partner	Private Partner	Public Role	Private Role
<b>Uni seeds</b>	create a disease resistant okra seed variety	BIOTEC	Uniseeds Co. Ltd	Co-investment in R&D and Laboratory service	Co-investment in R&D and field trials
<b>B.Inter</b>	design and install air control fans in poultry feeding houses	NSTDA	B. International & Technology Co. Ltd, a subsidiary of Betagro Group	Co-investment in R&D	Co-investment in R&D and Commercial phase
<b>Mitr Phol</b>	develop a test kit for the detection of white leaf disease in sugar cane	BIOTEC	Mitr Phol Sugarcane Research Center, a subsidiary of the Mitr Phol Sugar Group	Co-investment in R&D , Provide funding resource, and Laboratory service	Full investment in the second phase of the project
<b>Biogas</b>	promote biogas technology in integrated slaughterhouses	Chiang-mai University	Betagro Group, GFPT Nichirei Thailand , F&F and Bangkok Produce Co.	Co-investment in R&D and provide Researchers	Co-investment in R&D and experiment trials
<b>Yield trails</b>	multiple hybrid corn yield trials	Kasetsart University	Multiple hybrid corn seed breeders	Field trials and project assessment	Invest and execute experiment

Project Yield trails, Uniseeds and Mitr Phol are PPP projects that operated in corn, okra and sugarcane subsectors, respectively. The other two projects, Biogas and B.Inter, are operated with companies in the poultry subsector. In most case, Public sector partnerships will provide financial support, around 300,000 Baht or more in each project, and research or technical services. Except for Yield trails project where the National Corn and Sorghum Research Center and Kasetsart University did not invest in the project but instead provides technical and administrative services free of charge. Each project is summarized as follows.

- In the Uniseeds project, BIOTEC was approached by Uniseeds, a producer and marketer of frozen okra, for help in developing an improved okra hybrid with resistance to the damaging yellow vein virus (YVV). The R&D cooperation between Uniseeds and BIOTEC lasted from 2004 to 2007. Six resistant varieties were developed, two of which have been commercialized. The availability of okra varieties that are less susceptible to YVV outbreaks has helped Uniseeds to secure a more dependable okra supply in addition to increasing incomes and decreasing risks for Thai okra farmers.

- The B.Inter project began in 2005 when NSTDA offered services and funding subsidies to small and medium enterprises (SMEs) in the poultry industry, aiming to aid the adoption of technologies to improve productivity and save energy. B. International & Technology Co. Ltd (B.Inter) asked NSTDA for financial and technical assistance to design and install air control fans in its poultry feeding houses. The project was completed in 2009. The fans, which are manufactured in Thailand, have now been commercialized. As a result of the B.Inter project, agribusiness investment and poultry farmers' incomes have increased thanks to domestic availability of more affordable air control fans. Investment in air-controlled feeding houses has also resulted in higher poultry growth rates and lower disease risks compared with open-air systems.

- The Mitr Phol project, a cooperative venture between the Mitr Phol Sugarcane Research Center and BIOTEC from 2005 to 2008, involved the creation and commercialization of a simple test kit to identify white leaf disease in sugar-cane crops. With technical and financial support from BIOTEC, the collaboration developed an antibody able to detect white leaf disease and a test kit utilizing the

antibody. With this new technology, Mitr Phol and other sugar-cane farmers are now able to screen cane stalks free of white leaf disease before planting, which not only reduces losses, but also minimizes the spread of disease to healthy plants. As a result, the risks of investing in sugar-cane farming have been reduced, enabling the sugar-cane industry to expand production. Mitr Phol owns the test kit technology and BIOTEC receives a royalty fee from test kit sales.

- The Biogas project was initiated by the Energy Research and Development Institute (ERDI) of Chiang Mai University to promote biogas technology in poultry slaughterhouses. The project, which began in 2008 and is scheduled to end in 2013, aims to utilize wastewater for the production of biogas energy at five large poultry slaughterhouses throughout Thailand. To date, poultry operators Betagro Land Co. Ltd, GFPT Nichirei (Thailand) Co. Ltd, F&F and Bangkok Produce Co. Ltd have committed to the project as private sector partners. A fifth partner will join later. By helping slaughterhouses install systems to utilize wastewater for energy production, the project will increase agribusiness investment in addition to reducing greenhouse emissions and improving community health.

- The hybrid corn yield trials project is an annual project that has been carried out by NCSRC, Kasetsart University, every year for the past 24 years. Each year, private sector breeders from throughout Thailand and the world are invited to participate in multi-location corn yield trials. The trials allow breeders to test new hybrids in multiple geographic locations at low cost as a result of collaborative management and technical support. Thanks to this PPP and management and resource contributions by NCSRC and private sector plant breeders, investments in Thailand's corn seed sector have increased, better hybrids are being developed, and farmers in Thailand and across Asia have access to hybrids that are better adapted to their geographic areas.

However, due to the promotion of policies and strategies for the development of science and technology of the Thai state over the past five years, the PPP project within agro-food sector has predominately focused on research, development and innovation to implement the policy of improving agricultural efficiency and promoting the Knowledge-based Economy. From the five projects mentioned above, we can see that the government mostly plays a role in reducing the risk for private



partners in various ways, such as funding for research and development, sourcing scientific research services, and providing human resources management expertise. However, the literature review found that, prior to the establishment of Food Innopolis, the PPP project in the agro-food industry were focus on large scale projects that use relatively large fund. In this sense, larger companies could be more benefitted from government support than small and medium companies with lower resources in general.

By reviewing relevant regulations and implementation of PPP projects in the Thai agro-food sector over the past period, the problems and weaknesses of the project implementation were identified below.

### **The Weaknesses of the Past Public-Private Partnership**

#### **1. Policy**

1) The public acknowledgments on the PPP are not widespread; it was only limited among centralized policy makers and some major corporations. Local governments still have relatively less acknowledgment and resource to initiate such cooperation and led to only limited beneficial outcome as a result.

2) The lack of variety of projects; PPP project in Thailand in the past, was predominantly established for large infrastructure projects, such as mass transit, subway system, and power generation. However, due to unclear policy to engage the private sector, other important public services such as public health, public education, and agriculture were left out.

3) Political instability; political issues in recent years had led to unclear policy on the investment plan and prevent policy continuity.

4) Non-transparency issues from project implementation; since most PPP projects were mega projects worth billions or more, there are many involved. And therefore could lead to corruption and illegal exploitation.

5) The issue of third sector participation; although the Strategic Plan PPP requires the public hearing to be involved in the proposed project, but in practice, there was no clear indication of what groups are required to comment and what are process steps to be taken to address them. It can be seen that there are often problems

when implementing projects that affect the environment or the community due to the lack of stakeholder participation in project planning.

## **2. Laws and Legal Enforcement**

1) Submission and selection process under the law takes a long duration to complete. This includes the process to negotiate and examine the contract. Some project was taken around three years from the feasibility study process to contract signing.

2) There are various private sectors interesting to participate on the ground that they are large value of projects regarding the PPP and consequently political and commercial benefits are usually involved with these projects. As a result, due to many corruption issues, some PPP projects were cancelled or unable to continue proceeding.

3) The calculation of the value of the project is one of the significant problems. The law stipulated no guideline and method to calculate the value of the project. Especially in the project which the state grants the concession or license to the private sector, it was frequently been argued that whether the value of the project should include investment cost paid by the private sector

4) The PISU Act stipulates, as a general rule, that a private investment in a state undertaking shall have regard to suitable risk allocation in the project between the state and private entity. However, the PISU Act does not incorporate the detailed risk-allocation rules and regulatory provisions for the PPP projects. Hence, there is no allocation of risk principles or a risk-mitigation mechanism specified in the laws regarding PPPs. Typically, the distribution of the risks associated with a project is determined on a case-by-case basis and the parties usually provide details of the risk allocation in the PPP contract. Although force majeure risks are shared by both parties, other risks associated with the project are, in almost all cases, borne by the private entity.

5) The lack of effective check and balance mechanism due to the structure of the Joint Commission in the PISU Act:

5.1) As a result of the fact that the PPP under the PISU Act is chaired by the Prime Minister and when a PPP project is proposed, it is necessary to seek the approval of the Cabinet, who are under the Prime Minister's administration. This

proves thus not comply with the principle of check and balance of power and can lead to the issue of transparency.

5.2) The approval of the budget or the amount of money to be spent on the debt for the project is not monitored by the legislature. Since the legislature did not participate, acknowledge or approved the proposed PPP project or participate in the monitoring and balancing process, there was a lack of check and balance between the administration and the legislature in the implementation of the project. This may lead to non-transparency in the monitoring and may also affect fiscal stability in the long term.

### **3. Quality of the Services**

Problems with the quality of the given service could be caused by the pursuit of private profit. Rather than consider the quality of service and reasonable rates for the public, the private sector may reduce quality of service to seek more profit.

### **4. The ability of agencies / organizations.**

1) The PPP project in past were mostly governed by a concession or a long-term contract. So when the contract is signed, the amendment to the contract could be difficult. As a result, the public sector will be burdened with or burdened by budgets from future litigation. In addition, staff or government officials often lack the capacity to carry out large scale projects with high investment. This may cause the project to be unsuccessful and public consumers may have to suffer from a lack of continuity of public service.

2) Not only that PPP projects in Thailand tend to focus on large scale projects that use relatively high operating costs and with long term contract, but the regulations to propose project is also complex. Thus, it seemed that larger companies may be benefit from government support more than small and medium companies with lower resources.

## **2.10 Previous Studies and Conclusions**

Literatures in public-private partnership in food related industries can be viewed and assessed as in international experience and as in Thailand's context.

At global level, international experience shows that PPP in food related industries has importance role in addressing the problems of food security and safety,

particularly in developing countries. Many studies relating to the issues have been widely explored, not only by academic scholars, but also by international organizations, with several focuses on research agenda setting, while others focus on sustainable development, poverty reduction, and inclusive supply chain.

Regarding to research agenda setting literatures, International Food Policy Research Institute has published the series of papers on Food Security in Practice. Included in the series is the work of Hartwich (2008) “Building Public-Private Partnership for Agricultural Innovation” which summarizes the experiences of 125 public-private research partnerships in agriculture related fields from 12 Latin American countries. Hartwich’s work indicates that PPPs have emerged in Latin’s America as a new way of carrying out R&D in agricultural sector and had help in the dissemination of innovations and institution arrangement promoting R&D projects. The findings also conclude that keys process for successful PPPs are the phase of identifying common interest, negotiating the contract, and evaluating for termination or continuity of the partnership.

With similar focus, the work of D. J. Spielman, F. Hartwich, and K. von Grebmer (2010), “Public-Private Partnership and Developing Country Agriculture: Evidence from the International Agricultural Research System”, explores the role of PPPs in encouraging pro-poor productivity-enhancing innovation research in the international agricultural context. With survey of 75 PPP projects, the study found that PPPs are employed to overcome market and institutional failures that hinder development and technology diffusion in developing countries. The survey also shows that PPPs are changing the way research agenda was addressed in international agriculture research system, and few partnerships lead to joint innovation in productivity development for small farmers and other marginalized group in developing countries.

In line with two studies mentioned above, Rowe, Alexander, Kretser, Steele, Kretsch, Applebaum, and Falci (2013) has studied “Principles for building public-private partnerships to benefit food safety, nutrition, and health research” to examined possible process for effective PPPs in scientific researches collaborations and to introduce the successful factors to the literature to serve as a framework for future PPP initiations. The study was conducted by assessing 16 US and international

organizations previously or currently involved in PPPs that focus on enhancing cross-sector participation in food and nutrition researches. This study concludes that PPP can be useful to in leveraging diverse expertise among participating parties, both public and private, to address public needs and problems regarding food standards, food safety, nutrition, and health.

However, article by Camire and Collins (2015) “Transparent, Actionable Framework for Food and Nutrition Research Public-Private Partnerships” points out the challenges that public and private sectors are facing in research collaborations. Particularly in the United States, the involvement of private firms, such as by providing industrial funds, in conducting researches in food and agricultural industries has been criticized for manipulating or influencing the results that best represent their products. The findings suggest that, to strengthen consumer’s confidence, food research PPPs should include not only government and private agencies but also third party like nonprofit research institutes or universities to ensure the minimum bias and transparency of the research.

Respecting to issue of inclusive supply chain, study by Narrod, C.A., Roy, D., Okello, J., Avendaño, B., Rich, K.M., Thorat, A. (2009) titled “the Role of Public-Private Partnerships and Collective Action in Ensuring Smallholder Participation in High Value Fruit and Vegetable Supply Chains” compares the cases of how fruits and vegetables small scale farmers in India and Kenya adjust to demands of higher food standard from the global market. The study concludes that, by help identify cost-effective technologies for reducing risk and provide intermediary channel with larger producers, PPP enables small farmers in both countries to cope with stringent food safety requirement and standard in competitive market. Moreover, the study also finds that by organizing food safety monitoring group through collective action, small producers become more attractive to international buyers who seek for ways to ensure traceability in the food productions.

The work of Richand Narrod (2010) “The Role of Public–Private Partnerships in Promoting Smallholder Access to Livestock Markets in Developing Countries” states similar conclusion that PPP is a useful mechanism for enhancing an involvement of small producers when there is market failure in parts of the supply chain. By assessing two cases of both successful and failed PPP in livestock markets



in India, the study found that PPPs can improve the management of relationship within the supply chain and help facilitate small producer access while reduce market failures.

In the perspective of poverty and sustainable development, a number of literatures indicate to positive impact of PPP in food and agricultural sector, while some also points to the challenges and limitation of PPPs implementation, especially in developing countries. One of several works that are relevance is the work of Brickell and Elias(2013)“Great Expectations: Realizing Social and Environmental Benefits from Public-Private Partnerships in Agricultural Supply Chains” which studied four cases of public, private, and civil society partnerships for social and environmental concerns relating to production of agricultural crops. Owing to documentary analysis and semi-structured interviews from more than 30 people participating in partnership projects, the findings show that PPPs help support actors to comply with good governance and in some cases can provide incentives for sustainability when policy framework is absent. In addition, the findings also suggest that other benefits of PPPs are cross-sectoral check and balance mechanism that can put pressure on governments, business, and civil society to comply with regulations.

Article by Boland (2012) titled “an Analysis of the Hidden Variables Influencing the Challenges and Opportunities of Implementing R&D and Value-Chain Agricultural Public–Private Partnerships in the Developing World” explores the characteristics of PPPs in agriculture aimed to alleviate poverty and hunger in developing countries. By collecting opinions and viewpoints from experts and practitioners actively working in the projects, the paper provides insider’s viewpoints in challenges and opportunities of PPPs in transferring private sector technology to developing world. The article concludes by suggesting that PPPs are good strategic choice because PPPs can provide mechanism that mobilizes institutions and expertise for the implementation of innovation driven solutions to the farm level. Furthermore, PPPs also play a role as a linkage between smallholders to global market and technology and help combat poverty and hunger in developing countries.

Another study that indicates positive impact of PPPs in development context is from Croplife International Report (2012), which states that, if proper policy, PPPs will enable resources, expertise, and risk to be shared between government and

business and thus provide access for farmers to valuable scientific innovations. And by making crops more nutritious, resistant to pests and better adapted for poor growing conditions, these innovations led by PPPs can lead to food security solutions and improve farming around the world. Furthermore, Croplife believes that PPP also has positive impact on sustainability because it helps connect farmers to fundamental resources which help increase more reliability and certainty for their production process at less cost.

Never the less, the study of Hawkes and Buse (2011) has revealed some issues associated with an implementation of PPP in food security and health policy. In “Public Health Sector and Food Industry Interaction: It’s Time to Clarify the Term ‘Partnership’ and Be Honest about Underlying Interests” Hawkes and Buse argue that PPPs can be useful if ‘public interest comes first’, meaning that when development is in process, public policy makers must act in setting public health objectives instead of letting private partner exercise power to effect decisions. This premise comes from the researchers’ stand point arguing that PPPs often sustained by underlying ‘interests’ of yielding profit for business and/or advancing visibility for public some officials. Thus before engaging in PPPs, public policy makers must clarify their goals setting and good governance must be carry out.

“PPP Consultants: Blessing or Curse?”, an article by Stephan Manning(2013) emphasizes the challenges of PPPs implementation in development projects. Manning argues that while PPPs have become popular in pursuing development goals such as food security, poverty, and sustainable development, the complex and tedious process of initiating PPPs can lead to biased development. Facing with multiple stakeholders namely government, business, civil society, NGOs, and development agencies with different interests, goals, and norms, several PPPs in development projects rely their facilitative work on the development consultants. These development consultants sometimes tend to choose projects with ‘low-hanging fruits’ that easier to initiate, have low risk, less ambitious agendas, or is in well-established domain to ensure a success, repeatable framework which benefits their role. From his study, Manning also discovers that PPP development projects driven mainly by consultants are likely to be narrow in scope, repetitive, and limited in their overall impact-- and this is not always desirable from sustainability perspective. On the contrary, Manning argues

that projects that originate from internal partners tend to be more ambitious and aim for greater benefit for regional or global impact.

In summary, food related PPP literatures reflecting on international experiences often address the positive impact PPPs has made in development context. PPPs are viewed as the management tools for public sector to enhancing efficiency and promote social and economic development, while helping business to minimize transaction cost and increase competitiveness through an expansion of production. Benefits of utilizing PPPs also include combining public sector accountability, long-term perspective, and social interests with private sector efficiency, flexibility, and resources for improving livelihood of millions. However, some challenges and limitations must be addressed while implementing PPPs, especially biases on different interests between public and private partners. All in all, PPPs should be carried out only where ultimate goal is to benefit the public interests.

In Thailand context, literatures of PPPs have been increasing in the past few years accordingly with the global trends. However, most of the PPP research papers focus heavily on basic infrastructure PPP projects, such as the work of Pongsiri (2003), Phuensaen (2011), and Panurach (2013).

Pongsiri (2003) study of “Public-Private Partnership in Thailand: A Case Study of Electric Utility Industry” offers insight into the dynamics of multi-stakeholder affecting to partnership performance. By information obtained through questioning management executives from 71 organizations involving in electric utility industry, the findings indicate different factors to participate in PPPs: public sector goal in PPP is to better service provision and cost reduction, while private companies tend to focus on better investment potential and opportunity to expand their interests. This study concludes that risk allocation, conflict resolution techniques, asymmetric relationship management, and contractual safeguard for sovereign risks are vital for successful PPP implementation.

Phuensaen (2011) work on “Public and Private Partnership and the Effectiveness of Policy to Promote the Generation of Electricity from Renewable Energy” also offers PPP assessment in electricity industry. The analysis of the research reveals that resources, government structure, legal context, and incentives are key factors affecting the effectiveness of the policy. The findings also point out that to

improve effectiveness, government must develop support measure and coordination services, as well as update legal structure and help promote public awareness and acceptance of renewable energy.

Also focusing on infrastructure PPPs, Panurach (2013) has conducted a research titled “Public-Private Partnership toward the Effectiveness of the MRT Chaloem-Ratchamongkhon Line” to study level of PPP effectiveness and relationship between public sector and private sector leaders, along with factors that contribute to the successfulness of the PPP. The findings suggest that leadership, decision making process, participation, cross-sectoral communication, and transparency are crucial for achieving the projects goals. In particular, leadership, communication, and transparency are vital for trust building, a fundamental principle that drives PPP to success.

Regarding to researches on food related PPPs, Tavonprasith and Charoanwiriayapap (2010) have studied “the Roles of Government and Private Agencies in the Promotion of Potential Development of Traditional Seafood Processing Industry around Songkhla Lake Basin” to investigate the support the producer received in the production of potential enhancement from the government and private agencies and to study the participation of the government and private agencies in the promotion of potential enhancement. By gathering information 203 producers and 100 private and public agencies, the findings show that producers received only limited support from both government and private agencies to develop their potential to increase productivity while the performances of the agencies depend heavily on budgetary and policies in difference circumstances. Hence, in order to improve the promotion for potential enhancement among small seafood producers, government must be more active and take the promotion policy implementation more seriously.

Sinthusakunet al. (2012) conducted a work on “Guideline for the development of cooperation between small-sized Business and Nakhon Pathom University: a case of food manufacturing firms in Nakhon Pathom Province” to study the business management styles, problems, obstacles, and limitations within the cooperation. The findings from 35 SME firms reveal that most of the firms do not have any serious management problem or obstacle due to the self-sufficiency management style: they



only produce as much as they capable of. The only limitation is the financial issue that most of the firm owners face from time to time, especially when most them did not want to use bank credit after the 1997 recession. In addition, firm owners also welcome government agencies and universities to visit and initiate cooperation, as well as accepting university student in an internship.

The most relevance study regarding food industry development is the study of Suankaew (2014) “the Success of the Thai Kitchen to the World Policy with Cooperation between Public and Private Sectors”. The objectives of the study were to evaluate the success of the Thai Kitchen to the World policy supported by public and private cooperation and to investigate the policy implementation problems and obstacles as well as to offer suggestions to achieve the policy’s goals. By collecting qualitative data from 17 key informants and 10 entrepreneurs and quantitative data from 70 government officials and firm’s representatives involving in the Thai Kitchen to the World policy project, the study reveals that the implementation of the policy is considered successful to the participants involved. The implementation of Thai Kitchen to the World project increased trade values respecting to the expanding database and agricultural products also increased in variety due to the greater market access. As for implementation problems and obstacles, the findings uncover that there was some non-standardized implementation process between imports and exports measures, which caused some delays and frustration among participants. Accordingly, the findings suggest that better budget allocation, government agencies integration, and improve PPP management would be helpful for the policy to succeed in the long run.

