CHAPTER 5
Conclusions and Future Work

5.1 Conclusions

The nowadays free trade in our world tries to reduce the trade barriers in terms of tax in order to promote free trade and goods exchange. On contrary, there is the creation of tools to protect goods or domestic producers so that there is no advantage from competitors. The tools are collectively known as the Non-Tariff Barrier (NTB).

In terms of the agriculture business, the trade barrier that directly affects farmers is the production standards of agriculture goods production. Developing or under-developed countries have the problem of application and implementation of the standards that have been established by the buyer or developed countries. The lack of knowledge and thorough understanding in farmers is the obstacle of the development of standards.

This research combines several theorem to create the model for developing farmers, namely Grower Maturity Model (GMM).GMM applies the Capability Maturity Model (CMM) which is famous for the development of process and communication to be more efficient. In applying CMM, the researcher also introduces the agriculture standards known as the Global GAP as a benchmark in order to show the consistency of the model development. The knowledge bodies or scopes for good and suitable agriculture according to the standards are used in the evaluation and development of farmers. In addition, the Knowledge Management (KM) is applied to facilitate the behavior analysis of farmers in order to transform the knowledge in terms of GMM, based on managing knowledge appropriate for the capability level of farmer. When the farmers know and understand their capabilities and the guideline in developing the capability according to GMM, the farmers can learn and develop themselves to elevate the capability. The motivation of the development comes from the reduction of cost and risk that may occur with the people in the supply chain. When the capability level is increased, the cost and risk is expected to be reduced. The equilibrium of cost and output can be easily determined.

GMM is also a tool for adding value to relevant agricultural research works. There are many research works that are not publicized or used because the users of the research works do not know the dispersion of research resources. GMM can collect and point out the scopes to farmers of the places of relevant organizations or promoting institutes, and of the location and what kind of research works being useful for the development of agricultural business. GMM is thus the data sources of the contributors or the persons who want to transfer the research output and of the receiver or the farmers who use the research works.

Based on the tool and guideline in developing farmers, the researcher has tested the proposed tool using 4 study cases. The samples of the cases come from the farmers who have experience and live on farming occupation. Their experiences clearly reflect the problems and research outputs. Apart from the farmers, some study cases also consider the main stakeholders in the supply chain, i.e. buyers or exporters, to confirm the effects and ability in reducing the effects that may happen with other stakeholders in the supply chain of agriculture business if the farmers have higher capability levels. In addition, the study cases also show that the GMM is more efficient than the Global GAP in terms of the evaluation of and the transfer of knowledge to the farmers because the GMM will evaluate and study the capability of the farmers based on the real behavior and shows the degradation. On contrary, the Global GAP will perform measurement and evaluation so that it is aimed at passing the evaluation but not continuously and seriously used. The evaluation of the Global GAP is the evaluation which concentrates the final output and focuses on the supplementary document to be the criteria of consistency. The GMM is the form of learning of the farmers so that the farmers know the present status of capability and the guidelines in developing the farmers to higher capability level in each scope according to the Global GAP. More specifically, the GMM focuses on the behaviors of the farmers more than the document.

GMM is help the grower to achieve Global GAP. It is Process Reference of Software. Which at the end is to be certified and get the certificates. However, GMM is Process improvement.

The Global GAP has many versions and has been continuously developed to be consistent with the situation. This research follows the standards according to the

framework of the Global GAP Version 3 which is used as the criteria in developing the GMM. However, the GMM can be adjusted to be applicable with the agriculture standards of every version because the criteria for classifying the farmers and the guidelines are applicable for every version of the other standards too.

The research found the explicabilities of the GMM which are novelties as follows.

