A Study of Risk Components of Agricultural Cooperatives in Thailand*

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Abstract

Agricultural cooperatives have been established in Thailand for more than 30 years. The five main areas of service are loans; savings and deposits; sale of consumer farm supplies, and agricultural products; joint marketing; and agricultural extension and services. The existence of agricultural cooperatives in Thailand does not only meet with financial needs of all rural people but also helps farmers improve the quality of their lives. Recently, many agricultural cooperatives in Thailand had to stop their business operations because they had low operational successes and severe repeated losses from their operations, thereby affecting the survival of the farmers who are the members of the cooperatives.

The study indicates that there are only four main types of risk which have significant impact on profitability and even threaten solvency of Thai agricultural cooperatives, namely: credit risk, liquidity risk, operational risk, and market risk. Risks bear significance on the cost of funds, costs for operations, provision loss and "other costs"; consequently influencing the total cost of agricultural cooperatives. Increase in total cost, in turn, exerts pressure on the profitability of agricultural cooperatives. Different types of risks affect different classes of agricultural cooperatives in Thailand in varying degrees. It is evident from the study that the total cost of agricultural cooperatives in Class 1 and Class 2 are affected in descending degrees by market risk, operational risk, liquidity risk, and credit risk respectively. On the contrary, the total cost of agricultural cooperatives in Class 3 and Class 4 are impacted by market risk, credit risk, operational risk, and liquidity risk in decreasing order respectively.

Key words: Agricultural cooperative, Market risk, Liquidity risk, Credit risk, Operational risk

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การศึกษาความเสี่ยงของสหกรณ์การเกษตรในประเทศไทย*

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บทคัดย่อ

สหกรณ์การเกษตรในประเทศไทยก่อตั้งมากว่า 30 ปี โดยมีจุดมุ่งหมายหลัก 5 ประการ คือ 1. การให้บริการสินเชื่อแก่สมาชิก 2. การให้บริการด้านฝาก – ถอนเงิน 3. การจัดหาวัสดุอุปกรณ์การเกษตรให้แก่สมาชิกและผลิตผลทางการเกษตร 4. การบริการด้านการตลาด และ 5. ส่งเสริมการเกษตรและบริการอื่น ๆ สหกรณ์กาการเกษตรไทยไม่ได้ให้บริการเฉพาะด้านการเงินแก่สมาชิกเท่านั้น แต่ยังช่วยพัฒนาคุณภาพชีวิตให้กับสมาชิกเหล่านั้น ปัจจุบันสหกรณ์การเกษตรไทยหลายแห่งได้ปิดกิจการลงเพราะไม่ประสบความสำเร็จ และขาดทุนในการดำเนินกิจการ ซึ่งส่งผลต่อความอยู่รอดของสมาชิกสหกรณ์

การศึกษาในครั้งนี้ ได้ศึกษาเฉพาะความเสี่ยงหลัก 4 ความเสี่ยง ที่มีผลกระทบต่อความสามารถในการทำกำไร และเป็นอุปสรรคของสหกรณ์การเกษตรไทย ซึ่งประกอบด้วยความเสี่ยงต่อไปนี้ คือ ความเสี่ยงด้านสินเชื่อ ความเสี่ยงด้านสภาพคล่อง ความเสี่ยงด้านการปฏิบัติการ และความเสี่ยงด้านการตลาด โดยความเสี่ยงที่เกิดขึ้นนี้มีนัยสำคัญต่อต้นทุนเงิน ต้นทุนการดำเนินงาน ค่าเผื่อหนี้สงสัยจะสูญ และต้นทุนอื่นๆ ซึ่งมีอิทธิพลต่อต้นทุนรวมของสหกรณ์การเกษตร การเพิ่มขึ้นของต้นทุนส่งผลกับความสามารถในการทำกำไรของสหกรณ์การเกษตร ความแตกต่างของความเสี่ยง แต่ละประเภทมีระดับผลกระทบต่างกันในแต่ละระดับชั้นของสหกรณ์การเกษตร จากการศึกษาพบว่า ต้นทุนรวมของสหกรณ์การเกษตร ในชั้นที่ 1 และชั้นที่ 2 ได้รับผลกระทบจากระดับความรุนแรงของความเสี่ยงลดลงตามลำดับ ดังนี้ คือ ความเสี่ยงด้านการตลาด ความเสี่ยงด้านปฏิบัติการ ความเสี่ยงด้านสภาพคล่อง และความเสี่ยงด้านสินเชื่อ ตามลำดับในส่วนของต้นทุนโดยรวมของสหกรณ์การเกษตรชั้นที่ 3 และ 4 ได้รับผลกระทบจากความเสี่ยงด้านการตลาด ความสี่ยงด้านสินเชื่อ ความเสี่ยงด้านปฏิบัติการ และความเสี่ยงด้านสภาพคล่อง ตามลำดับ