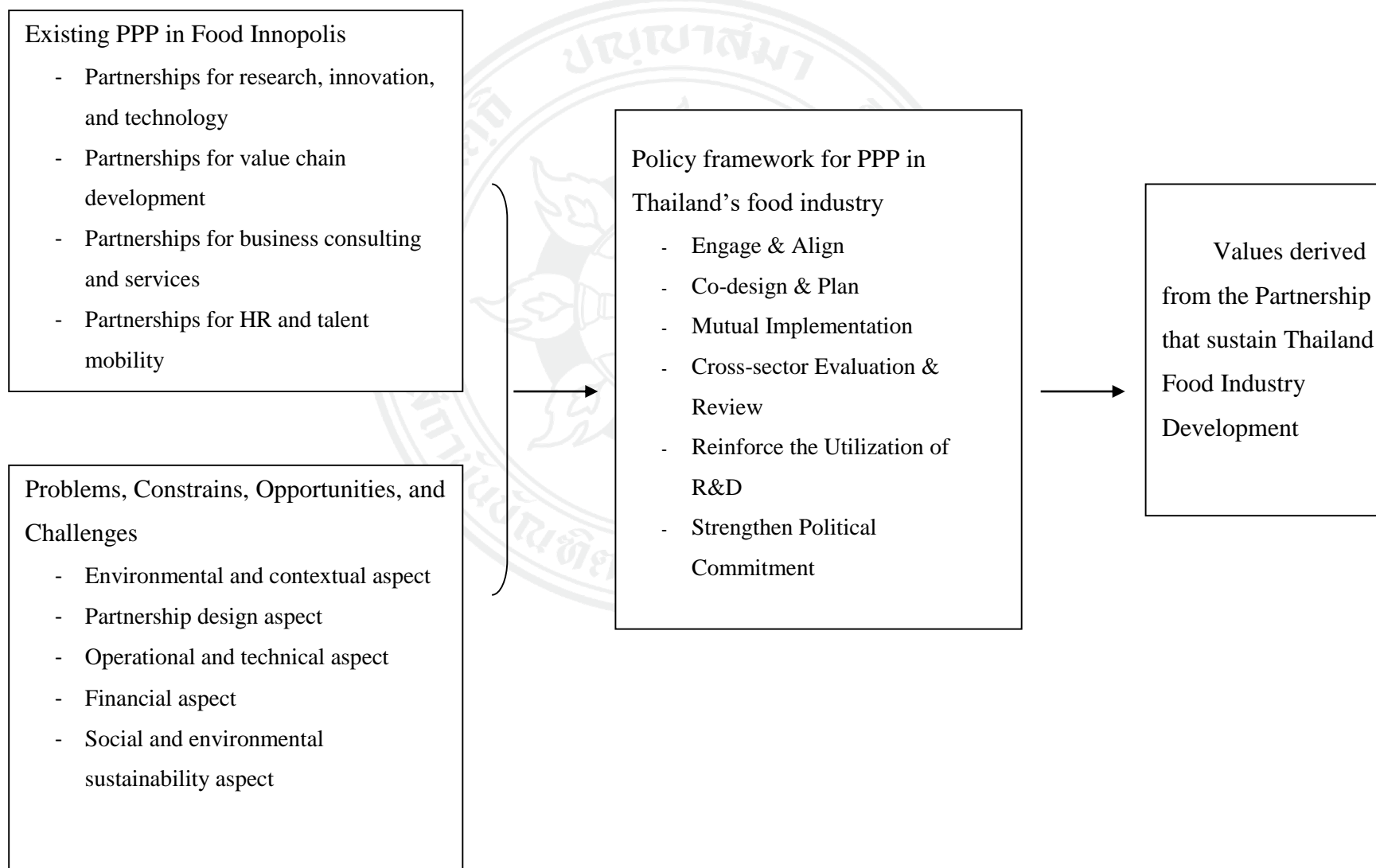
As seen above, despite of increasing interest in PPP among Thai scholars, academic papers focusing on PPP in food related industries is very limited. Most of the work concerning food issues usually focuses on local market domain with specific food products. The work on national level, industrial impact research is still lacking. Essentially, Thailand’s academic literature has not yet caught up to the practitioner understanding of PPPs prominence in food industry. This topic has received much less interests and only has been discussed in narrow ways in the scholarly literature in Public Policy or Public Administration arena. Concrete contributions from other related disciplines such as Management Sciences and Economics also appeared to be



limited. Given the evolving policy framework and ongoing organizational change within Thailand and the so-called government reforms, academic contribution must be further made to foster PPP in Thailand's food industry so that they can prosper over the long term in Thailand's political and social environment.



## 2.11 Conceptual Framework



## **CHAPTER 3**

### **RESEARCH METHODOLOGY**

This chapter describes the formulation of a research design and methodology adopted to achieve the objectives of the study. Since there had been little documentation on the topic and in the wake of considering the stipulated goals of the study, the research questions, the limitations and the scope, the researcher felt the suitability for applying both the qualitative and quantitative techniques on data gathering. By embracing both techniques, each method could complement and substantiate the other in making the findings more concrete.

In this study, qualitative data is obtained through structured in-depth interviews supported by the survey method, using the questionnaire as the instrument to obtain quantitative data.

#### **3.1 Research Design**

For the purpose of this research, after examining the objectives of the study and realizing the absence of past review and distributed literature on public-private partnership in Thailand's food industry, an exploratory descriptive research design had been chosen since it would decisively portray the qualities and experiences of the population under study. Exploratory descriptive research would suits best because according to Uma Sekaran (2000) an exploratory study research was performed when a researcher had little knowledge about the circumstance or had no data on how comparable issues or research issues had been previously understood. It embarks on investigating and discovering the real nature or characteristics of the problem. Moreover, solutions, new ideas, and groundbreaking findings could derive from this type of research (Richardson, 1996), providing a inclusive answer of who, what, when, where, why, and way (6 Ws) of the problem under the study, usually through a questionnaire survey, interviews or observations(L. R. Gay, 1992)

Prior to the development of questionnaires for both methods, the researcher had explored the literature on the subject from related studies, news articles, press releases, journals articles, as well as field works i.e. visiting Food Innopolis site and discussing with the public officials overseeing the project.

### **Unit of Analysis**

By interviewing representatives from management boards, Unit of Analysis of this study is Food Innopolis and its private partners (participating food manufacturers).

The purpose of this study is to analyze Food Innopolis project for its partnership with public partners. Food Innopolis, a pilot partnership between public and private organizations in Thailand's food industry, reconceptualizes the role of the public agency in the process of sustaining Thai food industry development through Public-Private Partnership. This article thus interested in analyzing the relationship between the public entity, Food Innopolis, and its private partners for structure, process, and outcomes through such partnerships. The analysis of Food Innopolis and the ongoing practice is aimed to serve as a guide for the development of Public-Private Partnership to facilitate successful, sustainable, and replicable partnerships that benefit both public and private organization.

### **3.2 Qualitative Methodology**

Since this research would be adopting both quantitative and qualitative data gathering techniques, qualitative data would be obtained through structured interviews. Qualitative research methods provide flexibility and adaptability; questions or inquiries could be embraced as they went along (Johns, 1998). It is also a helpful strategy for acquiring data and assessments from experts, enabled the interviewer to expand her comprehension of the respondent's perspective.

The total 14 interviews i.e. 5 interviews from government official with administrative positions and 9 interviews from the private businesses from small, medium, and large companies was conducted. The interviews were structured and guided in order to find the best possible answers coupled with the research objectives.

In-depth interviews were intended to investigate and identify the situation that participants were experiencing in embarking on PPP in food industry development under Food Innopolis project.

The respondents were made to understand that some of their verbatim statements would be reported and utilized as a part of the research when it would be necessary. They were also given the confirmation that the data gathered would be treated with confidentiality and privacy. Ethical procedures such as informed and voluntary consent, confidentiality of information shared, anonymity of interviewees, no harm done to the interviewees and reciprocity were carried out.

### **3.3 Quantitative Methodology**

Subsequently for the qualitative method, quantitative data was applied for the purposes of re-affirmation and consolidation and to gauge at some convergence of findings. The self-completion questionnaire was used as the instrument for the survey supplementing the qualitative data in gathering opinions towards PPP in Food Innopolis. Thus, the questions of the questionnaires were set according to data from qualitative method, with the last question on the perceived experiences would be utilized to frame the basis for recommendations.

#### **1. Population and Sampling**

The targeted population of this study refers to public or government officials and private business entrepreneurs participating in PPP in Thailand's food industry under Food Innopolis project.

To get a relevance answers, a questionnaire is submitted to senior executives or company administrators who can answer questions to represent the organization. The total of 200 respondents of private participants operating in the food industry of Thailand was selected by Purposive Sampling.

Cross-Sectional Approach data collection method was conducted during the month of July-August 2017. Data collection tools were questionnaire which was distributed to the informants during the conferences, seminars, trade shows, and



exhibitions of innovations related to Thai food industry until the number reached 200; representing 100% expected respondents.

## **2. Questionnaire Design**

A structured set of questions in the interviews such as demography and questions accordingly with objectives of the study i.e. partnership status; effectiveness of the partnership; problems, opportunities, obstacles, and challenges in embarking the partnership; and possible solutions of suggestion to enhance effectiveness of the partnership were also the key questions that had been asked in the questionnaires, covering the aspects that would meet the set objectives and reaffirm the findings obtained by the interviews. To ensure that the measures developed in the instrument were relevant and appropriate, the instruments were tested for its validity and reliability.

In this research, an in-depth study of the extent of PPP in Thailand's food industry done through the literature review, coupled with the field work that had gauged the status of Food Innopolis project, had helped in the formation of the interview questions and questionnaire development.

For quantitative data collecting instrument, three experts in the area were requested to check on the validity of the instrument for face and content validity and finally evaluate the appropriateness of the issues covered. By using Index of Concordance or IOC, three experts had assessed the validity and the linguistic appropriateness of the content. IOC values were as follows: the validity of the content is 0.99 and the linguistic appropriateness is 0.95

To ensure that the measures developed in the instrument were relevant and appropriate, the instruments were tested for its reliability by using the test-retest with statistics for reliability check. Try-out questionnaires with 15 selected entrepreneurs operating in the food industry were tested using Cronbach's Alpha confidence test. In terms of reliability, the try-out questionnaires were calculated at 0.91, which were acceptable by Cronbach's Alpha confidence test and able to carried on to the survey.

### 3. Quantitative data collecting instrument

Instrument for data collection was a questionnaire, which was divided into 3 parts.

Part 1 is general information of the respondents which consists of 8 check list questions about the nature of the business i.e. the type of establishment, the duration of operation, types of goods and services, attitudes towards R&D, R&D investment, R&D experience with public sector, and Food Innopolis recognition.

Part 2 is a questionnaire about attitudes towards working with the government in research and development of the food industry. This part consists of 24 Rating Scale questions, covering opinions on problems, obstacles, opportunities and challenges in working with the public sector in research and development. In this part, 5-scale rating questions based on Likert's Scale was used to measure the level of feedback. The criteria are as follows:

Scoring at Level 4 means strongly agree

Level 3 means agree

Level 2 means disagree

Level 1 means strongly disagree

To interpret the meaning of the data, the scopes of scores 1, 2, 3, and 4 were analyzed by the following criteria:

$$\begin{aligned} \text{The width of each interval class} &= \frac{\text{Max Score} - \text{Min Score}}{\text{Score range}} \\ &= 4 - 1/4 \\ &= 0.75 \end{aligned}$$

Evaluation criteria = score range at + 0.75

Thus, the importance of each score range can be determined as follows:

Level 4: between average score of 3.26 - 4.00 = strongly agree

Level 3: between average score of 2.51 - 3.25 = agree

Level 2: between average score of 1.76 - 2.50 = disagree

Level 1: between average score of 1.00 - 1.75 = strongly disagree

Parts 3 is an open-ended query for the informants' comments or suggestions towards problems, constraints, opportunities and challenges in working with the government for research and development within food industry.

#### **4. Quantitative Data Processing**

4.1. The questionnaire was distributed to the sample group between August and September 2017. The questionnaires were returned and the complete information was 200 copies or 100% of expected respondents.

4.2. After completion of the questionnaire, the data were processed by computer using SPSS program (Statistical Package for Social Science). The results were then analyzed and summarized using tables and charts as well as discussion of the results.

4.3. The characteristics of the data were analyzed and described using:

4.3.1 Percentage (%) to describe general information of the respondents

4.3.2 Mean ( $\bar{x}$ ) to vary the meaning of the data

4.3.3 Standard Deviation (SD) to determine Standard Deviation level

#### **5. Statistics used in data analysis.**

5.1. Descriptive Statistics used for data analysis were Percentage (%), Mean ( $\bar{x}$ ), and Standard Deviation (% Standard Deviation: SD) to describe variables as a data type as following:

5.1.1 Frequency, expressed in number and percentage (Percentage: %) to describe characteristics of the nature of the establishment, type of establishment, duration of operation, types of goods and services, attitude towards R&D, R&D investment, R&D experience with public sector, and Food Innopolis recognition.

5.1.2 Central Tendency Measurements with Mean ( $\bar{x}$ ) and standard deviation (SD) to measure the distribution of information on attitude levels in working with government for research and development within food industry.

## **CHAPTER 4**

### **THE PUBLIC-PRIVATE PARTNERSHIP OF FOOD INNOPOLIS**

Operating under NSTDA, and located within TSP, Food Innopolis is government funded one-stop solution center for research, development, and Innovation (RD&I) service to private investors. Comprise of 3,000 researchers, 10,000 students in Food Science and Technology, 9,000 food factories, 150 food research laboratories, 20 pilot plants, and 70 universities as partners, the key goal of Food Innopolis is to create a linkage between public and private sectors, from large international companies, to SMEs and startup companies in the country, in order to support innovations and value added in food supply chain, as well as to support other industry reform measures indicated in Thailand 4.0 policy.

The resolution of the Cabinet on April, 22 2015 approved the Special Economic Zone in clustered form and Food Innopolis is one of seven Super Clusters, which represents a cluster for high-tech and futuristic industries, to strengthen the Value Chain, leading to the building of a future industry, strengthen Thailand's investment potential, spread the prosperity to regional and local development and create business opportunities for SMEs. Food Innopolis Project then established in the new economic area on the basis of innovation and research development under the responsibility of the Ministry of Science and Technology to produce goods and services that are high value added (HVA). By transforming the economy from intensive use of low value added labor to the use of science technology and innovation, Food Innopolis is expected to attract investment, research, development and innovation of the global private sector, improve the ability of SMEs, and increase the start-ups investment opportunities, as well as attract Knowledge Workers, and increase the employment of researchers, scientists, technologists and innovators both Thai and foreign in the food and beverage industry.

Food Innopolis one-stop solution center for RD&I comprises of five service platforms to serve and support innovative business in various areas:

1. *High-Value Added Food Product & Service*: encourage and support food companies in maximizing the value of their products and services, as well as the ability to compete with advanced technology and innovation.

1.1. Focused Areas

- Healthy and functional food such as healthy food, elderly food, and other functional food
- High value added food products such as food additives, nutritional extract, food and raw materials to produce high quality Halal food.
- Supporting business for food innovation such as food packaging, production traceability, food safety, and food storage and transport technology.

1.2. Focused Customers

- Multinational Corporations (MNCs)
- Local food manufacturers
- SMEs and Start-ups business

1.3. Access to Global Value Chain; linking Knowledge, technology sources, partnerships, networks, and global markets.

2. *One-Stop Service*: integrated service center with full range of services

2.1. Improve the management system and service procedures of the public sector to facilitate business operations by providing

- Food Innopolis Service Platforms
- One-stop service for RDI to facilitate food innovators, including Liaison and Help Desk services
- An update proposal to improve the management system and service procedures of the public sector to facilitate business operations (Ease of doing business)



2.2 Provide benefits and incentives to attract entrepreneurs to invest in innovation in Food Innopolis with cooperation from relevant agencies such as the BOI and the Revenue Department

3. *Infrastructure*: Promote standardization infrastructures for food analysis, food testing and food safety

3.1. Provide the infrastructure and facilities for science and technology in potential areas.

- Develop infrastructure investment plan in potential areas.
- Develop and deploy spaces for science and technology infrastructure to support the private sector.
- Develop a Pilot Plant and potential test labs.

3.2. Manage the use of science and technology resources and infrastructure of the integrated agencies to provide the most cost effective and efficient service for food industry.

- Create a database and database connecting systems in human resources, lab tools, technology, and knowledge to manage the use of such resources.

4. *Research Development and Innovation*: Using Public-Private Collaboration to link entrepreneurs to food innovations, with a system of maintaining confidential information and managing intellectual property.

4.1. Promote and support research, development, and food innovation in

- (1) Healthy foods and functional foods.
- (2) High value added food
- (3) Food additives, extracts, and food ingredients.
- (4) Food processing technology

4.2. Promote and support research and development cooperation between private sector and research units, focusing on developing agricultural products to high value added products particularly rice, vegetables, fruits, seafood, herbs, poultry, grains, plants, oils, fats, milk and dairy products.

4.3. Build systems and service mechanisms that enable trust among partner organizations and entrepreneurs by providing a system of confidentiality and intellectual property management

5. *Talent Mobility*: Promote and support talents from around the world to join with local business research and development project and develop food personnel with relevant agencies and BOI.

5.1 Encourage and facilitate public personnel from government and university to go work with private companies in RDI units by establishing a Talent Mobility program that facilitates the movement of research and development personnel from the public sector to the private sector, including experts from leading international organization and retired specialists to work alongside private scientists

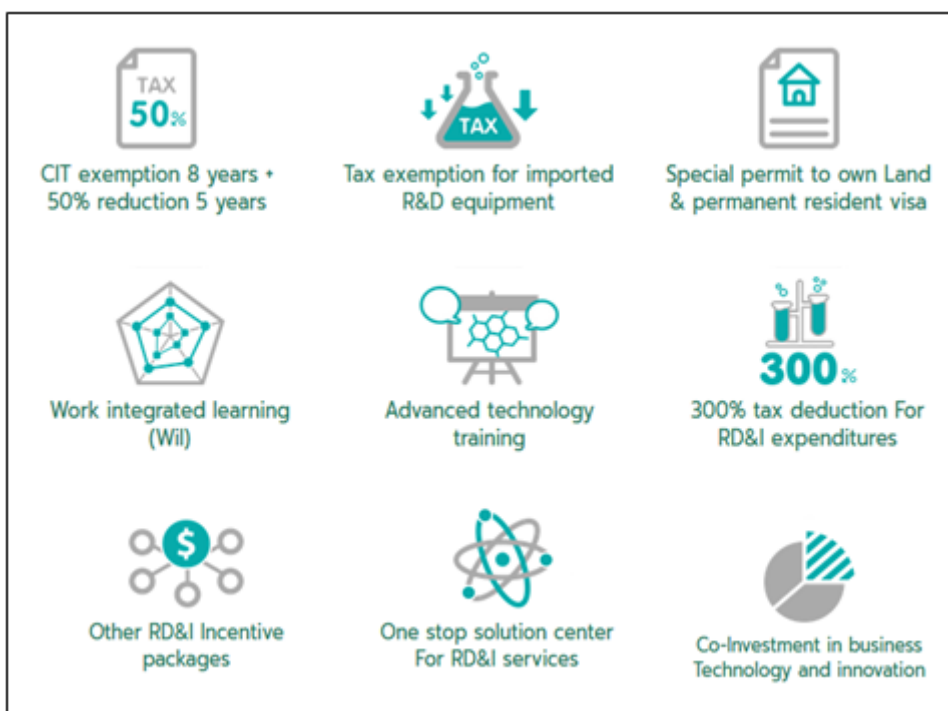
5.2 Develop the capacity of innovative food research personnel through research and development with a global researcher as a team leader to support technology transfer from international expertise and develop specialized training courses such as innovative food management courses for senior executives and the operating personnel

5.3. Promote and support the use of international leading experts.

- Collaborate with BOI and related agencies to promote and encourage private sector to utilize BOI's database of international experts to support research, development and innovation in food industry

In addition, as Food Innopolis belongs to one of the BOI's super cluster (as stated in Thailand 4.0 policy statements), BOI thus also offers wide range of tax and non tax incentives for private partner in food industry. Tax-based incentives include the exemption of corporate income tax for up to 8 years, with additional 50% reduction for 5 years, special accelerate depreciation rate for R&D machineries and equipments, and 300% tax deduction for R&D expense. While non-tax based incentives include of legal privileges for international companies to own land, as well as special facilitation on visas application and work permits procurement.

Incentives and Privileges of Food Innopolis



#### 4.1 Objectives of Food Innopolis

- To attract the world's leading food companies to invest in food innovation in Thailand
- To enhance the capacity of the agricultural sector, Thai raw material producers and SMEs into a global food supply chain
- To create a new economic space on the basis of innovation and research for the development of products and services leading to High Value Added Foods
- To be a mechanism to solve the problem of agricultural prices decline as by creating a global market for local producers
- To create a new source of income and increase employment in the food and related industries, especially knowledge workers.
- To create joint commercial research project between public and private sector and to be a new mechanism to supports the efficient interoperability of all network partners.
- To induce technological spill over and innovation in related industries and lead to the creation of start-up business that is considered a new growth engine in the Thai economy

- To develop Thailand's food industry to be one of the world's food innovation hub in:
  - Functional and Nutraceutical Food
  - Halal Food
  - Premium Seafood and Aquiculture
  - Essential Nutrition and Food Ingredients
  - Healthy Fat & Oils
  - Organic Fruits & Vegetables
  - Supporting Business for Food Innovation

#### **4.2 Rationales for Public-Private Partnership under Food Innopolis**

The use of PPPs for fostering Thailand's food industry development under Food Innopolis project is predicated on the following reasons:

- PPPs provide a framework for facilitating the financial preparation, research activities and development of production techniques between public and private partners by coordinating and organizing eligible researchers, expertise, professionals, and services providers into networks that enhance the demand-driven nature of research solutions and technology transfer.
- In the past decade, the public sector is no longer expected to have sole responsibility to provide necessary resources to foster the development of new technology or innovation; private sector who possesses competency and resources must assume their part in development plan by contributing in PPPs with appropriate support from government.
- Driven by newly emerging market opportunities, domestically and globally, demand for value-added and innovative products has been growing. This increasing demand requires research and technology solutions that go beyond the traditional public or private R&D techniques. Advance and complex research resulting in more spending and skills that stretch the realm of conventional public responsibilities.

- PPPs can facilitate access to market and commercialization for small producers such as SMEs and Start-up businesses by help reducing the transaction costs and prevent unnecessary loss, thereby increasing income or profit for these manufacturers.

Driven by recent consumer concerns and higher international standard, food manufacturers and government are under pressure to demonstrate responsible production; while the government has interest to protect their own reputations in international market, firms must comply with various standards to stay competitive. PPP was the managing tool that expected to sustain both parties' interests by ensuring that productions are made with responsible sourcing techniques while safety and sanitary standards are met through PPP's collaborative monitoring and evaluating model.

### **4.3 Expected Results of Food Innopolis**

#### **Output**

- Project Management Office for food related innovation
- Technological development and innovation, including new mechanisms and measures to promote start-ups businesses.
- Investment for R&D and innovation from international companies in food and related industries.
- New companies with food innovation base
- Joint commercial research projects between private sector, government, and research institutes or university

#### **Outcome**

- A large food supply chain which will make SMEs in Thailand and the agricultural sector or raw material producers able to upgrade their ability to produce goods and services with world-class standards.
- Solutions for the problem of declining agricultural prices as Food Innopolis is a global market creation and connection mechanism



- Technological spill over and innovation in related industries leading to the creation of start-up business that is considered a new growth engine in the Thai economy
- The country's innovative system environment and linkage between research and manufacturing sector are strengthen

#### Impact

- Thailand becomes a center of food production. The value of Thai food exports increased and the economic value will be stronger and grow continuously.
- Increase investment in research and development of the private sector, leading to the sustainably increasing of the country's competitiveness.
- Development of high-level knowledge workers as a source of employment for scientists and researchers that lead to the growth of research-based companies
- Improvement in the quality of life and well-being of the country's population in the long run.