1) Systems thinking is process reference model that could help grower to learn for capability improvement or knowledge. It better than currently process reference model such as Global GAP, which base on PDCA model (Plan, Do, Check, Act) by TQM
2) The GMM can classify the farmers into 5 groups. The GMM is originated from using the concept and format of the process development according to CMM which divides the capability into 5 levels. 5 levels of the GMM include initial, repeated, defined, manager, and optimization. The evaluation of GMM is consistent with the Global GAP but contains more elaborate description for further development.
3) The GMM is a tool for developing the capability of farmers based on the existing capability levels. The farmers with low capability levels or fail from the Global GAP evaluation will be evaluated by GMM and transferred with the appropriate knowledge to elevate their knowledge levels.
4) The GMM helps reduce costs that may happen with the stakeholders in the supply chain for each capability level of farmers. For farmers, the cost reduction due to the increase of capability can reduce the cost of using chemicals because the farmers have more knowledge and understanding about chemicals and thus appropriately use them as necessary and needed. For buyers of exporters, they can reduce their costs too. To join the program, the exporters must have confidence in the system and farmers. The use of GMM in evaluating of farmers for the decision making of joining the project can reduce uncertainty and cost for the exporting companies if the farmers join the project. It can be seen that the application of the GMM can reduce costs and expenses for every part of supply chain.

5) The GMM reduce the risk that may happen with the stakeholders in the supply chain, which may due to the lack of knowledge or the inadequacy of knowledge. This is accomplished by making the farmers understand and learn so that the farmers adapt to new behaviors. The risk with the farmers is mainly that of failure in doing agriculture business like deficit, lower rates of products than expectation, abolished orders of products, safety and hygiene of workers and farmers. Moreover the risk can happen with buyers or exporters or other persons in the supply chain. The risks that may happen with the other persons include products, markets, finance, law, and people. The product risk is, for examples, the contamination with the product or the inability in delivering the product as required. The market risk is the risk of losing reputation if the product is not quality or contaminated. The financial risk is the risk of investment failure like the investment in the contract farming system, or the risk due to the expenses of residual poisonous matters. The legal risk is the risk that may happen due to the prohibition of importing goods because the goods do not comply with the standards. Finally, the personnel risk is like the sickness or dead of the farmers due to farming. The cost is used as the motivation in using the GMM as the guideline in developing the knowledge and capability of farmers. The risk issue is also considered so that the farmers know that the agriculture must consider the risk that may happen apart from considering the finance or cost factor. The consideration of risk needs to be performed throughout the supply chain.
6) The GMM is a tool in supporting the stakeholders to study the readiness of the farmers before making the contract or transferring them knowledge. This research work studies the making of contract with the farm. The GMM is presented to the exporting companies and explained to them. The GMM plays an important role in supporting the decision making of doing the agriculture contract with the farmers. The exporters use the GMM in evaluating the readiness and behaviors of the farmers. The exporters know which farmer has potential or lacks the abilities in specific scopes. The knowledge transfer is thus carried out correctly and appropriate.

7) The learning process is developed and classified according the learning in action of the KM theory. There are recommendations of learning guideline via new channels of communication, e.g. comic, animation, internet, and several others. These channels are categorized in each of learning scope according to the GMM.
8) The GMM also informs the sources of knowledge, e.g. IPM and the location of this knowledge, which can be known by the knowledge transferor too. The GMM also informs the format of learning which is appropriate and interesting for the knowledge transferee because the format is different, depending on the content of the knowledge.

The systems thinking in this thesis is first version that has been applied to be use in agricultural. Initial study and dividing level by knowledge base is used knowledge base as measurement. The researcher applied know who instead of information in level 4 due to the grower in Thailand will learning from person rather than from own acquired information. However, in other domain such as software engineering the information might be prioritize than know who. Since know who is means known who the experts or associated with other people to acquired new knowledge for improve their process and explore for sustainable.

The GMM in this thesis is level 4 consider know who as prioritize it could be conformed to the CMM standard. For further development the measurement at this level should be considered.

5.2 Future Work

Since this research focuses only on the IPM and PPP (Plant Protection Products), the details of sources of knowledge and learning format may not cover other sources. It is recommended that the GMM need further research for its completion and be developed to be a comprehensive guideline for developing the farmer capability in the future.