#### 4.4 Key Partners of Food Innopolis

- |   |                         |
|---|-------------------------|
| - Ministry of Science and Technology    | - Local Universities    |
| - Thailand Board of Investment (BOI)    | - Smallholder Farmers   |
| - Public and Private Laboratories       | - Research Institutions |
| - Innovation Design Center              | - Business Incubators   |
| - Private Businesses in Food Industries | - Community Enterprises |

#### 4.5 Research and Development Network

As of June 2017 Food Innopolis has total of 35 organizations from various sectors in its R&D network which were initiated under a memorandum of understanding or MOU since May 2016. The MOU was signed between public agencies, private companies, and academic institutions to provide research infrastructure, facility and human resource services, along with food innovation experts and specialty to drive Food Innopolis as “an investment zone for research,

*development and innovations of private sector in order to increase competitiveness of the food industry” (Food Innopolis, 2017). Those organizations are:*

**Public Organizations:** National Science Technology and Innovation Policy Office, Department of Science Service, National Science and Technology Development Agency, Thailand Institute of Scientific and Technological Research, National Institute Metrology (Thailand), Thailand Management Association, The National Food Institute, National Innovation Agency, Geo-Informatics and Space Technology Development, Synchrotron Light Research Institute;

**Academic Institutions:** Kasetsart University, King Mongkut’s University of Technology Thonburi, Chulalongkorn University, Thammasat University, King Mongkul’s Institute of Technology Ladkrabang, Khon Kaen University, Maejo University, Chiang Mai University, Prince of Songkla University, Bangkok University;

**Private Companies:** Betagro Public Company Limited, Siam Cement Group, Charoen Pokphand Foods Public Company Limited, Thai Union Group Public Company Limited, Malee Group Public Company Limited, Mitr Phol Group, Thai Beverage Public Company Limited, Universal Food Public Company Limited, Bangchak Petroleum Public Company Limited, Thai Vegetable Oil Public Company Limited, Medifoods (Thailand) Co.,Ltd, Thai Prasident Foods Public Company Limited, GIB-Green Innovative Biotechnology Co.,Ltd,

#### **Private Food Companies in Food Innopolis R&D Network**



## 4.6 Partnership Typology

Under Food Innopolis project, the cases of PPP can be identified into three types of partnership:

1. *Partnerships for research collaboration*: Partnerships for research and development collaboration were aiming to support the development of new technology and innovation to improve productivity. They also include partnerships for technology transfer and talent mobility program to improve production techniques.
2. *Partnerships to develop food production value chain*: these partnerships were designed to develop a specific value-added product, primarily to support quality certification to gain access to domestic and international market.
3. *Partnership for business consulting*: This type of partnership may involve in business service and counseling to help upgrade business and management skills including to support private partners in the conducting of a business plan, market analysis and financial analysis, human resource training, information provision, business networking, as well as for the preparation to obtain the IP ownership, certificates, business license, work permit/visa, etc.

## 4.7 Roles and Functions of Partners in the Partnership

Under Food Innopolis project, the most common roles of the public and private partners are described below.

### Public Sector Roles

- *Creating a supportive regulatory environment with appropriate incentives in alignment with national strategy*: Public sector e.g. Ministry of Science and Technology and NSTDA ensured that legal and regulatory environment must be suitable for the partnership process to support the establishment of success

public and private partnership. Public sectors were also responsible for the designation of appropriate incentives in order to incite private sectors participation in alignment with national priorities and development strategy.

- *Leading the preparatory phase of partnership:* Public partners were responsible for the PPP concepts designs. For partnerships under Food Innopolis project, once the concept of the project has been developed, the public sector begins to establish the set of criteria for the eligibility of private partner, designs the program and partnership guidelines, and secures partnership with relevant institutions through the MOUs.
- *Conducting feasibility studies for the partnership:* This role of public sector is most common in partnerships for technology transfers and innovation. The feasibility studies may include the analysis of market demand for new technologies, the input resources for production, end markets capacity for an output product, environmental impact assessment, technology dissemination assessment, economic benefits analysis, financial risk analysis, ensuring regulatory compliance, and an estimation of possible investment in new technologies for each parties, etc.
- *Identifying risk sharing/mitigation in partnership process:* Public sector will ensure that risk allocation between public and private parties is included in the production process. The risk transferring or mitigations may include bank guarantees or subsidize interests on loans, purchasing contract security, business management training to help decrease the possibility of default risks, agricultural insurance and the available contingency funds for private partners.
- *Coordinating and facilitating negotiations:* This role of public sector involves coordinating meetings and discussion between partners to ensure the clarification of partnership terms and agreements, monitoring and evaluation process, implementation of activities, an agreement on risk allocation, responsibility of each partner in case of *force majeure*, third-party contracting eligibility, terms of sale and minimum price ceiling for new technologies, as well as agreement on an ownership for the IP rights.
- *Providing Funding:* The public partners are usually responsible for determine funding levels and schedule the time of fund releasing to ensure timely

delivery of funds and avoid delay of activities. In some cases, public partner also help private partner with bank loans guarantee. Tax and nontax incentives for private partner were also offered under the project to facilitate the initiation fund for innovation and new technology.

- *Acting as project coordinator:* The public partners may act as coordinators by overseeing project management at all stages, from concept development to end markets, supervising the flow of funds and selecting third party contractors. Public partners' responsibility usually includes coordinating private partners with public institutions, networks, and services to provide private partners with necessary resources such as production infrastructure, research organizations, academic institutions, potential markets and extension services.
- *Acting as project facilitators:* Food Innopolis itself was founded to primarily support the access of private company to necessary public infrastructure and equipments. The public partners in all cases under the project thus have a key role to facilitate the implementation of partnership, which includes providing support for technology development, access to public expertise, incubation for business development and startups, as well as access to government funds and special land permit for international partners.
- *Providing assistance and training:* This role may involve technical and managerial assistance to support technology development, human resource development, and the commercialization of the output. By working with private partners in various stages of partnership, public partners may provide access to technology under license, potential areas for field trials and offer guidelines to visa application (for international partners) and IP procedures. Public partners were also accountable for private partners' access to talent mobility program, human resources and experts, and assistance for commercialization and multiplication or replication production process.
- *Leading research:* In the cases of Food Innopolis, researchers, laboratories, infrastructures, and equipments were mainly provided by NSTDA. Linking to research networks, academic institutions, and other research facility can also be provided upon request. In most cases, public partner may lead the first phase of research for product development, then, private partner will be



responsible for the second phase of field tested or production trials. Public partner may help private partner in latter phase by providing assistance for commercialization and conducting market research for instance.

- *Fostering and developing incubation services for SMEs and start-ups business:* Public partners were tasked with SMEs and start-ups business capacity building services. Such services involve with raising awareness of the available facilities, support, and possible benefits of joining Food Innopolis project among smallholder farmers, farmer groups/cooperatives, SMEs, and start-ups business owners. The public partners were also responsible for fostering incubation for SMEs and start-ups business by providing access to credit facilities and government grants for investment, facilitating licensing process, providing business and technical training, bulking requirement to minimize transaction cost, and granting business privileges and special incentives.
- *Monitoring and evaluating the partnership:* The public partners are often tasked with monitoring and evaluating activities. These activities usually include tracking progress of the project, monitoring the execution of business plan as agreed, approving fund release in designed timeframe of, ensuring that private partner are following the agreed guidelines, tracking certification status for private partners, and monitoring the overall relationship within the partnership. When the public partners retain ownership of IP rights, they will also be responsible for the private partners' sales record evaluation; as the basis for calculating royalty payments greatly involved with the sales volume of the ends products.

### **Private Sector's Roles**

Complementarily to public partner's activities, the main roles that private partners commonly played in partnerships under Food Innopolis project are as follow.

- Developing a business plan as guided by the public partners, preferably with thorough financial and market analysis.
- Contributing funding, in-kind contributions, resources, or other kind of investment as agreed in the negotiation/preparatory phase.

- Preparing a market analysis for highly marketable new products or to determine the demand for new technologies/innovation.
- Identifying a sound source of raw materials for the production phase.
- Implementing business activities as agreed and delivering results.
- Leading production and day-to-day operations of the facilities.
- Participating in the testing/pilot production or field trials of new technology prior to commercialization.
- Participating in commercializing and dissemination of phase.
- Supporting the monitoring and evaluating activities by preparing a report for a submission to the public partners.
- Negotiating IP ownership agreement and other licensing issues.

In some cases, the private partners were also responsible for providing an after-sale support services to the adopters of new technologies or innovations.

#### **4.8 Recent Performance**

Food Innopolis project was initiated by the Kasetsart University and presented to the Ministry of Science in late 2014 and has been continuously revised for almost 2 years until it gets the approval of the Cabinet on September 22, 2015. The Food Innopolis project was initiated as one of the Super Cluster, a technology-intensive and futuristic enterprise with special promotional privileges in their target areas to promote the competitiveness of the target participants.

In the early stages (2015 - 2016), the Ministry of Science and Technology was assigned by the Cabinet on May 16, 2016 to be the main agency for the implementation of the Food Innopolis project and to coordinate with the Ministry of Industry, Ministry of Finance, Ministry of Agriculture and Cooperatives, the Board of Investment (BOI), food research institutes, and other relevant agencies to provide incentives and carry out measures to attract food companies to invest in research innovation and to promote Thailand as a center for research and technological development and innovation for the food industry. Food Innopolis is located in the responsibility area of the Ministry of Science and Technology (Science Park), which

is well equipped in terms of infrastructure, manpower and other supports for research, development and innovation for high value added products (HVA).

The initial goal of the Food Innopolis is to transform the country's economy from the Middle Income Trap by replacing low-value concentrated labor production with high-value science, technology concentrated production through investment in research and development from the private sector, nationally, regionally and globally. It is expected that, by attracting knowledge workers and investors to the area of the project to further commercialize research, the ability of SMEs in the country and investment opportunities for startup companies, as well as the employment of researchers will increase. The establishment of Food Innopolis will lay out the basis for enhancing sustainable competitiveness and prepare the food industry for the expansion of the economy in ASEAN and the world market.

The objectives of the project in the early stages

- (1) To attract the world's leading food companies, both domestic and international, to invest in food innovation in Thailand;
- (2) To be a research and innovation hub for the food industry and to be the source of employment for researchers;
- (3) To enhance the ability of SMEs and startup companies to effectively link to the global food supply chain;
- (4) To transform the structure of Thai food industry from the production of low-value concentrated labor and goods to high value added goods and services using science, technology and innovation.

For current goals, NESDB has set a target for the Food Innopolis in the fiscal year 2018 to accelerate the expansion of the local participation. (Office of Policy and Strategy Office of the Permanent Secretary, Ministry of Science and Technology, 2017)

Indicator	Target for Fiscal Year 2018				
	1 <sup>st</sup> Quarter (Oct-Dec 17)	2 <sup>nd</sup> Quarter (Jan-Mar 18)	3 <sup>rd</sup> Quarter (Apr-Jun 18)	4 <sup>th</sup> Quarter (Jul-Sep 18)	Total
Number of private company participate in Food Innopolis	20	50	50	30	150

In second stage, the Secretariat of Science Park's Board of Directors has been entrusted as the promoter of the Food Innopolis project and follows the objectives to:

1. Coordinate regional entrepreneurs who are interested in accessing the Food Innopolis;
2. Coordinate entrepreneurs in the projects the access to related services in the region;
3. Coordinate linkage with raw material sources in the region;
4. Link entrepreneurs the project to regional markets and AEC

In 2018 NESDB plans to expand its food innovation program by setting up the Future Food Lab as support, in particular for SMEs, for research and development activities by providing access to Research Coach and providing food information and packaging to participating entrepreneurs. NESDB also plans to expand Food Innopolis project by setting up a comprehensive research center for innovative food testing called the Northern Science Park to establish a network of 1,600 SMEs and Startup entrepreneurs in Upper Northern Region and create value added food products with expected valued at ₪2,100 million). The Northern Science Park is expected to provide opportunities for more than 50 entrepreneurs to access to advance food processing equipment in the first year of operation and aimed to provide to not less than 700 entrepreneurs within 5 years (Ibid).

However, the past performance of the Food Innopolis project (as of June 2018) has not met the stated goal for the first three quarters of 2018 fiscal year. There are only 36 private companies participating in the project to use the service to link

research personnel from universities in the network and to establish research and development centers related to the food industry.

Dr.Kitipong Promwong, Secretary General of National Science Technology and Innovation Policy Office (STI) stated that, to attract the world's leading food companies, both Thai and foreign, to invest in food research and development in the Food Innopolis project would takes time and would require incentives or motivation in various ways. Thus, the Food Innopolis should shift its focus to attract small-scale food enterprises in the country as well as it will take less time and fewer budgets to drive. For small food company, R&D should be implemented in two key areas: training and development of food innovations for those wishing to invest in new business and product; and technology development services for existing enterprises to solve the problem of production for capacity expansion and marketing through a network of scholars and a team of agricultural and food researchers in both central and regional area.

The expansion of Food Innopolis service in 2018-2019 aims to promote research and development cooperation between the public and around 9,000 small and medium enterprises within Thai food industry to further enhance competitiveness among entrepreneurs throughout the value chain. It also aims to increase the number of farmers and primary agricultural producers in the network and ultimately increase income from the food industry for the country.

#### **4.9 Recent Success**

From the media release in April 27, 2017, there are several successfully commercialized products from Food Innopolis R&D projects with private partners. Despite details of development process are being mostly protected by Trade Secret protection protocol, following are some of the success cases that can be revealed to the public:

Thai Otsuka Co., Ltd., a leading pharmaceutical company originally from Japan with a group of more than 150 network companies worldwide, has now successfully produced innovative food products for patients with diseases such as diabetes and Dyslipidemia with hypercholesterolemia or high cholesterol. Thai



Otsuka Co., Ltd. also has set up a laboratory within Food Innopolis project area at TSP and been planning to develop new medical food products suitable for the elderly and patients with various diseases with the support of Food Innopolis at the moment;

Sweet & Invent Co., Ltd., a research company focusing on undertaking research and experimental development in the field of natural sciences, are now partnering with Food Innopolis to develop an all-natural plant-based scent extracts for food additives. In particular, this project also focuses on the development of food scents that use local ingredients to reduce imports demand as well as to add value to raw materials in Thailand including Thai renowned local fruits such as Okrong Thong Mango, Sam Phran Aromatic Coconut, and Bang Mod Tangerine to create a scent that is unique to the global market. In addition, to feed the demands of specialized food scent professionals in the domestic food industry, Sweet & Invent Co., Ltd. has also been developing curriculum for food scents and food extract training program with the collaboration and support from Food Innopolis;

Sago Farm Co., Ltd., with cooperation of Synchrotron Light Research Institute (Public Organization) (SSC), a research agency under the Ministry of Science and R&D network of Food Innopolis, has successfully produced Chong Cao or Cordyceps that contains higher levels of adenosine than other products available in the market. By using Synchrotron Light technology, Sago Farm Co., Ltd. was able to developed better system to cultivate Chong Cao with a technique to better control the temperature, humidity, and lights in the cultivation and processing phases. This Chong Cao development not only improves the quality of the products from domestic raw materials, but it also helps promote the transition from small scale farmers to Smart Farmers with high value agricultural products in the Chong Cao plantation area, especially in 3 southern border provinces.

## **Limitations of Public-Private Partnership under Food Innopolis Project**

### **1. Structural/Systematic Limitations**

#### **1.1 Limitation of Infrastructure**

Thailand's limited infrastructure is a long-standing issue due to the centralized development policy. Bangkok and large provinces have relatively good utilities and infrastructures compared to smaller provinces and people who want to

join a state-sponsored program often have to travel to use utilities in the central area. Since the project's infrastructures, such as the laboratory, machinery, plants, and rental areas, are located in or nearby Bangkok; the centralized infrastructure has become one of the limitations of Food Innopolis projects as well. Private entrepreneurs who want to use the service or rent space under the project need to move production site and move some staff and personnel to Bangkok. This can increase the cost of operation and discourage some smaller companies who have less resource to join Food Innopolis. Therefore, in the future, Food Innopolis should expand its infrastructure to different regions of Thailand so that the opportunities for entrepreneurs in different areas can be facilitated and expand.

Moreover, there are times when the existing infrastructure is not fully functional or not available due to the lack of effective infrastructure management. This leads to delays of project implementation and unnecessary additional cost for the participant.

## 1.2. Limitation from Bureaucracy

### 1.2.1 Inadequate Regulatory Structure

The nature of administrative structure of the government has resulted in a lack of flow in the government's management and working system. Actions on almost all matters in the public sector will require steps or processes; whether it is project selecting, project approval, budgeting, contract writing, coordinating with other organizations, performance evaluation, or reporting, these are all limits that does not correspond to the changing trend of society in a timely manner. These administrative issues make the public sector's work flow incompatible with private sector and oftentimes lead to complications in partnership operations and cause difficulties in expectation management.

### 1.2.2 Lack of Coordination between Government Agencies

Many public agencies revolve around similar or duplicate projects but the integration of resources was not effective and economies of scale and scope were not put into place. Oftentimes, each ministry or government agencies has some unfavorable or contradictory rules and conditions with one another and thus the ongoing work or taking process can be disrupted. An entrepreneur who needs to

coordinate or work with several government agencies often encountered overlapping management problems or some other inconsistent regulations. This led to the problem of delay or increased sink cost follow by other operational problems.

### 1.3 Limitation of Human Capital and Acknowledgement

In general, Thai entrepreneurs are still trying to compete with the advantages of raw material variety and the production efficiency, not the value added product, and have not been able to raise their exports to high added value. This resulted from the fact that many entrepreneurs are still not aware of the importance of innovation to help businesses compete in the long run and reflected in the low R & D investment in private and public research and development, number of patent registration, and number of publications in science and technology.

And although Thailand's agriculture and manufacturing sector are constantly growing in its knowledge base, innovative production output of small scale farmers, community enterprise, and SMEs are still low. The government still lacks effective policies to link the thinking process with research and development including the way to optimize productivity, especially through the support and cooperation of the private sector with educational institutions and government agencies, which is truly beneficial to the private sector.

### 1.4. Limitations from the PISU Act

By considering the PISU Act, there are some limitations that affect the promotion of the PPP in Thailand as follows:

1.4.1 The vagueness of “State Undertaking” definition definitions: one of the most significant problems in the PISU Act was the unclear scope of the Participation in the State Undertaking which was required to be construed to determine whether a project failed under this act or not.

According to section 4 in the PISU Act, in consideration of which project must fall under the PISU Act, such project must meet these following requirements:

1. Be a State-Undertaking as defined in Section 4;
2. Be an Investment as defined in Section 4; and

3. Have a value of Project at least one billion Baht or higher value as prescribed by Ministerial Regulation.

With regard to the value of the Project qualified under the PISU Act, it was, once, a problematic issue in the PPSU Act since the law only indicated that the Project must be in value of at least one thousand million Baht, yet no detail mentioning what assets should be included to evaluate the value of a project in particular revealed. However, there has been a Notification of Private Investments in State Undertakings Policy Committee regarding regulation and calculation of value of PPP project under the PISU Act. Therefore, such problem has been diminished.

On the contrary, in respect of State Undertaking definition which is unchanged from the PPSU Act, it has been defined in section 4 as:

“State Undertaking means an undertaking having one of the following descriptions:

(1) An undertaking which a government agency, state enterprise, other state agency or local administrative organization, either singly or collectively, have a legal obligation to perform

(2) An undertaking which requires the utilization of natural resources or properties of one or several government agencies, state enterprises, other state agencies or local administrative organizations, either singly or collectively”.

Moreover, pursuant to section 4 of the PISU Act, it stated that

“Investment means a public-private joint investment undertaken by any means or designation of a unilateral private investment by way a license or concession or grant of any kind of right”

Due to vagueness of those two definitions, both public and private investors have been facing the same problem as occurred under the PPSU Act, which would lead to many issues needed the Council of State to construe again. It can be clearly seen that decisive scope of Investment in the State Undertaking is a significant part in the PISU Act so that it must be clarified or revised immediately.

1.4.2 Strategic Plan for PPP is not clear enough to encourage private investment in the state project. There is no concrete identification for the private sector to see what the state wants to develop, making it difficult for private investors to prepare for the project. The Strategic Plan does not specify the priority of the

project accordingly with the National Economic and Social Development Plan and there are no definite and clear timelines how to prepare and propose a project

In addition, the Strategic Plan for PPP does not address the promotion and support for PPP mechanism, which may affect the project proposal process, private partner selection, related contract revision, and supervision and follow-up process and thus may cause the participating private partner to lose some of their deserving benefits.

1.4.3. The PISU Act contains various ambiguous provisions which lead to many problems in respect of enforcing and construing the law. It is lacking of significant necessarily procedure and regulations, especially, the process of amendment agreement and the process to calculate the project value. The law also needs to be amended on the definitions of “Investment” and “Participation”, and on penalty determination process. Consequently, the government immediately needs to clarify the rules, regulations and procedure to contribute reliability towards private investment in public service and to ensure the transparency and coherent to public policy and fiscal discipline.

## 2. Practical/Operational Limitations

### 2.1 Overreliance on the public sector

Overdependence on the public sector likely happens with start-ups and SMEs who are supported by incubator services and with companies and entrepreneurs who rely heavily on financial aid, incentives and business subsidies services. To address the problem of dependency arising from this incubation, public partners must try to gradually reduce their role or support and provide favorable conditions with financial and credit institutions, where applicable, to ensure access to finance over the long term for the incubatee. However, measures in discontinuation of support or existing phase should be considered and clearly drawn upon in beginning of the partnership to minimize the likelihood of overreliance that hinders the growth of businesses.

Innovative research or newly invented technology often take long lead times to developed with no guarantee of short term success, and delays are sometimes unavoidable. If research or technology development takes longer than expected or



needs to be improved in many harvesting seasons, it is important to manage partners' expectations in the technology development process, particularly with private partners, which may be familiar with operating under shorter periods, returns can be more easily realized. This could be seen as potential threat for businesses where the risk from return of investment, sales, market preferences and other production issues will be increased.

## 2.2. The differences between public and private sector

various constrains of partnership under the PPP project are results from the differences of environmental, organizational structure and culture between public and private sectors, including the way both sectors prioritizing their tasks. Public sector is governed by a range of laws and regulations resulting in centralized decision-making processes, sometimes lacking speed and not flexible and unresponsive to change. While the private sector is focused on speed of decision making process, efficiency, and competitiveness in business. In implementing partnership in Food Innopolis, the staffs have expressed that managing expectation from potentials private partners was difficult, as most companies expect government services to be swift, covering many needs, and flexible. It is often forgotten that Food Innopolis has some form of governmental management, whether it is decision-making, financial management, operation rules and conditions, and decision-making that requires hierarchy of command among other issues such as limited manpower, budgeting and other limited capabilities.

Failures of expectation management may affect the potential partner's satisfaction with the project and results in abortive partnership. This point is consistent with the opinion of many entrepreneurs who see that the public-like operation of Food Innopolis is a hindrance to the implementation of the project; especially on the issue of slow decisions making and time consuming implementation due to the complex project management rules and conditions. In addition, even though Food Innopolis is working as a coordinator and relay work between various government agencies and participating partners, but when entrepreneurs have to directly contact with other government agencies themselves, they usually found that many government agencies also divide the work into many specialized agencies.

These specialized agencies will strictly handle only the tasks that they are responsible for. This administrative nature of public sector makes contacting with the government difficult and time consuming. Eventually, some entrepreneurs felt that the coordination that Food Innopolis has been offering has become a small step that has not helped deliver the expected completion of the needed operation.

### 2.3 Delays of process and overspending

Innovative research or newly invented technology often take long lead times to develop and may require more investment after the process takes off which impact directly on company's financial planning both on fixed cost and working funds cycle. In addition, the inability to perform accordingly to a business or financial plan, such as applying borrowed funds outside the business plan or overspending on one of the company's projects, may also perceived as lacking of financial planning reliability and may be a hindrance to future credit approval from financial institutions.

### 2.4 Difficult access to funds resources

In general, while large enterprises have the advantage and opportunity to access to credit or loans from banks, approval conditions for financial support are still considered unsupportive among SMEs and Startups. The major problem that causes SMEs to have less access to financial institutions is due to three main factors; firstly, the problems from the company itself, such as the lack or insufficient of collateral and mortgage securities; secondly, limitation or financial institutions, such as insufficient capital and inflexible regulatory; lastly, infrastructure problems such as scarcity of financial advisers to mentor or absent of financial incubator that suited to SME needs. The lack of financial resources may result in constraints in operations or lower efficiency production after research and development.

### 2.5 The Lack of Accurate Information and Data Connectivity in the Value Chain

The upstream of the agri-food value chain of Thai food industry consists of many small processors and retailers of food products who often lack the information to use in business decision making; for example, data on demand in the

short and medium term, list of partners who are interested in importing Thai products, analysis of the impact of policy change in the country that will affect the market demand, list of competitors in the market, details on strength and weaknesses of its production and so on. Although lack of insights is not a major issue for the large and medium-sized exporters who often has a strong network to provide information and source of marketing data such as the Chamber of Commerce and other trade associations, However, it can be a major constraint or obstacle that prevent the midstream and downstream producers to completely connect with the farmers upstream.

However, this lack of information or incomplete information does not only apply to the private sector. It also happens to government agencies as well. It was found that the government data collection on quality and quantity of raw materials in Thailand (prepared by the Ministry of Agriculture and Cooperatives), market trends (prepared by The Ministry of Commerce), as well as many other information from relevant agencies, such as information on technology and innovation (prepared by the Ministry of Science and Technology) and information on agricultural products exporters (prepared by the Thai Chamber of Commerce) was lack in systematic linkage and accuracy. The duplication of government data has prevented the formation of "Market Intelligence" and lead unnecessarily cost.

The lack of accurate data and lack of data connectivity between upstream raw material producers and downstream food processors and exporters may cause Thai food producers to face the risk of producing substandard products and services that fail to meet market demand and directly affect the performance and competitiveness of the country.

## CHAPTER 5

### LESSONS LEARNED: QUALITATIVE ANALYSIS

The total 14 interviews i.e. 5 interviews from government official with administrative positions and 9 interviews from the private businesses from small, medium, and large companies participating in Food Innopolis were conducted. Under this process, group interviews with government official and in-depth interviews with private companies were conduct with an intention to investigate and identify the situation that participants were experiencing in embarking on PPP in food industry development under Food Innopolis project. The interviews were structured and guided in order to find the best possible answers coupled with the research objectives: the problems, obstacles, opportunities, and challenges in utilizing public-private partnership for Thailand's food industry development under Food Innopolis project. As a supplementation to information gathered by the interviews, opinions and insights from public policy makers were also gathered through seminars and conferences attendances. And as requested by the informants, discretion to protect the privacy, trade secret, and confidentiality was applied; the participating companies in the interview will be remained anonymous.

#### 5.1 The Lessons Learned

##### 5.1.1 Major Problems of Food Innopolis Partnerships

Environmental and contextual aspect:

- *Inadequate or obscure public regulatory frameworks:* lead to the lack of coordination between agencies and overlapping tasks of relevant agencies. Many agencies revolve around similar or duplicate projects but the integration of resources is not effective, economies of scale and scope were not put into place. Each ministry or government agencies has some unfavorable or contradictory rules and conditions

with one another and thus the ongoing work or taking process can be disrupted. This led to the problem of delay or increased sink cost follow by other operational problems. Partners in Food Innopolis regularly face the problem of inconsistency of government regulation because Food Innopolis is responsible for coordinating between manufacturers and other government agencies whether it is Ministry of Commerce, Ministry of Agriculture and Cooperatives, Ministry of Science and Technology, Ministry of Public Health, and Ministry of Industry, along with other government agencies such as the National Research Council of Thailand, the Agricultural Research Development Agency, Office of the Consumer Protection Board etc. including other government agencies in the Food Innopolis R & D Network. Under Food Innopolis, an entrepreneur who needs to coordinate or work with several government agencies often encountered overlapping management problems or some other inconsistent regulations. Some company also indicated that the government policy or regulations are sometimes unreliable or change frequently. These problems led to confusion, dissatisfaction and waste of time and most mostly affects the R & D development project, which is a long process and easily affected by the change. One entrepreneur, in particular, pointed out the scenario where his research project was delay due to the inadequate regulations of public agencies: his company is a processed seafood product manufacturer who interested in developing new product to the local market. He has decided to offer his product as an OTOP product (One Tambon, One Product) and positioned his product mainly in the provincial marketplace. However, when he began the R&D process, he found out that his application for being OTOP product cannot be completed due the obscure regulation of OTOP status requirement about the location of the registered company and the manufacturing site. Because of this issue, the analysis of his marketing strategy thus requires revising, resulting in the modification in new product's



research and development approaches which delays the operation and impact on the partnership under Food Innopolis project.

- *Public management and legal structure lack flexibility:* the nature of administrative structure of the government has resulted in a lack of flow in the government's management and working system. Management or administration of public sector is all based on the framework of the statutory authority and lack flexibility. Actions on almost all matters in the public sector will require steps or processes; whether it is project selecting, project approval, budgeting, contract writing, coordinating with other organizations, performance evaluation, or reporting, these are all limits that does not correspond to the changing trend of society in a timely manner and make it difficult for many public agencies to adapt to the changing technology. These administrative issues make the public sector's work flow incompatible with private sector and oftentimes lead to complications in partnership operations and cause difficulties in expectation management. Many Food Innopolis officials indicated that these limitations of public agency have made it difficult to manage partner or potential customer expectations; private companies often come with a limited time to consider projects, expecting fast results and clear process, especially with Food Innopolis research and development projects that often have a fast-paced nature. Thus when they found out that limitation of government administration still exists, it decreases partner's satisfaction and some potential partners even expressed it as a risk of losing more opportunity cost and may eventually abort the partnership project before it even begins.
- *The lack of effective publicity of Food Innopolis:* The Food Innopolis project is not widely recognized, especially to SMEs and small scale farmers. This problem occurred from several reasons such as the lack of clear or continuity of publicity or the lack of survey

information/review of the situation related to the organization which makes it difficult to determine the target audience and the selection of appropriate activities; the problem of prioritizing publicity policy that needs to be driven by senior management or high ranked executives. Thus, when the project has a variety of roles and missions, it may neglect the importance of publicity which lead to losing a potential constructive partner or an exclusion of small-scale partners; Shortage of working personnel responsible for publicity of Food Innopolis project. While tasks and projects are increasing, the number of staff has become limited, causing problems to assign people to suit the workload; another important problem is the insufficient publicity budget which causes the limitation of publicity activities and tools selections. Making effective publicity relies heavily on appropriate budget. Budgeting is the core that supports the promotion of a well-planned publicity that encompasses all potential partners from various audiences. Today, publicity works of Food Innopolis project mainly runs through the Ministry of Science and Technology not by the Food Innopolis personnel itself. This publicity management strategy could be the reason why the project's publicity issues have not yet been addressed at the organizational level.

#### Operational and technical aspect

- *Unable to comply with quality standards or retain certification after the partnership ends:* especially for value chain development partners who focus on high value markets, which all raw materials for production must be certified. When certification is becoming expired or manufacturers are unable to achieve compliance, end markets may be lost and private-sector partners, especially SMEs or start-ups companies, may start finding alternatives to find a source of supply with reduced transaction costs where farms or raw material sources are lowered in quality or non-certified. Continuous monitoring and technical support for these manufacturers is essential for capacity

building and ensuring that regulatory compliance can be addressed. Labor shortages during periods were also reported as increasing the risk to the private partner through losses associated with deterioration of product quality and the operation of processing equipment below capacity. Labor shortages during the peak harvesting periods have also been accounted for the increasing risk of losses due to deterioration of product quality when manufacturers utilize lower-capacity processing equipment to lower transaction cost or accelerate production. These risks can be reduced by designing production and harvesting schedules, including machine and labor rotation based on appropriate cyclical cycles and harvest quotas that match daily processing or collection capabilities. The company needs to plan ahead to ensure that funding is available for the design and implementation of strategies to improve efficiency and productivity so that certification can be maintained after the partnership ends.

- *Problems of recruiting and retaining qualified public officials:* Recruiting and retaining qualified staffs are another key element in driving the Food Innopolis project. The project staff must have a deep understanding of R & D and digital technologies and must be able to apply those insightful capabilities into the management within the organization and partnership. Despite that the government has accelerated the production and development of human resources in science and technology continuously by allocating scholarships and increased training in both domestic and international research, but the severe shortage of science and technology personnel still persists as the number of research project is growing rapidly with the launching of Thailand 4.0 policy. The Food Innopolis project, which is a public sector project that requires departmental staff who familiar with researchers or scientists R&D project as well as administration work that related to research and development subject. This causes the difficulty in recruiting qualified people working in this field that will

be willing to work on the Food Innopolis project, especially considered the inferior salary and compensation system comparing to private sector and the heavy workload.

- *Limited human resources and work overload of public officials:* relating to the problem to recruit and retain project staff, problem of current workload among Food Innopolis staff can resulted in an ineffective partnership. Staff of Food Innopolis expressed that they are suffering from work overload and sometimes the limitation of necessary work tools to response to the work requirement, especially from their private partner who are expecting them to promptly response. The heavy workload and inadequate manpower also lead to the problem of retaining workforce. With limited manpower in the organization, coping with the diverse needs of private partners, which are so numerous and diverse, the problem of heavy workload could possibly result in a long-term human resource problem to recruit and retain qualified workforce for Food Innopolis in the future.
- *Long lead times for research and development of new technology:* Innovative research or newly invented technology often take long lead times to developed with no guarantee of short term success, and delays are sometimes unavoidable. If research or technology development takes longer than expected or needs to be improved in many harvesting seasons, it is important to manage partners' expectations in the technology development process, particularly with private partners, which may be familiar with operating under shorter periods, returns can be more easily realized. This could be seen as potential threat for businesses, especially with emerging new measures such as quality and safety measures, environmental measures, labor measures and regulations, animal welfare measures, etc. that constantly changing and increasing. When research and innovation takes a long time to be developed, the risk from return of

investment, sales, market preferences and other production issues will be increased. To reduce the impact from this problem, a well-designed legal and regulatory framework for the partnership to operate is needed and must be flexible enough to allow for time extensions and amendments for both parties.

- *Marketing failure or new technology/innovation adoption failures:* disappointing profit after the commercialization of new technology or poor marketing performance after the sales of new products can result in to losses or dramatically undermine returns on investment for both parties. This problem is more likely to happen in the innovation or new technology development targeting SMAEs and small scale manufacturers; although there are clearly identified benefits that the introduction of new innovations or technologies would increase productivity and cost savings in the long run, but the cost of investing in advance and sink cost are still too high. For many small entrepreneurs, financial recovery or return of investment from the cost of R&D simply takes too long and can lead to the abandon or delay in utilizing the new technology. In this case, private companies interviewed suggested that public sector partner could help reduce the impact of this problem through making a thorough market analysis prior to commencing the partnership to assess the size of potential market for the new developed technology. A reasonable timeline for implementation also needs to be taken into account when planning the partnerships operation to manage the expectations of private partners.

#### Financial aspect

- *Delays of process and overspending:* Innovative research or newly invented technology often take long lead times to develop and may require more investment after the process takes off. This problem usually occurs from inadequate planning at the initial phase of the



R&D project and might cause serious financial problems for public partners afterwards. Delays of process and overspending impact directly on company's financial planning, both on fixed cost and working funds cycle. On one hand, if the company overspend over invest too much on R&D, it will affect other operations, on the other hand, if the business does not invest sufficiently in machinery, equipment, and productivity improvements, it may not be competitive enough to survive or significantly lose its market share. In other words, overspending or incorrect conjecture of the use of existing assets would result in operational uncertainty. In addition, the inability to perform accordingly to a business or financial plan, such as applying borrowed funds outside the business plan or overspending on one of the company's projects, may also be perceived as lacking of financial planning reliability and may be a hindrance to future credit approval from financial institutions.

- *Failure to achieve return on investment in short and medium-term:* financial problem can be occurred due the unpredictable nature of markets, economic environment and political context. Other similar financial problems such as lower than expected returns on investment, slower than expected payback periods, limited funding for renewing operations, disappointing profits, and escalating costs resulting from inflation also were identified by private company embarking on the partnership under Food Innopolis. These financial issues also relate to inability to sustain activities or required investment beyond partnership period. Besides, some entrepreneurs still lacking in understanding that R&D is a tool to increase the competitiveness and profitability of the company in the long run rather than the tools that payback its cost in short or medium term. This resulted in the disappointment of R&D project and sometimes led to bad impression towards Food Innopolis project as a whole.

### Sustainability aspect

- *Overreliance on the public sector:* overdependence on the public sector likely happens with start-ups and SMEs who are supported by incubator services and with companies and entrepreneurs who rely heavily on financial aid, incentives and business subsidies services. To address the problem of dependency arising from this incubation, public partners must try to gradually reduce their role or support and provide favorable conditions with financial and credit institutions, where applicable, to ensure access to finance over the long term for the incubatee. However, measures in discontinuation of support or existing phase should be considered and clearly drawn upon in beginning of the partnership to minimize the likelihood of overreliance that hinders the growth of businesses.
- *Lacks of utilizing research and development in food production chain:* lacking in utilizing research and development in food production chain are partly resulted from the lack of acknowledgment towards the benefits of research and development as well as the lack of awareness in value chain development among Thai manufacturers. Private sector is not motivated enough to invest in research and development in value added products, partly due to the government's measures and policies that have not yet been able to stimulate R & D investments, particularly to small-scale entrepreneurs and SMEs. Importance of R & D investment was not receiving adequate support from the government including shortage of necessary budget makes it difficult for small companies to invest in research and development to create new innovations. Besides, most Thai entrepreneurs still have a perception that R & D is a cost of the company, resulting in lower short-term earnings, instead of viewing them as a tool to increase the competitiveness and profitability of the company in the long run. Not to mention that overall research funding in Thailand is low compared

to other countries in the region. In particular, by comparing the competencies in the dimensions of science, technology and innovation, it appears that Thailand are not fully focused on R & D and education and human resource development in science and technology remains weak. As a consequent, the country's production problem persists. And this hinders the sustainable development of food products in the country.

### 5.1.2 Constrains of Food Innopolis Partnerships

Environmental and contextual aspect:

- *Inadequate patent and other intellectual property register services:* Thailand only has a small number of patent applications and a small number of registered patents-- most of them are registered by foreigners. As expressed by many entrepreneurs, Thailand has less effective system of patent and other intellectual property register services compared to other international standards. Main problem was time-consuming registration process which led to the missed opportunity to increase the amount of research and IP that can be imported into the intellectual property protection system. This requires the continued development of government intellectual property management capabilities and qualified personnel who work in these services to sustainably support innovative research and development in the long run.
- *Emerging new measures that hinder the flow of international food trade:* In addition to quality and safety measures, other production measures such as environmental measures, labor measures and regulations, animal welfare measures, etc., are constantly changing and increasing. Therefore, when research and innovation takes a long time to be developed, the risk from return of investment, sales, market preferences and other production issues will be increased.

- *Intensified competition in trade and marketing in the food industry:* Not only that free trade market has been intensifying competition in both price and quality among domestic and international manufacturers, but the increasing in specialized trade integration and a more diverse and complex economic integration also make the market more competitive. In particular, the food and agriculture manufacturing sector was directly impacted by the entry into the ASEAN Economic Community (AEC) and the agreement of joint production base that has opened the door for competing countries with lower cost and better quality product to come and compete in the domestic market. These manufacturers also have to compete for the share in the export market of some agricultural products, such as palm oil, coffee, coconut, etc. The low awareness of Thai entrepreneurs on R&D and the sluggishness of the public sector's procedural rules may hinder the market expansion and development of the country's food industry to meet its goals. Therefore, the research and development of products to meet the needs of the market must be done quickly.
- *Most of the small scale food manufactures are still lacking in awareness, knowledge, access and proper utilization of information and production inputs:* Most Thai SMEs still lack knowledge and ability in modern business management, lack of skills in dealing with international business negotiation and unknowingly aware of changing world situation. These limitations led to inefficient production, inability to expand market, and reduced competitiveness. Many Thai food producers still trying to compete with the advantages of raw material variety and the production efficiency, not the value added product. The majority of Thai SMEs export products are basic commodities, usually as the Non-Fuel Primary Commodities and Medium Skill & Technology Intensive products. Thai SMEs in food

industries have not been able to raise their exports to high added value and this resulted in the inability of SMEs to generate much income from exports. In other words, many SMEs are still not aware of the importance of innovation to help businesses compete in the long run. The SMEs that are aware and interested are lack of investment capital and lack of knowledge. This problem thus has to be resolved in a variety of areas, such as basic knowledge in the business, the use of information technology in business, strengthening international trading capabilities, and promoting the concept of a global business context, in order to help Thai SMEs to be able to operate professionally and grow according to the Thailand 4.0 policy.

Operational and technical aspect:

- *The differences between public and private sector:* various constrains of partnership under the Food Innopolis project are results from the differences of environmental, organizational structure and culture between public and private sectors, including the way both sectors prioritizing their tasks. Public sector is governed by a range of laws and regulations resulting in centralized decision-making processes, sometimes lacking speed and not flexible and unresponsive to change. While the private sector is focused on speed of decision making process, efficiency, and competitiveness in business. In implementing partnership in Food Innopolis, the staffs have expressed that managing expectation from potentials private partners was difficult, as most companies expect government services to be swift, covering many needs, and flexible. It is often forgotten that Food Innopolis has some form of governmental management, whether it is decision-making, financial management, operation rules and conditions, and decision-making that requires hierarchy of command among other issues such as limited manpower, budgeting and other limited capabilities. Failures of expectation management may affect the potential partner's satisfaction with the project and



results in abortive partnership. This point is consistent with the opinion of many entrepreneurs who see that the public-like operation of Food Innopolis is a hindrance to the implementation of the project; especially on the issue of slow decisions making and time consuming implementation due to the complex project management rules and conditions. In addition, even though Food Innopolis is working as a coordinator and relay work between various government agencies and participating partners, but when entrepreneurs have to directly contact with other government agencies themselves, they usually found that many government agencies also divide the work into many specialized agencies. These specialized agencies will strictly handle only the tasks that they are responsible for. This administrative nature of public sector makes contacting with the government difficult and time consuming. Eventually, some entrepreneurs felt that the coordination that Food Innopolis has been offering has become a small step that has not helped deliver the expected completion of the needed operation.

#### Financial aspect

- *High costs of innovation and technological research and development:* One of the companies interviewed indicated that the company faces a number of obstacles to drive innovation, particularly in terms of cost, that is, research or innovation development usually requires a large amount of investment. Thus, government support is vital to help SME or Startup business, who usually have limited production funds and working capital, develop innovation. And even though Food Innopolis has several tax and non-tax incentives to mostly help reduces the costs of R&D for participating partners, it is still not directly help small companies with less capital to access to the sources of fund. The interviewee company suggested that government policies must support SMEs R&D investment both in

terms of funding and product publicity so confidence in the product can be built and the opportunity to seek funding sources will be increased. The interviewee also expressed that banks often do not trust the capabilities of small companies and requires additional guarantee for them to make a loan which make securing money to develop productivity or invest in R&D very difficult.

Sustainability aspect:

- *Ineffective management of research, technology and innovation to link researchers or research institutes with the research users or lack of research result commercialization:* reflected in the low R & D investment in private and public research and development, number of patent registration, and number of publications in science and technology, Thailand's rate of utilization and commercialization of research results or innovation is at a very low level. The government still lacks effective policies to link the thinking process with research and development including the way to optimize productivity, especially through the support and cooperation of the private sector with educational institutions and government agencies, which is truly beneficial to the private sector. And although Thailand's agriculture and manufacturing sector are constantly growing in its knowledge base, production output of small scale farmers, community enterprise, and SMEs, who usually has limited funding and lacking access to new technologies and innovations, are still low. These producers often face with high cost of production that yields no added value output. Besides, there are also deforestation and unsustainable agriculture that destroy the environment which are major impediments to development of the food industry as well as the sustainability of natural resources and the environment in the long run.

- *Inefficiency governance that hinders sustainable development:* One of the reasons of inefficiency governance comes from the hierarchical nature of bureaucracy, the multi-step work that causes delays in performance, the lack of good governance in many organizations, and the lack of participation of other sectors that partly come from the a long and slowly changing bureaucratic system of Thailand. Many administrative problems, such as budgeting problems, the lack of effective project evaluation process, centralized administration, centralized decision making, inflexible organizational structure, the statutory-authority-based management, the lack of technology utilization and the lack of creativity of personnel, including issues of corruption and misconduct in the government, still persist. This is a major and chronic problem that has accumulated for a long time and it critically impacts the implementation of sustainable development.

### 5.1.3 Opportunity of Food Innopolis Partnerships

#### Environmental and contextual aspect

- *High competitiveness of Thailand in the food market:* Thailand has long been a major source of food for the region and the world which make it very competitive in the global food market. Thailand has a high level of competitiveness due to many factors such as abundant resources of raw materials, in terms of quantity, quality and variety, skilled labors in the food industry, strong related and supporting industries, and the geographical advantages as the center of Southeast Asian region. Thailand's geographical condition is suitable for both agriculture and fisheries and it is one of the few countries in the world that has capacity to produce food far more than domestic demand, with the rate of food exports has exceed the rate of food imports by a broad margin. Thus, with a proper boost, income for farmers and producers throughout the food chain is likely to increased, particularly through the development of food services that

related to tourism and culture, a new trend in global food market penetration.

- *The government plans to continually develop new technologies and innovations:* the government plans to develop technology, including the development of digital system, logistics system, and e-commerce, in order to increase efficiency and create opportunities in the food chain, including the production, distribution and trade of food. As can be seen from the National Economic and Social Development Plan, the country's 20-year strategic plan, and Thailand's 4.0 policy, importance of science, technology, and innovation was emphasized, especially on research and development to bring about advanced production and services in food and agricultural industries such as encouragement of large national investment projects which includes clean energy, water and waste management and electric vehicle system, the support to increase national research and development funds, accelerate manpower in the scarce field, reforming the system of public sector incentives, regulations, and laws that hinder research work, improve and equip the science, technology, research and development infrastructure and innovation. These initiations from government are important intellectual infrastructures to help advance the commercial use of modern technology and innovation among industrial sector. In addition, to promote research and development cooperation between universities, research institutions, and private companies as well as to utilize research and development into commercial use, various analytical centers, scientific laboratories, public research centers, such as Food Innopolis, were established. This continuous support by the government in technology and innovative research and development has led to increased private sector awareness, an opportunity for Food Innopolis to have more potential partners, and the development of Food Innopolis's service platforms to suit the variety of research project in the future.

### Operational and technical aspect

- *Access to public land and public infrastructures:* The Food Innopolis project is one of the super-clusters that the government is driving to increase the competitiveness of the nation. Therefore, to support and facilitate private partners who participate in the project, the government has provided access for private partners in Food Innopolis to the research infrastructures with minimum cost. The provided infrastructure to support innovative development for private companies under Food Innopolis project included One Stop Service Center, Ready to move-in lab and Pilot Plant, and Food Functionality Evaluation Center. In the first phase, the Ministry of Science as prepared an area of 20,000 square meters, surrounded by leading research units and universities and equipped with innovative private support infrastructure to support businesses for food innovations, at Thailand Science Park, Pathum Thani Province, to support the growth of Food Innopolis project. In addition, Food Innopolis also have R&D network with leading research and academic institutes locating within Thailand Science Park areas such as Kasetsart University, Chulalongkorn University, Mahidol University, and King Mongkut's University of Technology Thonburi, who are ready to support and cooperate in the development of agri-food innovations, research and development of technology and innovation in various related industries with private sector partners.

### Financial aspect

- *Applicability of various financial incentives:* since Food Innopolis belongs to one of the BOI's super cluster, government thus also offers wide range of financial incentives for private partner in food industry. Tax-based incentives include the exemption of corporate income tax for up to 8 years, with additional 50% reduction for 5 years, special accelerate depreciation rate for R&D machineries and equipments,



and 300% tax deduction for R&D expense, including personal income tax exemption for leading experts both in Thailand and abroad. While non-tax based incentives include of legal privileges for international companies to own land, as well as special facilitation on visas application and work permits procurement.

Sustainability aspect:

- *The demand for safe and high value food is likely to steadily increase:* The rise of the middle class and the entry into the elderly society has resulted in a continuous increase in demand for quality, safe and nutritious food both domestically and internationally. Trends in the changing market demand for health products, safe food products, and Niche market products, were brought about by the direct demand from consumers who needs food that match their daily lifestyles; For example, people tend to spend less time eating, thus the food should be processed to be able to consume more quickly and easily, such as the increased demand of ready to eat meals, instant meals, and cornflake or serial stick from rice, etc. From these trends, therefore, the development of agricultural products using modern technology to produce a modern food will help make a great progress for food industry development. Furthermore, with the emphasis on the production of products and services that focus on health and local culture, the rich in marketing story of Thai food production will also help to confirm the high potential of Thai food industry in both old and new markets.

#### **5.1.4 Challenges of Food Innopolis Partnerships**

Environmental and contextual aspect:

- *Force Majeure or extreme weather:* Force Majeure or extreme weather crucially affect the agricultural sectors in terms of production

efficiency, production costs, and including harvest patterns of and crop seasons. Not only that climate change that result in rainfall changes, droughts, floods, encroachment of saltwater, etc., which impacts the quality and moisture of soil, but pests and plant diseases are also the main challenges that Thai farmers usually have to deal with. And because Thailand's the agricultural production is still heavily rely on climate and natural resources, when there is extreme weather, agricultural and food industries will have been critically impacted. One entrepreneur pointed out that more than 80 percent of the total of Thailand agricultural area are still rely mostly on seasons and rainwater with low productivity outside of irrigation system. Thus, the management of agricultural production in Thailand is difficult to control. And when the flows of raw materials, the primary sources of the food industry are uncertainty, improving production efficiency in agriculture and industry becomes very difficult. The issue of uncertain flow of raw materials led to several production risks, such as the temporarily production pause, the inability to deliver the product to the target customer on time, and financial risks such as sinking costs, inadequate working funds, or decreasing of profit per unit, which resulting in the long-term risk to the company's reputation, reduced customer satisfaction, and complications in quality control, etc. In the last few years, climate change, natural disasters, floods, droughts, and storms have had damaged Thai agricultural production with an average value of 4 billion baht per year. In this sense, research and development can play a big part in this; with a right technology, scientific development will help the agricultural sector and food industries to adapt to the changing climate and can help prevent damage in the long run.

- *Emerging new risks*: emerging new risks in today's market may includes such issues as rapid change of globalization, regulations and customer's preferences, price fluctuations, requirements for

conforming with new quality and labor standards, tax and trade policies to which they had not previously been exposed. Smallholder entrepreneurs and startups are more sensitive to these risks and are more specifically need to address the possible impacts thoroughly. Conducting a risk assessment during the partnership's designing phase can help identify the possible impact of such interventions on smallholder public partners. Implementing the cost-benefit assessments and evaluation also helpful to determine whether a partner's expected profits of joining the partnership justify the risks associated with the possible interventions.

#### Operational and technical aspect

- *Partner's expectation management:* due to the differences between public and private sector in organization structure and culture, the Food Innopolis staffs have indicated that managing various expectations of their private partners was difficult as most companies expect government services to be swift, covering many needs, and flexible, while Food Innopolis still operating as public organization where limited manpower, budgeting and other limited capabilities issues persist. The challenge for public sector in this case is how to improve service levels. The customer's perspectives must be valued before and after the service, because if the benefits have been reduced, such as by delay process or overspending, it will affect the relationship between both partners and impact private sector satisfaction in terms of efficiency or the effectiveness of the service. This could potentially results in the complaint being returned to the organization after the service and lead to other problems in the implementation of the partnership in the future.
- *Retaining a qualified personnel and workforce:* challenge of retaining a qualified staff is directly linked to the problem of inadequate manpower and heavy workload among Food Innopolis staff. Staff of

Food Innopolis pointed out that Food Innopolis staffs are trying to cope with the problem of inadequate manpower within the organization and indicated that they are suffering from work overload and dealing with the lacking of necessary work tools to response to the work requirement, especially when their private partners are more familiar with expeditious working process and expect promptly responses. Inadequate manpower and the issue of heavy workload can make retaining of workforces challenging. With limited manpower in the organization, coping with the diverse needs of private partners, which are so numerous and diverse, could potentially result in the difficulty in retaining people with qualified skills in the long run, especially when considered the inferior salary and compensation system comparing to private organizations operating in similar areas of research and development.

#### Financial aspect

- *Lack of investment funds beyond partnership period:* this is mostly due to the difficult access to financial resources. The interviews showed that those who are setting up SMEs and start up business is mostly to use their own savings as the source of funds follow by informal borrowing and applying for loans from both commercial banks and specialized financial institution comes as a last choice. The major problem that causes SMEs to have less access to financial institutions is due to three main factors; firstly, the problems from the company itself, such as the lack or insufficient of collateral and mortgage securities; secondly, limitation or financial institutions, such as insufficient capital and inflexible regulatory; lastly, infrastructure problems such as scarcity of financial advisers to mentor or absent of financial incubator that suited to SME needs. Many interviewees pointed out that lack of collateral or insufficient mortgage securities is a big problem for SMEs and startups to raise

funds or seek investment funds beyond Food Innopolis partnership or when the incentives ends. In general, while large enterprises have the advantage and opportunity to access to credit or loans from banks, approval conditions for financial support are still considered unsupportive among SMEs and Startups. The lack of financial resources may result in constraints in operations or lower efficiency production after research and development under Food Innopolis ends.

- *Expectation of limited first-mover advantages:* In some cases, the specific challenge addressed by a private partner was the perception of limited first-mover advantages. One of the key impetuses for a business to participate in a Food Innopolis partnership is to take the benefits from new market opportunities and potentially to gain first-mover advantages in previously unexploited markets. However, these advantages may be short lived and do not imply a guarantee of partnership success. For example, if new competitors entering the market, it may impact the firm's operation and expected outcomes such as losing access to raw materials towards the end of the partnership or increased risk of losing current market share. In this case, private partner may feel that its commitment and high-risk upfront investment are not rewarded adequately.

#### Sustainability aspect

- *Absence of an exit strategy for the reliance companies:* this challenge is linked to the problem of possible overreliance of Startups or SMEs on public partner where the exit strategy that ensures the financial and operational sustainability or the access to business services is absence. To address this overdependence of the incubatee, the phasing out of support and realistic timeframe of partnership processes should have been considered in the designing phase of the



PPP arrangement. As the partnership comes to an end, the public-sector partner has to gradually reduce its role and should provide favorable conditions with banks or other financial and credit institutions, where applicable, to ensure that the incubatee will have access to finance over the long term.

- *Long-term privileges of the supported or participated firms may undermine competition:* In Food Innopolis case, concessional elements that have been offered and provided by the public partner gave private partners exclusive rights to use Food Innopolis space, processing plant, and other equipments during the period of the partnership. This meant that these facilities will no longer available to other potential partner during this time and thus may undermine competition in general.
- *Environmental and sustainability concerns:* concerns about environmental sustainability and sustainable development from an increased rate of scientific researches and new technology development in food industries may include issues such as the impact on national food security of the expansion of monoculture, exploitation of natural resources and deforestation due to the need for new production areas. While there is no concrete evidence or assessment of these effects from Food Innopolis project, measures and thorough consideration towards these environmental and sustainability issues should be adopted in all partnership agreements to address the long term impact of the R&D projects.

## 5.2 Success Factors

Six main successful factors were identified

- *Adopt a participatory approach during the design phase:* Multi-stakeholder meetings/consultations are important for PPPs. These partnerships require

participation at all levels of the chain and negotiations need to be transparent about expected costs, revenues, returns on investment, market demand forecasts, and the expectations of participating actors. Having administrative-level staff from both sides of the partnership lead the consultations is seen as useful in demonstrating the importance of the partnership to all actors.

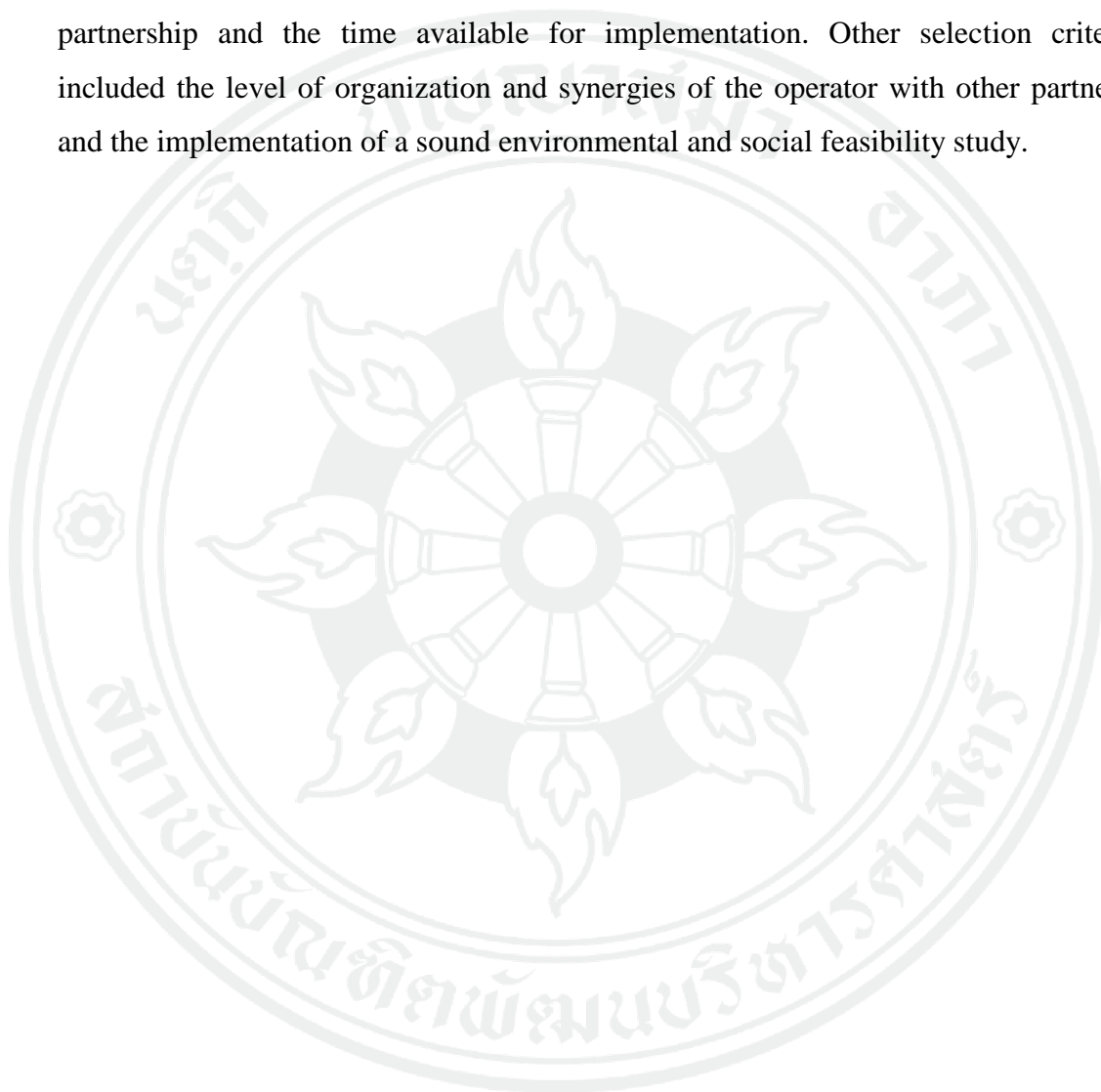
- *Creating synergies with other public-sector programs and/or networks:* In addition to collaboration with the core public partners involved in the agreement, linkages to other public-sector networks such as research institutions and trade promotion agencies were also highly valued by private partners. Where such linkages were possible, the private sector considered them a positive externality of the PPP. That is, the link with the initial public partner opened avenues for the private partner to obtain access to other public services previously unavailable/unknown to it.

- *Addressing issues in the enabling environment to improve the potential for long-term impact:* To achieve broader-based impact from value chain PPPs, a supportive regulatory environment with appropriate financial and non-financial incentives for private-sector investment needs to be developed in conjunction with PPP programs or through the learning-by-doing process associated with the PPP.

- *Clearly defined roles and responsibilities:* Contracts must include clearly defined roles, financial contributions, expected outcomes, management responsibilities, and agreements related to ownership of IP rights/licensing. Output-based contracts should be used to guide the project through phased stages that are connected to funding release, such as laboratory work and field trials to select the best seed varieties; multiplication and purity testing of seeds; advocacy and awareness raising; and commercialization and distribution of technology.

- *Flexibility:* Because of the often unpredictable nature of agricultural R&D, a well-designed legal and regulatory framework is needed that is flexible enough to allow for timeline extensions and similar amendments. However, extension periods should be limited and based on expert opinions from the project manager and third-party evaluators. While they are necessary in many cases, timeline extensions can be risky in high technology projects, mainly because fast-moving technological development threatens to make new products obsolete before they even get to market.

- *Sound project definition and planning*: This is by far the most important factor in determining the success of PPP. A well-developed business plan was a key element for successful project. Essential components of the business plans included thorough market identification, clearly defined target beneficiaries, and an offer of services that was realistic in relation to the resources available to support the partnership and the time available for implementation. Other selection criteria included the level of organization and synergies of the operator with other partners, and the implementation of a sound environmental and social feasibility study.



## **CHAPTER 6**

### **QUANTITATIVE OUTCOME**

For the purpose of this research, after examining the objectives of the study and realizing the absence of past review and distributed literature on public-private partnership in Thailand's food industry, a mixed method exploratory descriptive research design had been chosen since it would decisively portray the qualities and experiences of the population under study. And since there had been little documentation on the topic and in the wake of considering the stipulated goals of the study, the research questions, the limitations and the scope, the researcher felt the suitability for applying both the qualitative and quantitative techniques on data gathering. By embracing both techniques, each method could complement and substantiate the other in making the findings more concrete.

Subsequently for the qualitative analysis, quantitative data was applied for the purposes of re-affirmation and consolidation and to gauge at some convergence of findings. The self-completion questionnaire was used as the instrument for the survey supplementing the qualitative data in gathering opinions towards PPP in Food Innopolis. Thus, the questions of the questionnaires were set according to data from qualitative method, with the last question on the perceived experiences would be utilized to frame the basis for recommendations.

To acquire quantitative data, instrument for data collecting was divided into 3 parts:

Part 1, general information of the respondents which consists of 8 check list questions about the nature of the business i.e. the type of establishment, the duration of operation, types of goods and services, attitudes towards R&D, R&D investment, R&D experience with public sector, and Food Innopolis recognition;

Part 2, a questionnaire about attitudes towards working with the government in research and development of the food industry, which consists of 24 Rating Scale

questions, covering opinions on problems, obstacles, opportunities and challenges in working with the public sector in research and development; and

Parts 3, an open-ended query for the informants' comments or suggestions towards problems, constraints, opportunities, and challenges in working with the government for research and development within food industry.

In this chapter, descriptive statistics will then be discussed to describe public sector's attitudes towards the utilization of public-private partnership in research and development of Thailand's food industry, including problems, constraints, opportunity, and challenges in such operation. Later, statistical analysis of T-Test and one-way ANOVA will be used to analyze and present the summary.

## 6.1 Characteristics of the respondents

This section describes the characteristics of a sample or the respondents' nature of their business i.e. the type of establishment, the duration of operation, types of goods and services, attitudes towards R&D, R&D investment, R&D experience with public sector, and Food Innopolis recognition.

From the total of 200 respondents, the types of establishment were 27% large enterprises (with more than 200 million baht in capital); 43% medium enterprises (with capital of 50-200 million baht); 20.5% small enterprises (with capital less than 50 million baht); 5% community enterprises; and 4.5% Startup businesses.

Table 6.1 Types of Establishment

Types of establishment	Frequency	Percent
Large Enterprise	54	27
Medium Enterprise	86	43
Small Enterprise	41	20.5
Community Enterprise	10	5
Startup Business	9	4.5
Total	200	100



From the total of 200, the duration of operation of the respondents were 11% 0-4 years; 25.5% 5-10 years; 22% 11-20 years; and 41.5% more than 20 years in business.

Table 6.2 Duration of Operation

Duration of operation	Frequency	Percent
0-4 years	22	11
5-10 years	51	25.5
11-20 years	44	22
More than 20 years	83	41.5
Total	200	100

From 200 in total, the types of goods and services provided by the respondents' businesses were 40.5% processed food products; 25.5% food packaging; 11% drinks; 12% business services and consultants; and 11% food related chemical products.

Table 6.3 Types of Goods and Services

Types of Goods/Services	Frequency	Percent
Processed Food	81	40.5
Food Packaging	51	25.5
Drinks	22	11
Business Service	24	12
Food Chemicals	22	11
Total	200	100

The attitudes toward the importance of research and development of the respondents were as follows: 4.5% of the respondents think R&D is somewhat important; 88% of the respondents think R&D important; and 51.5% of the respondents think R&D is very important for their business.

Table 6.4 Attitudes towards R&amp;D

Attitudes towards R&D	Frequency	Percent
Somewhat Important	9	4.5
Important	88	44
Very important	103	51.5
Total	200	100

The spending or investment in research and development from the total annual working capital within the business of the respondents were: 16.5% no investment in R&D; 24.5% invest in R&D less than 5%; 35% invest 5-10% in R&D; and 24% invest more than 10% of their budget in R&D.

Table 6.5 Investment in R&amp;D

Investment in R&D	Frequency	Percent
none	33	16.5
Less than 5%	49	24.5
5-10%	70	35
More than 10%	48	24
Total	200	100

From the total of 200 respondents, 48.5% of the respondents have had an experience working with public sector in R&D, while 51.5% of the respondents never had an experience working with public sector in R&D.

Table 6.6 R&amp;D Experience with Public Sector

R&D with Public Sector	Frequency	Percent
Yes	97	48.5
No	103	51.5
Total	200	100

From the total 200 respondents, only 21% have heard about the Food Innopolis project, while other 79% have never heard of Food Innopolis.

Table 6.7 Food Innopolis Recognition

FI Recognition	Frequency	Percent
Yes	42	21
No	158	79
Total	200	100

Among the respondents who recognize Food Innopolis, 33% of them were informed about Food Innopolis through attending conferences and seminars, and the other 67% were informed through media such as news and articles.

Table 6.8 Sources of Food Innopolis recognition

Sources of FI Recognition	Frequency	Percent
Conference and Seminar	66	33
Media	134	67
Friends or Family Member	0	0
Other	0	0
Total	200	100

## 6.2 Attitudes towards working with the government in research and development of the food industry

A total of 200 samples were surveyed on the problems, constraints, opportunities, and challenges in promoting research and development of the Thai food industry by Public-Private Partnership mechanisms. In this part, 5-scale rating questions based on Likert's Scale was used to measure the level of feedback.

To interpret the meaning of the data, the scopes of scores 1, 2, 3, and 4 were analyzed into the following criteria:

Level 4: between average score of 3.26 - 4.00 = strongly agree

Level 3: between average score of 2.51 - 3.25 = agree

Level 2: between average score of 1.76 - 2.50 = disagree

Level 1: between average score of 1.00 - 1.75 = strongly disagree

Based on a survey of private companies on the problems, constrains, opportunity, and challenges in promoting research and development of the Thai food industry, the results of the survey are summarized as follows.

### 6.2.1 Problems in Promoting Research and Development of the Thai Food Industry by Public-Private Partnership Mechanisms

Based on a survey of private companies on the problems of promoting research and development of the Thai food industry, the results are described below.

*Inadequate or obscure public regulatory frameworks and legal structure that lack flexibility:* 24% of the respondents strongly agree and 76% of the respondents agree that inadequate or obscure public regulatory frameworks and legal structure that lack flexibility are major problem of the R&D promotion in Thailand's food industry.

Table 6.9 Problem of inadequate or obscure public regulatory frameworks and legal structure that lack flexibility

Inadequacy & Inflexibility of Public Regulations	Frequency	Percent
Strongly Agree	152	76
Agree	48	24
Disagree	0	-
Strongly Disagree	0	-
Total	200	100

*The lack of effective publicity of the promotion of PPP mechanism from the government:* 34.5% of the respondents strongly agree and 65.5% of the respondents agree that the lack of effective publicity of the promotion of PPP mechanism from the government is a major problem of the R&D promotion in Thailand's food industry.

Table 6.10 Problem of ineffective publicity of the promotion of PPP mechanism from the government

Ineffective Publicity	Frequency	Percent
Strongly Agree	69	35.5
Agree	131	65.5
Disagree	0	-
Strongly Disagree	0	-
Total	200	100

*Limited human resources of public sector:* 37.5% of the respondents strongly agree, 52% of the respondents agree, and 10.5% of the respondents disagree that limited human resource of public sector is a major problem of the R&D promotion in Thailand's food industry.

Table 6.11 Problem of limited human resource of public sector

Limited Human Resource	Frequency	Percent
Strongly Agree	75	37.5
Agree	104	52
Disagree	21	10.5
Strongly Disagree	0	-
Total	200	100

*Long lead times for research and development of new technology:* 38.5% of the respondents strongly agree and 61.5% of the respondents agree that the long lead times for research and development of new technology is a major problem of the R&D promotion in Thailand's food industry.



Table 6.12 Problem of long lead times for R&amp;D of new technology

Long lead times for R&D	Frequency	Percent
Strongly Agree	77	38.5
Agree	123	61.5
Disagree	0	-
Strongly Disagree	0	-
Total	200	100

*Delays of process and overspending from research and development project:* 27.5% of the respondents strongly agree, 56% of the respondents agree, and 16.5% of the respondents disagree that the delays of process and overspending from research and development project is a major problem of the R&D promotion in Thailand's food industry.

Table 6.13 Problem of delays and overspending of R&amp;D project

Delays and Overspending	Frequency	Percent
Strongly Agree	55	27.5
Agree	112	56
Disagree	33	16.5
Strongly Disagree	0	-
Total	200	100

*Marketing failure or new technology/innovation adoption failures:* 21% of the respondents strongly agree, 50.5% of the respondents agree, and 28.5% of the respondents disagree that marketing failure or new technology/innovation adoption failures is a major problem of the R&D promotion in Thailand's food industry.

Table 6.14 Problem of marketing or adoption failure

Marketing or Adoption Failure	Frequency	Percent
Strongly Agree	42	21
Agree	101	50.5
Disagree	57	28.5
Strongly Disagree	0	-
Total	200	100

*Failure to achieve return of investment in short and medium-term:* 32.5% of the respondents strongly agree, 41.5% of the respondents agree, and 26% of the respondents disagree that failure to achieve return of investment in short and medium-term is a major problem of the R&D promotion in Thailand's food industry.

Table 6.15 Problem of failure to achieve return on investment in short and medium-term

Failure of ROI in short and medium term	Frequency	Percent
Strongly Agree	65	26
Agree	83	41.5
Disagree	52	32.5
Strongly Disagree	0	-
Total	200	100

*The Lacks of utilizing research and development in food production chain of the Thai entrepreneurs:* 24% of the respondents strongly agree, 40.5% of the respondents agree, and 35.5% of the respondents disagree that the Lacks of utilizing research and development in food production chain of the Thai entrepreneurs is a major problem of the R&D promotion in Thailand's food industry.

Table 6.16 Problem of the lacks of utilizing R&amp;D among Thai entrepreneurs

Lacking of R&D among Thai entrepreneurs	Frequency	Percent
Strongly Agree	48	24
Agree	81	40.5
Disagree	71	35.5
Strongly Disagree	0	-
Total	200	100

Overall, respondents' attitudes towards problems of R & D promotion in Thai food industry is at level 3 (Agree) with an average score of 3.18. On each problem, mean scores ranged from 2.91 to 3.43, which can be descending sorted as follows: Long lead times for R&D ( $\bar{x} = 3.43$ ), Ineffective Publicity ( $\bar{x} = 3.35$ ), Limited Human Resource ( $\bar{x} = 3.31$ ), Inadequacy & Inflexibility of Public Regulations ( $\bar{x} = 3.25$ ), Delays and Overspending ( $\bar{x} = 3.15$ ), Lacking of R&D among Thai entrepreneurs ( $\bar{x} = 2.92$ ), and Marketing or Adoption Failure ( $\bar{x} = 2.91$ ), as shown in table 6.17.

Table 6.17 Overall attitudes toward problems in the promoting of R&amp;D in Thai food industry

Problems	$\bar{x}$	S.D.
Inadequacy & Inflexibility of Public Regulations	3.25	0.44
Ineffective Publicity	3.35	0.48
Limited Human Resource	3.31	0.65
Long lead times for R&D	3.43	0.50
Delays and Overspending	3.15	0.67
Marketing or Adoption Failure	2.91	0.71
Failure of ROI in short and medium term	3.09	0.79
Lacking of R&D among Thai entrepreneurs	2.92	0.78
Total	3.18	0.47

### 6.2.2 Constrains in Promoting Research and Development of the Thai Food Industry by Public-Private Partnership Mechanisms

Based on a survey of private companies on constrains of promoting research and development of the Thai food industry, the results are described below.

*Inadequate patent and other intellectual property register services:* 31% of the respondents strongly agree, 57% of the respondents agree, and 24% of the respondents disagree that inadequate patent and other intellectual property register services is a major constrain of the R&D promotion in Thailand's food industry

Table 6.18 Constrain of inadequate patent and other intellectual property register services

Inadequate intellectual property registration	Frequency	Percent
Strongly Agree	62	12
Agree	114	57
Disagree	24	31
Strongly Disagree	0	-
Total	200	100

*Intensified competition in trade and marketing in the food industry that hinders the utilization of R&D:* 13.5% of the respondents strongly agree and 86.5% of the respondents agree that intensified competition in trade and marketing in the food industry that hinders the utilization of R&D is a major constrain of the R&D promotion in Thailand's food industry.

Table 6.19 Constrain of Intensified competition in trade and marketing in the food industry that hinders the utilization of R&D

Intensified competition	Frequency	Percent
Strongly Agree	27	13.5
Agree	173	86.5
Disagree	0	-
Strongly Disagree	0	-
Total	200	100

*Most of the small scale food manufactures are still lacking in awareness, knowledge, access and proper utilization of information and production inputs for R&D: 24.5% of the respondents strongly agree, 70.5% of the respondents agree, and 5% of the respondents disagree that the lacking in awareness, knowledge, access and proper utilization of information and production inputs for R&D among small scale food manufactures is a major constrain of the R&D promotion in Thailand's food industry.*

Table 6.20 Constrain of the lacking in awareness and proper utilization of information for R&D among small scale food manufactures

Lacking in awareness of R&D	Frequency	Percent
Strongly Agree	49	24.5
Agree	141	70.5
Disagree	10	5
Strongly Disagree	0	-
Total	200	100

*High costs of innovation and technological research and development: 41% of the respondents strongly agree, 55% of the respondents agree, and 4% of the respondents disagree that high cost of innovation and technological research and development is a major constrain of the R&D promotion in Thailand's food industry.*



Table 6.21 Constrain of the high cost of R&amp;D

High cost of R&D	Frequency	Percent
Strongly Agree	82	41
Agree	110	55
Disagree	8	4
Strongly Disagree	0	-
Total	200	100

*Ineffective public management to link researchers or research institutes with the research users:* 35% of the respondents strongly agree, 60.5% of the respondents agree, and 4.5% of the respondents disagree that Ineffective public management to link researchers or research institutes with the research users is a major constrain of the R&D promotion in Thailand's food industry.

Table 6.22 Constrain of ineffective management to link researchers with the users

Ineffective management to link researchers with users	Frequency	Percent
Strongly Agree	70	35
Agree	121	60.5
Disagree	9	4.5
Strongly Disagree	0	-
Total	200	100

*Inefficiency governance that hinders sustainable development of the food industry:* 20% of the respondents strongly agree, 66% of the respondents agree, and 14% of the respondents disagree that governance inefficiency is a major constrain of the R&D promotion in Thailand's food industry.

Table 6.23 Constrains of governance inefficiency

Governance Inefficiency	Frequency	Percent
Strongly Agree	40	20
Agree	132	66
Disagree	28	14
Strongly Disagree	0	-
Total	200	100

Overall, respondents' attitudes towards constrains of R & D promotion in the Thai food industry is at level 3 (Agree) with an average score of 3.21. On each constrains, mean scores ranged from 3.05 to 3.35, which can be descending sorted as follows: High cost of R&D ( $\bar{x} = 3.35$ ), Ineffective management to link researchers with users ( $\bar{x} = 3.31$ ), Lacking in awareness of R&D ( $\bar{x} = 3.22$ ), Inadequate intellectual property registration ( $\bar{x} = 3.21$ ), Intensified competition ( $\bar{x} = 3.15$ ), and Governance Inefficiency ( $\bar{x} = 3.05$ ), as shown in table 6.24.

Table 6.24 Overall attitudes towards constrains in the promoting of R&amp;D in Thai food industry

Constrains	$\bar{x}$	S.D.
Inadequate intellectual property registration	3.21	0.61
Intensified competition	3.15	0.36
Lacking in awareness of R&D	3.22	0.52
High cost of R&D	3.35	0.58
Ineffective management to link researchers with users	3.31	0.57
Governance Inefficiency	3.05	0.62
Total	3.22	0.36

### 6.2.3 Opportunity in Promoting Research and Development of the Thai Food Industry by Public-Private Partnership Mechanisms

Based on a survey of private companies on opportunity in the promoting of research and development of the Thai food industry, the results are described below.

*High competitiveness of Thailand in the food market:* 36.5% of the respondents strongly agree, 59.5% of the respondents agree, and 4% of the respondents disagree that high competitiveness of Thailand in the food market is the opportunity in promoting research and development of the Thai food industry

Table 6.25 Opportunity of the high competitiveness of Thailand in the food market

High Competitiveness	Frequency	Percent
Strongly Agree	73	36.5
Agree	119	59.5
Disagree	8	4
Strongly Disagree	0	-
Total	200	100

*The demand for safe and high value food is likely to steadily increase:* 51% of the respondents strongly agree, 44% of the respondents agree, and 5% of the respondents disagree that the steadily increasing demand for safe and high value food is the opportunity in promoting research and development of the Thai food industry.

Table 6.26 Opportunity of the steadily increasing demand for safe and high value food

Increasing demand for safe and high value food	Frequency	Percent
Strongly Agree	102	51
Agree	88	44
Disagree	10	5
Strongly Disagree	0	-
Total	200	100

*The government's plans to continually develop new technologies and innovations:* 24.5% of the respondents strongly agree, 51% of the respondents agree, and 24.5% of the respondents disagree that the government plans to continually develop new technologies and innovations is the opportunity in promoting research and development of the Thai food industry.

Table 6.27 Opportunity of the government's plans to continually develop new technologies and innovations

Government's plans to develop new technologies	Frequency	Percent
Strongly Agree	49	24.5
Agree	102	51
Disagree	49	24.5
Strongly Disagree	0	-
Total	200	100

*Applicability of government's various financial incentives:* 36.5% of the respondents strongly agree, 39.5% of the respondents agree, and 24% of the respondents disagree that the applicability of government's various financial incentives is the opportunity in promoting research and development of the Thai food industry, as shown in table 6.28

Table 6.28 Opportunity of the applicability of government's various financial incentives

Applicability of financial incentives	Frequency	Percent
Strongly Agree	73	36.5
Agree	79	39.5
Disagree	48	24
Strongly Disagree	0	-
Total	200	100

*Access to public land and public infrastructures for R&D:* 19.5% of the respondents strongly agree, 48.5% agree, and 32% disagree that the available access to public land and public infrastructures for R&D is the opportunity in promoting research and development of Thai food industry.

Table 6.29 Opportunity to access to public land and public infrastructures for R&D

Access to public infrastructures for R&D	Frequency	Percent
Strongly Agree	39	32
Agree	97	48.5
Disagree	64	19.5
Strongly Disagree	0	-
Total	200	100

Overall, respondents' attitudes towards opportunity of R & D promotion in the Thai food industry is at level 3 (Agree) with an average score of 3.17. On each aspect, mean scores ranged from 2.94 to 3.45, which can be descending sorted as follows: Increasing demand for high value food ( $\bar{x} = 3.45$ ), High Competitiveness ( $\bar{x} = 3.32$ ), Applicability of financial incentives from government ( $\bar{x} = 3.13$ ), Government's plans to develop new technology ( $\bar{x} = 3.04$ ), and Access to public infrastructures for R&D ( $\bar{x} = 2.94$ ), as shown in table 6.30.



Table 6.30 Overall attitudes towards opportunity in the promoting of R&D in Thai food industry

Opportunity	$\bar{x}$	S.D.
High Competitiveness	3.32	0.57
Increasing demand for high value food	3.45	0.61
Government's plans to develop new technology	3.04	0.72
Applicability of financial incentives	3.13	0.78
Access to public infrastructures for R&D	2.94	0.71
Total	3.17	0.51

#### 6.2.4 Challenges in Promoting Research and Development of the Thai Food Industry by Public-Private Partnership Mechanisms

Based on a survey of private companies on challenges in promoting of research and development of the Thai food industry, the results are described below.

*Force Majeure or extreme weather:* 15.5% of the respondents strongly agree, 75% of the respondents agree, and 9.5% of the respondents disagree that extreme weather which affects the agricultural sectors in terms of production efficiency, production costs, and including harvest patterns of and crop seasons is a challenge in promoting research and development of the Thai food industry.

Table 6.31 Challenge of extreme weather

Extreme Weather	Frequency	Percent
Strongly Agree	31	9.5
Agree	150	75
Disagree	19	15.5
Strongly Disagree	0	-
Total	200	100

*Emerging new risks:* 30.5% of the respondents strongly agree, 59% of the respondents agree, and 10.5% of the respondents disagree that emerging new risks

such as rapid change of globalization, regulations and customer's preferences is a challenge in promoting research and development of the Thai food industry.

Table 6.32 Challenge of emerging new risks

Emerging New Risks	Frequency	Percent
Strongly Agree	61	30.5
Agree	118	59
Disagree	21	10.5
Strongly Disagree	0	-
Total	200	100

*The difficult access to financial resources:* 25% of the respondents strongly agree, 65.5% of the respondents agree, and 9.5% of the respondents disagree that lack of investment funds due to the difficult access to financial resources is a challenge in promoting research and development of the Thai food industry.

Table 6.33 Challenge of difficult access to financial resources

Difficult Access to Financial Resources	Frequency	Percent
Strongly Agree	50	25
Agree	131	65.5
Disagree	19	9.5
Strongly Disagree	0	-
Total	200	100

*The differences between public and private sector in organization structure and culture:* 34% of the respondents strongly agree and 65% of the respondents agree that the issue of differences between public and private sector in organization structure and culture is a challenge in promoting research and development of the Thai food industry, as shown in table 6.34

Table 6.34 Challenge of differences between public and private sector

Differences between Public and Private Sector	Frequency	Percent
Strongly Agree	68	34
Agree	132	66
Disagree	0	-
Strongly Disagree	0	-
Total	200	100

*Environmental and sustainability concerns:* 29% of the respondents strongly agree and 71% of the respondents agree that environmental sustainability and sustainable development is a challenge in promoting research and development of the Thai food industry.

Table 6.35 Challenge of environmental sustainability

Environmental Sustainability	Frequency	Percent
Strongly Agree	58	29
Agree	142	71
Disagree	0	-
Strongly Disagree	0	-
Total	200	100

Overall, respondents' attitudes towards challenges of R & D promotion in the Thai food industry is at level 3 (Agree) with an average score of 3.24. On each challenge, mean scores ranged from 3.06 to 3.38, which can be descending sorted as follows: Differences between Public and Private Sector ( $\bar{x} = 3.38$ ), Environmental Sustainability ( $\bar{x} = 3.33$ ), Emerging New Risks ( $\bar{x} = 3.27$ ), Difficult Access to Financial Resources ( $\bar{x} = 3.16$ ), and Extreme Weather ( $\bar{x} = 3.06$ ), as shown in table 6.36

Table 6.36 Overall attitudes towards challenges in the promoting of R&D in Thai food industry

Challenge	$\bar{x}$	S.D.
Extreme Weather	3.06	0.51
Emerging New Risks	3.27	0.61
Difficult Access to Financial Resources	3.16	0.58
Differences between Public and Private Sector	3.38	0.48
Environmental Sustainability	3.33	0.47
Total	3.24	0.36

### 6.3 Content Analysis

Results from an open-ended query for comments and suggestions towards problems, constrain, opportunities and challenges in working with the government for research and development within food industry were summarized in the tables below.

Table 6.37 Frequency of the completion of the open-ended part of the questionnaire

Completion of the open-ended questions	amount	Percentage
Yes	32	16
No	168	84
Total	200	100

As shown in table 6.37, 16 percent or 32 respondents from 200 respondents had completed the open-ended questions, while the other 84 percent or 168 respondents did not complete the open-ended questions. From the completed responses, comments and suggestions towards problems, constrain, opportunities and challenges in working with the government for research and development within food industry are expressed in frequency as follows.

Table 6.38 Frequency of comments and suggestions for research and development within food industry

Comment/Suggestions	Frequency
The government should speed up the resolution of political conflict and the drive push the country back to democracy in order to facilitate trade with other countries.	13
Public-private partnerships projects in research and development should be more promoted at every level of the industry.	7
Knowledge on the importance of research and development and how to properly conduct research should be promoted or provided for all sectors.	6
Government and financial institutions should increase the support and facilitation of funding sources for R&D among private entrepreneurs, especially with SMEs.	4
All Thai entrepreneurs should be more aware of and focus on research and development of their products/services in order to enhance their competitiveness.	2
Total	32

As shown in table 6.38, comments and suggestions towards problems, constrain, opportunities and challenges in working with the government for research and development within food industry classified in descending by the frequency were: The government should speed up the resolution of political conflict and the drive push the country back to democracy in order to facilitate trade with other countries(13); Public-private partnerships projects in research and development should be more promoted at every level of the industry (7); Knowledge on the importance of research and development and how to properly conduct research should be promoted or provided for all sectors (6); Government and financial institutions should increase the support and facilitation of funding sources for R&D among private entrepreneurs, especially with SMEs (4);and all Thai entrepreneurs should be more aware of and focus on research and development of their products/services in order to enhance their competitiveness (2).



## Conclusion

The findings from the quantitative survey of 200 entrepreneurs were found to be consistent with the qualitative results that synthesized the problems, constraints, opportunities and challenges in promoting research and development of food industry in Thailand. Overall, the results from the quantitative survey concluded that 200 private entrepreneurs have a predominantly attitude of "agree" on problem, constraints, opportunities and challenges similar to those the entrepreneur who participated in the Food Innopolis project have had experienced. In addition, quantitative survey has also revealed another important concern for Thai food industry operators, namely, the political issues and the government's inefficiency in dealing with international trade which considered the key obstacles to the growth and development of the industrial sector of the country as a whole

## CHAPTER 7

### RECOMMENDATIONS AND CONCLUSION

Apart from the results of qualitative and quantitative researches in the previous chapters, the assessment of Thailand's food industry context and environment should also be evaluated to purpose the appropriate strategic measures to improve public-private partnership tools in sustaining the industry development. Such assessment should include both positive and negative impact of political, social, environmental, science and technology that affect the development of food industry in Thailand. Through SWOT Analysis, strengths, weaknesses, opportunity, and threats that affect the development of Thai food industry will be determined. Then, recommendations to improve Public-Private Partnership to sustain the development in Thailand's Food Industry can be appropriately identified.

#### 7.1 Thailand's Food Industry SWOT Analysis

Table 7.1 SWOT Analysis of Thailand's Food Industry

S: Strengths	<p>S1. Thailand's geographic location is suitable for agricultural production throughout the year and productively sufficient for domestic consumption and exports to generate income for the country's economy.</p> <p>S2. Thailand has large scale food manufacturing industries that are equipped with state-of-the-art technology, knowledge and skills.</p> <p>S3. Thai food has a unique identity and has a renowned good image in quality and safety.</p> <p>S4. The development of agriculture sector, food processing and trade are strongly promoted by the Thai government</p> <p>S5. Logistics system and transportation by land and air are covered and effectively support the growth of Food Industry.</p>
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<p>W: Weaknesses</p>	<p>W1. Agricultural production resource base is becoming scarcer and degraded. While the number of labor workers in agricultural sector has also decreased.</p> <p>W2. Most food production and exports are still primary products.</p> <p>W3. Outdated and complex rules, lack of unity and lack of integration in public management that slower the adjustment to the changing world situation.</p> <p>W4. Investment in research and development of agricultural and food technology and innovation, both public and private, and especially among SMEs, are still very low and lacking in research application or commercialization.</p> <p>W5. Has a gap between farmers and entrepreneurs to access and distribute inputs, information and knowledge throughout the food chain.</p> <p>W6. Agricultural production sector has relatively low efficiency and the use of information systems in business are at low rate.</p>
<p>O: Opportunity</p>	<p>O1. The global economic adjustment is growing as a multi-center system, and Asia, including emerging economies is becoming more important in these centers</p> <p>O2. The demand for quality agricultural products and food from global markets continued to increase.</p> <p>O3. Food technology is constantly evolving. Consumers are more aware of the local products that represent the wisdom of that country, so there are more channels to create value and variety of products.</p> <p>O4. The emerging trend of "Green Consumption" which recognizes the importance of sustainability to humans, animals and the environment involved in the food chain.</p> <p>O5. Direct communication with consumers is easier with Internet technology and Social network which lead to lower marketing costs.</p>

T: Threats	<p>T1. Consumers are changing their tastes and need new products faster.</p> <p>T2. New crisis and eruptions occur within global environment (financial crisis, epidemics, natural disasters, etc).</p> <p>T3. Other developing countries have the potential to produce more agricultural and food products due to the abundant of natural resources and low labor costs</p> <p>T4. High energy prices causing a scramble for arable food crops and energy crops. As a result, agricultural prices are unstable.</p> <p>T5. More and more government encourages their consumers to choose local food and strengthen the standardization for import product.</p> <p>T6. Climate change is likely to intensify.</p>
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SWOT Analysis combined with the results of qualitative and quantitative research from the previous chapters; recommendations to improve Public-Private Partnership tools to sustain the development of Thailand's Food Industry were identified as follow.

## 7.2 Recommendations

### 1. Recommendations for infrastructure expansion

Decentralize research and development infrastructure by expanding the distribution of infrastructure to the other regions, possibly in collaboration with universities in various regions such as Khon Kaen University, Chiang Mai University, and Prince of Songkla University, etc. These leading research universities have a Science Park that was already established to supports research, development and innovation, and has advance research and development equipment and researchers. These Universities and its Science Park are ideal for the expansion of regional food Innopolis project in the future to address the research and innovation based on the expertise and specific needs of each region.

In addition, while aiming to attract the world's leading food companies, both Thai and foreign, to invest in food research and development in the Food Innopolis project seems worthwhile, but encouraging big companies to join the project would take time and would require incentives or motivation in various ways. Thus, in the first five years of the operation, the Food Innopolis should shift its focus to attract small-scale food enterprises in the country as well as it will take less time and fewer budgets to drive. For the first phase, small food company should focus on investment in two R&D key areas: training and development of food innovations for those wishing to invest in new business and product; and technology development services for existing enterprises to solve the problem of production for capacity expansion and marketing through a network of scholars and a team of agricultural and food researchers in both central and regional area.

## **2. Recommendation for strengthening the public-service culture**

The bureaucratic structure and the performance of government officials are important for executing public-private partnerships. However, the Thai government has often been perceived as less flexible, more focused on the accuracy of the process than the achievement of the task, Interoperability between agencies is also unconnected, and based on the legal framework. The coordination of relations with other sectors is in a way that the government is leading other sectors to follow. And thus the government and related agencies should speed up the modernization of the government management.

If the government wants the public-private sector to succeed, the government should speed up the adjustment of relations between agencies, as well as accelerate the performance of civil servants in accordance with the requirements of the private sector

## **3. Recommendations for Practical Improvement**

When considering the practical limitations of project implementation and information from literature review, managers in Food Innopolis should take into account these underpinned prerequisite principles to reduce the risk of project failure and help enhance opportunities for success as follows.

Leveraging of partners' capabilities for the common goals



The “core competencies” of external stakeholders should be enlisted to “leverage collective action” by involving as broad a spectrum of actors as possible. In effective PPPs, the various partners' “value propositions” should be fully appreciated and plans must jointly develop, existing private-sector mechanisms ought to be fully utilized, and a mechanism for evaluating effectiveness should be inherent to the design of partnerships

#### Making ‘A good fit’

Whether there is an appropriate fit, noting that partners with complementary capability, capacity, resource access, and experience must be firstly identified. It is also important that partners should bear risk appropriate to their contribution and share fairly in the benefits from the research based on the value they bring to the partnership

#### Accountability and transparency

Emphasizes accountability and transparency among partners and between partnerships and the public, as well as urging an open, 2-way communication and dialogue among partners to achieve positive results desired by each partner in order to build trust or solve problems as early as possible.

#### Fair, unbiased project selection and disclosure of interests

The project selection process must be fair, unbiased, and as transparent as possible with reasonable opportunity for input by all materially affected stakeholders.

#### Honest interactive communication among partners and the public

Honest interactive communication should include dialogue that enables common understanding, particularly in a willingness to take risks and accept that outcomes may not always be perfect, a willingness to make compromises, and a willingness to admit to weaknesses, personal, organizational, or within a sector.

#### Clearly and agreed upon objectives

Public entities need to be realistic about the skills and experience they have to bring to partnerships and that they should bear in mind that integrated private sector

expertise is required. It must be made clear that all parties must recognize and understand their separate and common objectives in the partnership.

#### Public benefit from Intellectual property generated by partnership

When PPP project is expected to generate knowledge, data, and innovative research, the appropriate protection and use of intellectual property must be clearly defined to maximize public goals.

#### Mutual trust and cooperation

In creating cross-sector partnerships, the public- and private-sector members must have a clear understanding of their distinct roles and abilities in the collaboration. Mutual trust, cooperation, transparency of procedures, performance criteria, and review mechanisms must be applied.

#### Identifying and managing potential legal/ethical issues

In its steps for developing partnership projects, potential legal and ethical issues relevant to the proposed activities, potential collaborators or the funding or contract mechanism(s) being considered must be identified. Partners should study the legal specification of funding arrangements, activities to be pursued and activities not to be pursued, as well as points of communication and coordination before launching the project.

Recommendation for practical improvement includes guidelines at the cross-sectoral level and at the partnership level.

### **7.2.1 Cross-Sectoral Guidelines**

In order to achieve the effect of using PPP mechanism to create value throughout the production chain and to help the public and private sectors in the food industry to succeed, it requires the cooperation from all stakeholder namely government agencies, private sector, civil society, small-scale farmers, academic institution, and financial institutions while taking into account the political, economic, social, technological and technological contexts and the factors of globalization. These stakeholders should contribute their strengths into the collaboration as described below.

- 1) Government or Public Sector: Officials of Public entities at the national and local level
  - Set national goals
  - Enabling necessary environment for law, regulation, and policy to support investment in infrastructure and other public goods and services
  - Establish enabling support mechanisms for knowledge, information and capacity building for farmers and investors
- 2) Private Sector: Private companies and businesses across the value chain, including SMEs and startup business
  - Possible sustainable benefits that goes beyond short-term profit in value chains and competitiveness development
  - Collaborative partnership approach that benefits a long term business strategy
  - Innovative technologies, R&D model, and management strategy will be introduced
- 3) Farmers: Farmers organization, Cooperatives and Community Enterprises
  - Provide perspectives and recommendations for policy influences
  - Distribute knowledge and train farmers in new investment model and new practices
- 4) Civil Society: National or Local Civil Organizations, Non-Profit Organization, or Social Entrepreneurs working in food related issues.
  - Provide supportive insights for environmental and social initiatives
  - Provide technical, funding, learning, and capacity building assistance
  - Provide access to local grassroots networks
  - Ensure accountability and transparency for partnership activities and outcomes, possibly including tracking or monitoring mechanism

5) Financial Institutions: Financial institutions, National and Local Banks, Private funders and donors

- Provide funding for investment that support innovative development in specific areas
- Provide tools and information for financing/risk management
- Distribute knowledge, advice and networks for finance and funding support
- Serve as mediator of multi-sector gatherings

6) Academic Institutions: University, Research Institutions, Think Tank organizations

- Contribute knowledge, advice and networks for academic expertise
- Promote partnership in spheres of influence
- Provide tools and access for knowledge distribution among all sectors

To enable collaboration, all stakeholders must recognize their position as part of a larger ecosystem: one in which all actors influence each other and their environment, compete and collaborate, share and create resources, adapt to emerging challenges, and jointly lead ambitious efforts to transform the sector. Together, these stakeholders can develop stronger value chains and systems that lead to improved outcomes at each stage of food production and consumption, from “farm to fork”. It is important to understand the six key stakeholder groups from agriculture to food sector partnership and their roles. Each has a specific role to play, and each derives unique value from participating. The summary below outlines the required contributions and value propositions for each stakeholder group to sustain public-private partnerships in Thailand’s food industry in the long run.

Table 7.2 Key Stakeholder Contributions and Value Derived from Partnerships

Stakeholder Type	Key Contributions	Value Derived from Partnerships
<b>Government or Public Sector</b> Officials of Public entities at the national and local level	<ul style="list-style-type: none"> <li>– Set national goals</li> <li>– Enabling necessary environment for law, regulation, and policy to support investment in infrastructure and other public goods and services</li> <li>– Establish enabling support mechanisms for knowledge, information and capacity building for farmers and investors.</li> </ul>	<ul style="list-style-type: none"> <li>– Economic and social improvement for citizens</li> <li>– New contribution from private sector to complement with public investment in food and agriculture</li> <li>– Success case will lead to major initiatives or legacy of the government</li> </ul>
<b>Private Sector</b> Private companies and businesses across the value chain, including SMEs and startup business	<ul style="list-style-type: none"> <li>– Possible sustainable benefits that goes beyond short-term profit in value chains and competitiveness development</li> <li>– Collaborative partnership approach that benefits a long term business strategy</li> <li>– Innovative technologies, R&amp;D model, and management strategy will be introduced</li> </ul>	<ul style="list-style-type: none"> <li>– Social recognition and long term stability of business</li> <li>– Opportunity to work with new customers, innovative technologies or new business models</li> <li>– Excess to new markets and business areas</li> <li>– Acknowledgement with initiatives for environmental, social or talent management</li> </ul>



Stakeholder Type	Key Contributions	Value Derived from Partnerships
<b>Farmers</b> Farmers organization, Cooperatives and Community Enterprises	<ul style="list-style-type: none"> <li>– Provide perspectives and recommendations for policy influences</li> <li>– Distribute knowledge and train farmers in new investment model and new practices</li> </ul>	<ul style="list-style-type: none"> <li>– Access to new technologies, information, and knowledge</li> <li>– Access to new markets and products</li> <li>– Increased yields, productivity, and income in the long run</li> </ul>
<b>Civil Society</b> National or Local Civil Society Organizations, Non-Profit Organization, or Social Entrepreneurs working in food related issues.	<ul style="list-style-type: none"> <li>– Provide supportive insights for environmental and social initiatives</li> <li>– Provide technical, funding, learning, and capacity building assistance</li> <li>– Provide access to local grassroots networks</li> <li>– Ensure accountability and transparency for partnership activities and outcomes, possibly including tracking or monitoring mechanism</li> </ul>	<ul style="list-style-type: none"> <li>– Economic and social improvement for grassroots community</li> <li>– Opportunity to explore with new innovations to drive impact at local scale</li> <li>– Possibility to create long-term, sustainable impact through grassroots capacity enhancement</li> </ul>

Stakeholder Type	Key Contributions	Value Derived from Partnerships
<b>Financial Institutions</b> Financial institutions, National and Local Banks, Private funders and donors	<ul style="list-style-type: none"> <li>– Provide funding for investment that support innovative development in specific areas</li> <li>– Provide tools and information for financing/risk management</li> <li>– Distribute knowledge, advise and networks for finance and funding support</li> <li>– Serve as mediator of multi-sector gatherings</li> </ul>	<ul style="list-style-type: none"> <li>– Return of Investment that often higher than traditional development projects</li> <li>– Improvements in overall economic, social and environmental outcomes</li> <li>– Possibility to create long-term, sustainable impact through market-oriented approaches that can lead to self-sustaining funds</li> </ul>
<b>Academic Institutions</b> University, Research Institutions, Think Tank organizations	<ul style="list-style-type: none"> <li>– Contribute knowledge, advise and networks for academic expertise</li> <li>– Promote partnership in spheres of influence</li> <li>– Provide tools and access for knowledge distribution among all sector</li> </ul>	<ul style="list-style-type: none"> <li>– Unique opportunity to contribute ideas in new research areas, innovations, and technology</li> <li>– Rich insights from “real world” applications</li> <li>– Recognition across different sectors or in broader academic society</li> </ul>

In addition, the roles of these sectors must take into account the political, economic, social, and technological context, as well as factors from globalization or “PESTG”, which are dynamic and changeable. Changes in these environment contexts may cause new risks or opportunities and understanding the context of the operation will reduce the risk of investment and increase the chances of success in the operation. To execute the project, it is important to consider the following key contexts.

**Political Context:** It is the result of state power, including laws, regulations, and regulations along with the stability of government and the efficiency of government to administrate. This political context is the context in which an organization or agency often requires to adapt accordingly.

**Economic context:** Positive and negative trends in the economy are an important environment to consider in planning and executing projects. Economic context, including inflation, deflation, exchange rate, interest rate, annual budget, and government stimulus measures are extremely vital for PPP projects, which require appropriate financial risk management.

**Social Context:** there are many factors that cause change in social context and oftentimes impact on the implementation of the project. Social context is important to consider when plan the project especially in terms of marketing and consumer demand, such as customer attitudes, consumer expectations, consumer income, customer satisfaction, public awareness, and culture trends; as well as information from competitors such as number of competitors, marketing strategies of competitors and market share.

**Science and Technology Context:** science and technology context is an important environment for the planning and implementation of PPP projects, especially for PPP projects with a focus on research and development. It is necessary to understand the context of science and technology, such as the quality of scientific and technological tools, quality or knowledge of relevant personnel, difficulty level of the new technology, the speed of technological change, and the suitability of time to implement new technology.

**Factors from Globalization:** the impact from outside the country is an important factor that organizations or agencies must acknowledge. Because of the

current world situation, everything is linked together and in many cases, major customers or consumers also come from abroad. Contextual factors from globalization, such as the changing provisions of food and drug law, human rights law, the environment law, intellectual property law as well as import-export regulations, Consumer Protection Law, changes in world oil prices, and free trade agreements or special economic zones are vital for the planning and implementation of PPP projects.

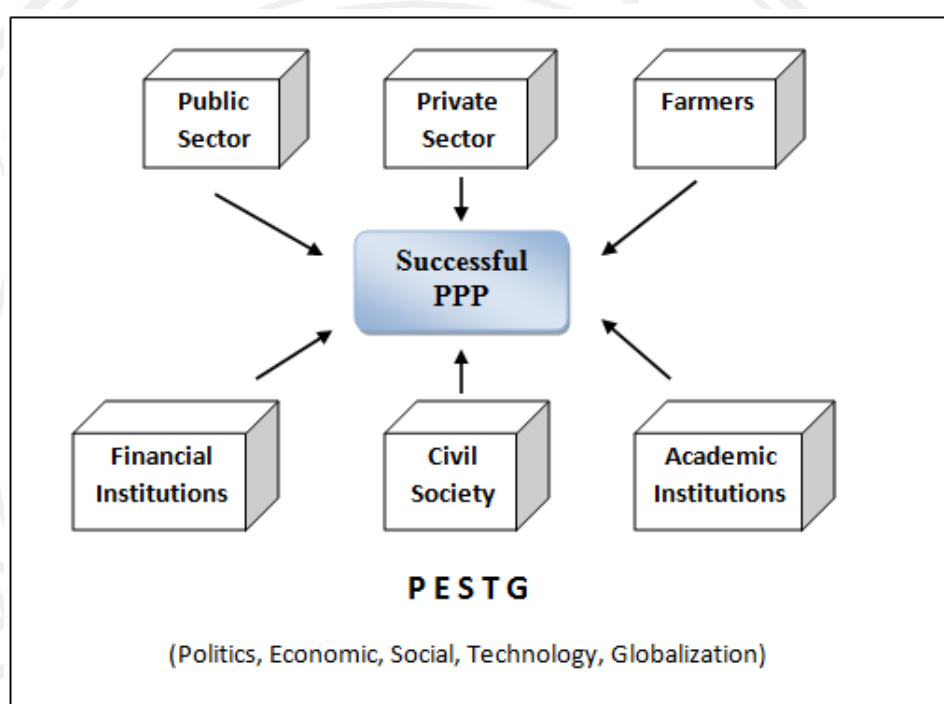


Figure 7.1 Cross-Sectoral Level Guidelines

### 7.2.2 Partnership Level Guidelines

The Partnership Level Guidelines will include a strategic guideline between the key partners of the project, namely government agencies and private sector entrepreneurs, in planning, designing, implementing, evaluating and improving the PPP project. These strategies are described below

#### Strategy 1: Engage and Align

As a starting point, develop a shared partnership agenda, including high-level goals and key opportunities which can be achieved through partnership collaboration. During initial conversations, it is important to develop an understanding between both

sector on each other's motivations, needs and priorities. These conversations tend to be most productive on a one-on-one basis, as it can take time to earn trust and reveal what truly drives each party to engage in the partnership. Spending time upfront to develop trust and confirm the existence of shared goals among the right group of decision makers from both public and private partners often goes a long way to build trust and prevent misalignment down the road. Also, to maximize impact in the country, it is critical to ensure alignment with national frameworks.

### **Strategy 1: Measures to engage**

Measures to engage and align include:

#### **1. Creating a vision of working together**

Creating a Vision of working together is an important starting point for establishing a business foundation with the partners. Mutual understanding of a clear vision will lead to working in the same direction. To create mutual vision, each partner will have to listen to the experience of others, try to understand and comprehend each other and start identifying common needs or mutual priorities. Keep in mind that although these participating partners has their own specific goals that they might want to achieve through partnership, the consultations can still help align mutual objectives that would altogether lead to common vision for both parties. Hence, engaging all key stakeholders from the earliest starting point of the procedure is pivotal -- despite the fact that it may at first develop confusions or defers the alignment process-- it will eventually increase the likelihood of partnership's achievement in long term because of the agreements of the co-designed and mutually supported strategy from every stakeholder.

#### **2. Define the roles and responsibilities for each partners**

All parties would not be able to write Job roles if they do not share the assumptions built up before starting the partnership. Job roles are similar to job descriptions, but it is hidden with its commitments and responsibility that drives each partner to success. If the clarity of job roles is lacking, the work will not be understood and may eventually lead to conflict failures of partnership. Both partners must clarify what to do while all parties have a clear understanding of the



responsibilities of each party as well. Each party must be able to explain how the process works and the results of the work are clearly understood. Also, if the project requires contracting or third-party hiring, it should be made clear in order to build confidence among all parties.

### 3. Choose a mutual investment direction

Investment direction of the project must be chosen at beginning of the partnership process. Additional from partnership's investment direction, all participating partners must also agree on the possible source of funds while financial solutions have to be decided and chosen by each participating partner. These sources of funds and financial solutions must also be secured before the partnership begins. Various funding sources for partnership project often include: Private Investment, Public sector co-investment, and Third Party funders.

With Private Investment, the primary source of project's funding or investment will be provided by participating private business or companies. Investment or funding from private sector usually approved after business case is assessed and the return of investment is evaluated base on the basis of the company's financial benefits and growth strategic goals (ADB, 2008).

Public sector co-investment occurs when government agencies provides part of the project's investment through formal or informal financial instruments. These funds from government agencies are often provided in order to support the partnership's financial plans or private sector funding mechanisms that are in use (ADB, 2008).

And alternatively, funding from Third party funders, where the project's investment funds are provided by third party funders or donors. A contributive funding to partnership projects may granted by third party donors when the partnership goals conform to their organization's objectives or agendas. In food and agriculture sector, third party or donors grants usually take place when the objectives of the partnership project are involved in sustainable development, the enhancing of social and environmental well-being and when the partnership in associated with the supporting of smallholder farmers, community enterprises, SMEs, and startup business.

## **Strategy 2: Co-Design and Plan**

Driving progress on multi-stakeholders' partnership with common agenda and diverse organizational nature calls for strong management, coordination, and administration. At the beginning of the project, after shared visions were identified and action plans were formed, coordinating structures must then be established as the basis for the formalization of the partnership's procedures. All participating parties must acknowledge and commit to the shared agendas and mutual goals which were identified and agreed upon at the phase of "Engage and Align". Essentially, coordinating structures must be established, formally or informally, as the project begins. However, these structures can be adapted or altered later as the project progress.

The process of initiating a coordinating structure for multi-stakeholders' project can be a time consuming phase that exhausts energy and resources. Thus, it is crucial that a key leader from each participating organization must be chosen to direct the action plans and other formalization mandate in order to push forward the partnership progress. Also, to assure viable outcome, responsibilities, roles, and accountability of each party must be assigned, while mutual agreement and recognition to the co-designed coordinating structures must be set up through following measures:

1. Find the needs and expectations of the partners

Identify your partner's needs is necessary because everyone has different desire and reasons for being in a public-private partnership; some may want to find a partner for financial opportunities; some may need partners to build expertise in the business; or some may just want to find a connection. These internal desires may not be immediately apparent, and if the other party is unable to detect these needs, things may turn into misunderstanding or conflict. So finding what your partner is expecting is essential. It is also important to explain one another's expectations and be prepared to make a plan to cope with different situations especially if the partners change their expectations.

2. Find out the strengths of each party and bring them to use.

The partnership is formed by several reasons and with expectations from each partners, one's strengths can be overlooked. Oftentimes partners often accept only the

prominent strengths and overlook other less prominent qualities. By utilizing each other's competency in addition to bringing in only the strongest quality, it will help all parties motivate and commit more. Taking advantage of each team's strengths will help to increase the motivation to work together and also create a long-term business advantage. Remember to take note of your strengths and ask your partners to do the same. Then sit down and talk about how you can apply those strengths to your business.

### 3. Help support the partners' limitations or weaknesses

Not accepting the weaknesses or limitations of yourself or your partners often affects the stability of the partnership and sometimes even lead to the collapse of partnership. Thus, each party must understand and accept its weaknesses or limitations and should also help resolve the weaknesses of each other. Identifying the defects of each others' strategy, product development, sales and marketing, personnel management, including their financial problems early will help prevent it from spreading out. Find out how partner's weaknesses will affect the projects of the partnership and then make a contribution to fix that part. But if the limitations could not be overcome, that could mean a return to the first step of making mutual understanding of foundation of the partnerships and identify how the implications of such limitations may affect the working process and outcome of the partnership over again.

### 4. Set the concrete directions for each goals

The best way of directing toward the goals of a business partner must start by writing a common goal then figure out a way to move towards their goals. The goals must be able to deploy and support the expectations of each other as well as the partnership goals. Ask each party to set goals that will help support common goals by utilizing their own strengths. Expressing these goals so that each party is similarly committed to the common goal and when finish, specify who is responsible for what part.

## **Strategy 3: Mutual Implementation**

Driving progress towards common goals and action plans is crucial for the partnership and for each partner to achieve expected benefits of joining in the

collaboration. Mutual defined plans and implementation process should be coordinated across all stakeholders to ensure that common goals are aligned and delivered. Defining clear roles and responsibilities of the different partners will tremendously help each party and partnership as a whole to deliver effective implementation. Agreements on projects coordinating structures and mutual accountability must be made as the partnership begins to ensure that each partner is well aware of the direction one must take on. Progress, impact, and mutual understanding on such progress should be tracked through regular meetings to ensure that agreed goals are brought about.

Following measures should also be applied, both at partnership level and sector level:

1. At the partnership level

Leaders from all stakeholders should set measurable targets for the partnership effort to ensure partner's engagement and to mutually agree on solutions for systemic challenges if necessary. To set measurable targets, overarching action goals and impact targets to guide specific partner goal-setting must be established. This should also include clear and simple processes to collect information, communicate and report progress across the partnership.

These measurable targets will be the important basis to define a framework for mutual accountability and help each partner set milestones for key deliverables. In addition, regular partnership-level meetings must be held and that each partner's managers or key decision makers must attend to ensure progress follow-through.

2. Within sector level

Each partner participating in the partnership must specify goals and action plan for themselves. Activities, roles and responsibilities of each partner, and timelines for target to be delivered must be defined. Within-sector's checkpoints, milestones and other timelines must be conformed to the major milestones set at the partnership level as progress should be driven towards partnership-level's delivery points to meet mutual timeslot.

During these procedures, “Bifocal goals” that include short-term and medium-term target should be encouraged within the action plan. Each partner should also consider linking the “bifocal goals” to longer term achievement or to visionary goals that produce sustainability in their sector. However, for some value chains such as those that based on perennial/seasonal crops or those that lacking existing infrastructure, progress may take time and partnership may take longer to produce outcomes.

In addition, each partner must establish mechanism for internal reporting processes. This includes organization’s internal reporting system and communication procedures to enable consistent project monitoring. The results of the monitoring procedure should be reported in mutual meetings with the associated partners in the project as mutual understanding of the progress can be made. Nevertheless, private partner may also choose to define additional target indicators beyond the partnership-level goals, based on what is most relevant or necessary to their company’s goals, such as financing, marketing, or production goals, etc.

#### **Strategy 4: Cross-sector Evaluation and Review**

Public-Private Partnership enables each participating organization to together address challenges that impact them both but too large or too complicate to be resolve by any one party. By embracing unique competencies from different sector and pooling knowledge, resources, and skills of both parties, both partner can jointly address systemic gaps (e.g. in infrastructure, financial or market access) to undertake larger and impactful activities than would be conceivable independently. Joining partnership also allows partners to assess risk and properly distribute risk for developing innovations, share knowledge and resources to develop R&D projects in which supposedly creates more opportunities for development for both participating organizations. However, projects may not always “get it right” the first time, so it is important to remain adaptable and try different things with new models and partners as the projects pushes ahead. Partnership structure and management models may need modifications as lessons are learned and progresses are made. Implement, experiment, and explore with different models after some time will enable both partners to assess the accomplishment of organization's relations within the partnership and protocol in



order to improve the sharing and distribution of tasks, knowledge, resources, risks, as well as return of investment through time.

### 1. Set an evaluation meeting

Meeting must be arranged to reflect on partnership progress and report activity accordingly with the action plan. Necessary support, problem resolve, and possibly immediate action to tackle challenges can rise from these meeting while new commitment may also secure to advance partnership's agenda. Participating organization is required to prepare information, plans, and lesson learn to share with partners make the most of these opportunities, including preparing reports that evaluate the partnership's progress and challenges up to that time. Reports should feature fact-based, objective feedback on the progress made, strategy changes or management issues, which makes a valid case for facilitate discourse and activity plan. In addition, these meetings should also be taken as deadlines to drive progress, particularly in the beginning phases of the project to pinpoint conceivable difficulties and to plan solving resolution for such cases. Sharing progress via report and meeting to the other party can help empower and motivate each partner to make delivery on progress at all levels.

### 2. Share lesson learned, resolved issues, and celebrate success of comparable partnerships

Meetings with other companies in similar partnerships should be encouraged in order to share troubleshooting and joint problem-solving as leaders from different organization share their point of view and experiences on challenges, potential solutions and lessons from their projects. These meetings can be useful in light of the fact that numerous organizations, particularly SMEs and Startups, may do not have an immediate discussion channel to speak with peers in different sectors or similar stakeholder groups. When meetings are arranged, ensure that successes across comparable partnership projects are celebrated – regardless of how big or small – to boost confidence, renewed energy, and companionship among companies interested in R&D and innovations. Furthermore, geographic presence of an existing project with the same partners or similar project in a new area or in new value chains with an

expanded group of potential partners can also be established through these collaborations. Remember that successful model is not “one size fits all”, it may need to be tweaked as they expand into other areas or into different partnership arrangements.

### 3. Review partnership outcomes and strategy to seize new opportunities in the long run

At least once, revisit the partnership goals and vision and then consider if the management strategy is still suitable in changing market and economic environment; Participating partners must evaluate how progress is heading compare to partnership's original goals and whether such goals, vision and role in transformation are still possible and applicable as the environmental context evolves. For public sector organizations, overall impact of the partnership's results must also be assessed and considered if it still relevance to current national policies, particularly in agricultural and food sector R&D. By reviewing partnership strategy, improvements in future projects such as linking the partnership to R&D in other sector or setting up a new funding instruments can be planned. In addition, thoroughly review previous project strategy can also help create new service platforms model to support participation in highly successful value chains or issue-specific solution center based on common challenges across food and agricultural sectors.

Building a multi-partner collaboration is complex and challenging. To make progress, constant adaptability and improvement are necessary. It is normal for those participating in such collaboration to make mistakes so that lessons will be learned. This is why open discussion and regular meetings with partnership leaders is crucial to pushes the partnership forward. Openly discuss about what each partner expects or need from the partnership, what need to change, and what is working and what is not will help partners to deliver success. And if the partnership is exceeding expectations, search for opportunity to expand partnership impact, whether in new areas of agriculture, new crops, new production chain, or even in new sector when development mechanism of public-private partnership is applicable.

### **Strategy 5: Reinforce the utilization of R&D**

Promote and support private sector's investment in R & D, innovation, and technology, and encourage the utilization of the research outcome in production, commerce and services in response to the needs of private sector and national development. This includes helping to reduce production costs, increase productivity and competitiveness, both at the company level and at the national level by motivating the private sector to recognize the importance of research and development as well as innovation within the organization and to point out the benefits of research and development in both the medium and long term through these measures.

#### **1. Review and improve related laws and regulations**

Review and improve the laws, regulations, measures, mechanisms, and procedures to facilitate investment and co-investment between sectors. Revise the patent licensing process to facilitate the implementation of research, knowledge, innovation and technology in commercial phase and linking information and resources of the public sector, the private sector, the education sector, the social / community sector, as well as managing and categorizing common agricultural database for the ease of storage and retrieval.

#### **2. Promote knowledge and understanding about the benefits of research, technology and innovation**

Promote knowledge and understanding about the benefits of research, technology and innovation Reinforce the use of research and development to enhance the productivity by collaborating with provincial, regional and educational agencies to gather research, technology and innovation for entrepreneurs and the general public to study and work to deploy the existing technology or continue to develop further innovations to support development of effective research results into utilization to generate income. In addition, through the cooperation of sectors such as industry, commerce, society, academia, and proactive public relations and innovative communications, practical use of research and development must be prompted, especially among SMEs.

### 3. Adjust financial and fiscal measures to reinforce the use of R&D

Adjust financial and fiscal measures to encourage the private sector to conduct research, develop technology, and innovate more, especially in the beginning of research process where return of investment is rather slow to yield. To solve the shortage of research funds which is a constraint to the development of research, especially for SMEs, the government should provide a mechanism to facilitate the private sector in the early stages of research and development to help stimulate the research activity such as through tax incentives or joint with financial institutions to use financial measures to promote investment in research and development; including exemption of corporate income tax for research or innovation expenditures.

### 4. Enhance the potential and importance of the researchers

Increase and develop the potential of research and development personnel to increase the competitiveness of the country, particularly in Project Management, Knowledge Management, and the process of transferring and utilizing the outcome of R&D. In addition, career paths for and compensation rates for researchers must also be revised while distinctive researchers must be honored broadly by all sectors to enhance the importance of researchers in Thailand.

## **Strategy 6: Strengthen Political Commitment**

Prepare and equip organizations across the nation with foundations and infrastructures for R&D advancement (including the improvement of strategies, regulations, and enabling environment) as well as improved instruments to empower innovative thinking and way of working across sectors. In addition, to ensure that the importance of innovation is acknowledge, government must formalize the processes of collaboration across ministries and bureaus to enhance competitiveness and empower innovative work of small farmers, SMEs, and Startups. Making efforts across all level of business will help support the growing of grassroots innovation and integration of smallholder farmers into value chains. The success of the PPP project requires political will as in following measures:

### 1. Political Commitment in infrastructure investment and policy continuity

Success of the PPP project requires political commitment in infrastructure investment and policy continuity even with political or governmental changes, including adjustments of related regulations to facilitate the smoothness and sustain low transaction cost of research and development of the private sector.

### 2. Improve the institutional structure

Improve the institutional structure that supports the implementation of the PPP project. Establish agencies that responsible for supervision PPP in the funding, promoting, evaluating, and negotiating with the private sector. Government must apply appropriate personnel policies and recruitment, with appropriate workload, and competent knowledge of the work position; particularly the understanding of the nature of PPP and nature of R & D work.

### 3. Enact appropriate R&D investment projects that are appealing to the private sector.

The scope of the commercial investment projects must be determined to attract joint investment from private partners. Incentives in various ways to stimulate private sector's interest in R & D, as well as funding sources in various ways must be granted to provide investment options for potential private partners, especially the source of funds for SMEs.

### 4. Enhance the capability of the private sector

Develop the capability and readiness of the private sector to jointly invest with the public sector so that the private sector can benefit from the PPP policy. Ensure that the Food Innopolis project and the PPP partnership program are becoming more widely available to all target groups, including private companies, cooperatives, community enterprises, and small farmers to raise the R & D level of the country in the near future.



### Framework for Action

The cycles of partnership evolution can be summarized in four main phases with several measures, distilled from the analysis of the past and ongoing partnerships within Food Innopolis. Across these four phases, two supplemental key measures must be accompanied to ensure the sustainable success in the long run. However, these measures may not always apply in order and multiple measures may under way at the same time. These measures represent a core set of activities that may lead to successful partnerships and should be undertake along the partnership journeys. They are summarized below in the framework for action diagram.

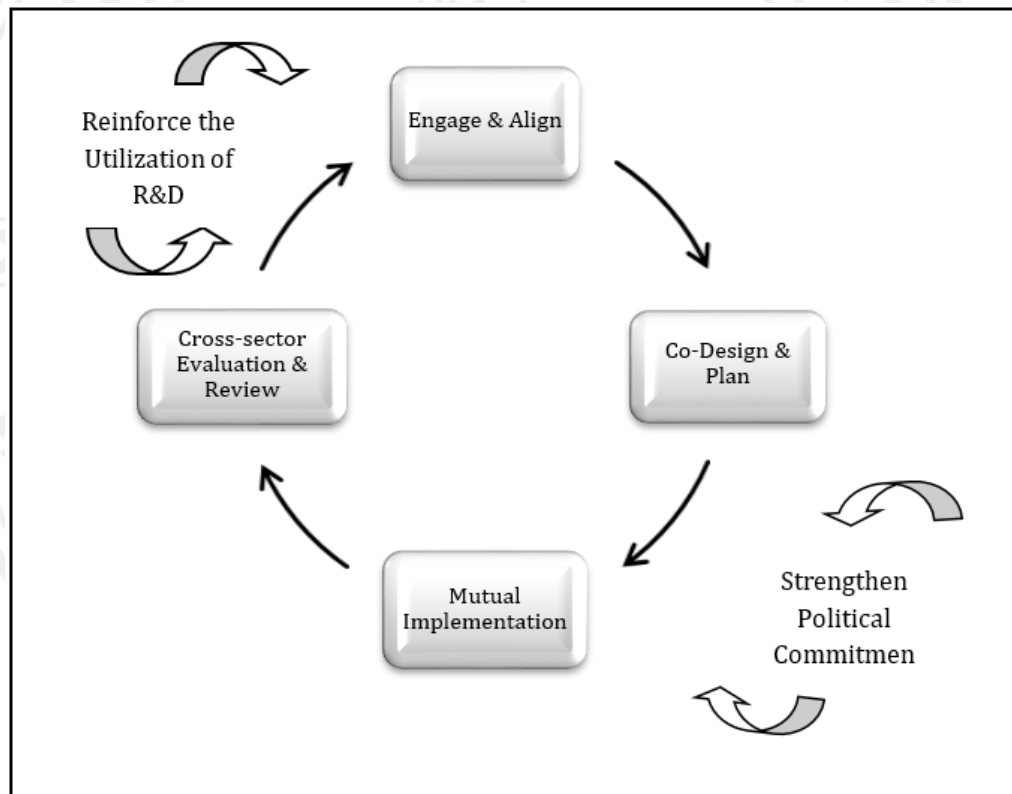


Figure 7.2 Framework for Action Diagram

### 7.3 Conclusion

This research provides a first attempt to better understand the rationales to establish public-private partnerships and the insights of how partnership in Thailand's food industry are designed, operated, and challenged. This study also aims to study

how public-private partnership was emphasized in recent development plans and policy statement, what are the existing patterns of the partnership, how public and private sector play their roles in the process, and what are problems, constraints, opportunity, and challenges that both partners are facing. However, the scope of this study only focuses on formal public-private partnerships that endorsed by national government under Food Innopolis project, which is a nation's pilot project initiated by the government to support food industry development under the 20-year National Strategy and Thailand 4.0.

The findings indicated that, by collaborating through model of public-private partnerships, perceptions among public and private representatives were different in many important aspects. The in-depth interviews with both sectors offered some insights into the dynamics of the differences on how each party play their role to operate, pertain, and deal with relationship arrangement and given tasks. While personnel from public sector expects direct outcome from the partnership as were more likely to better service/product provisions and more opportunities to expand their public interests, respondents from private sector, on the other hand, were more likely to perceive direct partnership performance based on better investment potential and more opportunities to expand their business interests. The findings also point out that there were various problems, constraints, opportunity, and challenges that the public and private sector organizations have encountered in their relationship and partnership process. These include issues in various aspects i.e. environmental and contextual aspects, technical and operational aspects, financial aspects, and sustainability aspect.

However, since this study placed a special emphasis on the collaborative relationship between the public and private sectors in the Food Innopolis project, therefore, further empirical testing of generalization is essential and necessary in building up a more prominent comprehension and better understanding of how relationship between public-private partners are carried on in broader market or in other industry and value chains.

## **Contributions of this Research**

### **1. Theoretical Contribution**

This research provides a first attempt to better understand the rationales to establish public-private partnerships and the insights of how partnership in Thailand's food industry are designed, operated, and challenged. This study also aims to study how public-private partnership was emphasized in recent development plans and policy statement, what are the existing patterns of the partnership, how public and private sector play their roles in the process, and what are problems, constraints, opportunity, and challenges that both partners are facing. In this study, an exploratory descriptive research design with mix methodology had been chosen. Qualitative data is obtained through structured interviews with 5 interviews from government officials with administrative position and 9 interviews from the participating private businesses. Quantitative data then gathered through self-completion questionnaire with the total of 200 respondents from private companies operating in the Thai food industry. The theoretical contributions derived from the research on public-private partnerships concept are described below.

#### **1.1. Trust Building and Communication**

Given that public and private sectors are different in terms of goals, organizational culture, and management process, it requires planning and communication between organizations to coordinate benefits and to achieve mutual understanding and trust. The results of this research confirm that the understanding and trust between the partners is an incentive for the private sector to work and invest with the government. A clear set of goals and an understanding of the role of each sector in the partnership will contribute to the success of the partnership. Trust and mutual goal also contribute in each partner's efforts to resolve problems which ultimately impact the outcome of the PPP project.

The research also found that when coordination process between the organizations is clear and flexible, communication will likely occur. Communication will help to coordinate mutual understanding and trust between partners. However, communication should occur regularly; to create familiarity through discussions or meetings periodically before and during the project.

Nevertheless, the study showed that managers from both sector value the organization's top executives. Managers responsible for the project will strictly carry out the work assigned by the management including in trust building and communication process. The managerial level staffs are usually set to follow the guidelines set by the executives, especially in public sector where sets of practice will be guided by legal or official policies. Therefore, under Food Innopolis, communication or coordination of benefits to build trust between each partners could take some time.

In addition, this study also found that there is a gap of awareness between executives and practitioners. Therefore, it is imperative that the understanding of all levels of the organization must be established. Effective communication between people in the organization is as important as communication between partners in understanding and achieving mutual benefits of the PPP project.

### 1.2. Leadership and Conflict Management

This research confirms that leadership of both government and private sector's executives is vital to the success of the project. Leaders or executives play an important role in building a working culture, working attitudes, and understanding within and between partners, especially when there are differences in government and private organizations. The leaders of each party must be assured that their staffs acknowledge and understand the mutual goals and going in the same direction. This will help to ensure consistency in operations, reduce conflict issues, and as a result, trust between public and private organizations.

Leadership also plays an important role in managing conflicts among organizations because leadership is the core of organizational behavior. If the leader behaves with transparency, compromise, promotes work that can be verified on the basis of trust and clear communication, it will result in a good relationship between the staff and help reduce problems that will arise during project implementation.

### 1.3. Risk and Risk Management

The study found that there are several risks to be considered in implementing a public-private partnership project under Food Innopolis project. Especially Project Risks that includes:

**Development Risk:** R&D projects often require relatively high technology and capital and often take a long time to see concrete results. Thus, the decision to develop the project must be thorough and concise;

**Design and Construction Risk:** Risk from design and construction (including the testing of systems), especially in projects requiring infrastructure development, such as the creation of laboratories and advance machines, may cause delays or additional costs at the design, construction, and testing stage. Improper design and construction can also affect the quality of the infrastructure as well as the quality of its final service;

**Technology Risk:** Technology risks include changes in technology or the unexpected effects of new technologies. This is a very common risk in research and development project which is highly dynamic and has a wide range of impacting factors, such as in research and development of agricultural and food products. The results also indicate that risks from technology are considered important to private entrepreneurs, along with the financial risk and revenue concerns;

**Finance/Revenue Risk:** Financial and revenue risks that may occur from uncertain consumer demand or unexpected costs may affect the final revenue from commercialization phase. It is a risk that private entrepreneurs give first priority to participating in research and development projects with the government.

There are also other external risks i.e. Force Majeure Risk which is the risk of uncontrolled events that may cause delays or may lead to breach of contract in the implementation phase, and Political Risk, which is the risk caused by political change or discontinuity of policy and affect the long-term cooperation between the government and the private sector.

To reduce risk, risk management and risk allocation must be considered in the beginning of the project proposal. Risks also need to be reviewed regularly, especially for research projects that may take a long time to complete. The study found that, for projects proposed to the Food Innopolis, the public sector will act as a leader in the risk assessment of the project; by divided project into phases, possible risks will be allocated by considering the expertise of the public and private sectors. In some cases, the public sector may provide management or financial tools to the private partners to help them manage risks. Therefore, in risk management, both



public and private partners need to understand the type of investment, risk allocation between public and private sectors, return of investment, and obligations both financially and not financially of their partner and of their own.

This study recognizes that the identification of project risks prior to the commencement of the project, and periodically reviewing the risks during the implementation of the project, clearly linked to the success of the project. If the PPPs are properly managed and risks are properly allocated, the private sector will be more interested in these projects and the Value for Money of the project will also be increased.

## **2. Practical Contribution**

2.1. Information on problems, constraints, opportunities and challenges in implementing PPP under Food Innopolis, and guidelines for PPP mechanisms improvement

This study reveals the current state of the cooperation, the different roles of public and private sectors play in the project, as well as the problems, constraints, opportunities and challenges in the implementation of Food Innopolis in environment, operational, financial, and sustainability aspects. The study also proposes guidelines to improve the policy to at both Cross-sectoral and at partnership level to facilitate the adoption of PPP mechanisms in the future.

To ensure successful cooperation between the public and private sectors in the food industry, it requires contribution not only from government agencies and private sector only. But it also requires collaboration from civil society, small-scale farmers, academic institutions, and financial institutions to succeed. It is vital that the political, economic, social, and technological contexts, as well as the factors of globalization, must be considered in order to achieve the effective use of PPP mechanism to create value and differentiation throughout the production chain and promotes sustainable innovation based on government goals. Moreover, government agencies and the private partners need to be aware of the guidelines for project planning and design, project implementation, project evaluation and future improvement that promote the coordination of goals and benefits, trust building, and transparency to maximize the benefits of PPP mechanism.

## 2.2. Guidelines for legal amendment to promote public-private partnerships

This study reveals the details and analysis of the problems regarding the scope of private participation/investment in state undertaking in the Private Investment in State Undertaking Act B.E. 2556 (the PISU Act). One of the most significant problems in the PPSU Act was the unclear scope of the Participation in the State Undertaking which was required to be construed. The calculation of the project also problematic since the law only indicated that the Project must be in value of at least one thousand million Baht, yet no detail mentioning what assets should be included to evaluate the value of a project in particular revealed.

Due to vagueness of those two definitions, both public and private investors have been facing the same problem as occurred during the PPSU Act was effective, which would lead to many issues needed the Council of State to construe again. This would be an obstacle for the private investors intending to invest in the PPP project and needed to be revised immediately to resolve the problem.

## 2.3 Guidelines to promote the enhancement of the value chain, from upstream to downstream in agro-food industry

This research has studied the policy "Thailand 4.0" which is the economic restructuring strategy focusing on the use of innovation and technology to help develop the country's production from "traditional agriculture", focuses on the production of labor, machinery and resources, to "modern agriculture" by producing knowledge and technology-based products, to raise the standard of agricultural and food products from upstream to downstream or "From Farm To Table" to increase trade opportunities and increase country's competitiveness in global markets. This is the policy to modernize agricultural development, focusing on quality standards -- not quantity—of goods and service including the development of low-skilled workers to high-skilled workers and the development of traditional small and medium enterprises (SMEs) to smart small and medium enterprises (SMEs) with high potential.

The establishment of Food Innopolis project is the Government's effort to improve the agricultural structure of the food industry in line with the Thailand 4.0 policy through research and development of agricultural and food production. The

project was found to promote innovative products for the Thai food industry, such as research and development of organic foods as a response to the popularity of consumers who pay more attention to health and healthy diet. Research results show that participation in the Food Innopolis project gives private entrepreneurs direct access to information from the public sector to produce products that meet the needs of the local and international markets and how to produce value added products. Being in partnership also granted private partners the support, both direct and indirect, risk management tools, and access to new markets or access to the state's market for agricultural products. This benefits the participant to increase their productivity and competitiveness which ultimately improve the competitiveness of the country as a whole.

However, while participants in Food Innopolis today are mostly downstream operators, a processor or exporter of food products, small farmers, cooperatives, and community enterprises, which are upstream producers in the value chain, have not yet joined the project; making value chain development is not complete. Therefore, □□ publicity to spread acknowledge of Food Innopolis to grassroots producers are essential for the dissemination of knowledge and technology, as well as to provide opportunities for small-scale farmers to access government funding in order to enhance the development of the value from upstream to downstream; such as from seeding (with high yield, fast growth, insect resistance seed); agricultural machinery and inputs (water management, soil modification, technology in cultivation); yielding management (harvesting, packaging, selecting, grading); information transfer (access to data for decision-making, marketing analysis, linkage to information network); to the processing and value creation (produce the value added products and high value food, etc.) to complete thorough value chain creation.

### **Limitations of this Research**

1) This thesis is an overview study of the public-private partnerships implemented in the Food Innopolis project, which is a project the government intends to set up to utilize the PPP mechanism in Thai food industry development. And because of the intention to study the sample under the same context, with the same

participant selection process, same management conditions, and with the same public partner from the same government agency, therefore, other collaborations that may be related to the agri-food industry outside of Food Innopolis projects are not included in the scope of this research. Since this study placed a special emphasis on the collaborative relationship between the public and private sectors in the Food Innopolis project, hence, further empirical testing of generalization is essential and necessary in building up a more prominent comprehension and better understanding of how relationship between public-private partners are carried on in broader market or in other industry and value chains.

2) Due to limitations in tracking information, this study cannot be traced to operators who have canceled their contracts or terminated their operations before the cooperation project has ended. Most of all, such information is treated as a trade secret and is not available to the public. Therefore, the researcher cannot study the obstacles or problems that may lead to the cancellation of such cooperation.

3) This study is an exploratory descriptive research, which is a type of research that focuses on explaining the occurrence of phenomenon in a descriptive manner. Therefore, the result of the research will not be able to measure the relationship between variables or factors that cause or effect on the success or failure of the project.

4) Since this study is focusing of public-private partnerships under Food Innopolis project which are predominantly operate in R&D aspect, the acquisition of data was very difficult; the informants were well aware that information on research and development is an important trade secret and giving the information on such topic must be done with precaution. Obtaining data from public informant was also problematic since the tendency of government agents responding to the questions was completed toward publicity or concealment of mistakes. Hence, the researcher must be prepared; proper documents must be acquired before interviewing the informants, permission should be formally granted, and the ethics of the researcher must be strictly applied in order to not to do any harm to the data providers.

### **Suggestions for Further Research**

1) Further research should focus on creating a measurement of variables and finding the relationship of the variables or factors affecting success and failure of PPP by assessing the PPP implementation model in other industries, concepts of organization/project management of PPP, and the results of various researches as a guideline for determining the variables in the research model. Finding relations between variables or factors will contribute to the determination of reasons for the success or failure of the PPP mechanism in public services

2) It would be beneficial if the information from those who canceled or terminated the project can be collected; it will allow us to understand the important causes that impede the operation so that solutions to improve the implementation of PPP under Food Innopolis project can be determined.

3) Further research should broaden the perspective that formerly analyzes only the cooperation between the public and the private sectors and include the perspective that integrates civil society, small farmers, and other stakeholders in the network to the study. By broaden the scope of the study to include other stakeholders, the management approach leading to the achievement of the PPP mechanism for capabilities enhancement among Thai entrepreneurs, covering from upstream to downstream, will also be highlighted holistically.

4) Researchers may choose to study on selected problems found in this research. Such as conducting research to identify concrete strategy to promote and educate about the importance of research and development among Thai entrepreneurs, since this is a significant problem arose from quantitative data analysis in this research. This is to enable every Thai entrepreneur to realize the importance of researching and developing products to enhance their competitiveness for themselves as well as for the nation.



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