คำสำคัญ : สหกรณ์การเกษตร ความเสี่ยงด้านตลาด ความเสี่ยงด้านสภาพคล่อง ความเสี่ยงด้านสินเชื่อ ความเสี่ยงด้านการดำเนินงาน

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1. Introduction

Thai agricultural cooperatives have been established for more than 30 years to enable farmer members to engage in business together, thus helping one another in times of crisis as well as gaining for themselves a better livelihood and higher quality of life (Cooperatives Promotion Department, 1998). The existence of agricultural cooperatives (agricultural coops) helps Thai farmers who are not integrated into the formal financial sector because of low-income, or remote location. The agricultural coops provide the farmers with the chance to access credit and deposit services for their enterprise formation and growth. Agricultural coops, hereby, became efficient grass root financial institution that helped promote rural economy (Cooperative Auditing Department, 2000).

According to the Cooperative Promotion Department (CPD) (1998), the business operations of agricultural coops in Thailand are designed to fulfill a wide range of objectives as follows:

1. To provide loans to members for productive and providential purposes at affordable interest rates;

2. To encourage members' thrift through savings and deposits;

3. To provide agricultural products and daily necessities for sale to members at reasonable prices;

4. To promote appropriate farm practices and disseminate technical know-how aimed to help members reduce production costs and obtain higher yields. With government assistance, members are introduced to proper cropping techniques as well as use of fertilizers and insecticides.

5. To provide farm equipment such as tractors, water pumps, etc., to members at reasonable price.

6. To enable members to market products together, thereby obtaining higher prices for their produces and maintaining fairness in terms of weights and measures

7. To educate and train members on cooperative principles and method.

At present, Thai agricultural coops are engaged in various types of businesses in responding to their members' needs, for example, credit businesses, savings and deposits, purchasing businesses, marketing businesses and agricultural services.

The Ninth National Plan for Economic and Social Development 2002-2006 stressed on community/farmer participation and integration of modern and traditional knowledge to produce healthier agricultural produces.

As agricultural business is a high-risk business, when banks sanction loan to farmers, they consider the performance of agricultural coops, to reduce the adverse consequences should the unfavorable event occur. This criterion forms the basic requirement of the banks although the lending process analysis still takes into consideration other aspects as well; for example, the characteristic of the borrowers, the working capital, the repayment capability, and the collateral.

Based on the statements of Bank for Agriculture and Agricultural Cooperatives (BAAC) (2000), the formulated criteria, of BAAC for evaluating the performance of agricultural coops are as follows:

1. Credit: For credit evaluation, BAAC inspects the outstanding amount of past loans, and the aging of the outstanding loans.

2. Finance: For financial evaluation, BAAC examines the source of funds, use of funds, cash flows and profit and loss.

3. Accounting: For accounting evaluation, BAAC analyses the accounting system, accounting standards and the annual closing of accounts.

4. Management : For management evaluation, BAAC checks the general management and business management.

As identified by BAAC, Thai agricultural coops, as the customers, can be categorized into four classes on the basis of the performance as follows:

1. First Class Agricultural Coops (Class 1): The First Class is comprised of the agricultural coops with good performance for past three consecutive years.

2. Second Class Agricultural Coops (Class 2): The agricultural coops exhibiting good performance for two consecutive years are grouped as the Second Class.

3. Third Class Agricultural Coops (Class 3): The Third Class constitutes the agricultural coops, which performed good in the previous year.

4. Fourth Class Agricultural Coops (Class 4): The agricultural coops indicating problems in performance are classified as the Fourth Class.

With reference to the classification of agricultural coops, BAAC generally grades the performance of agricultural coops in Class 1, Class 2 and Class 3 as ”Satisfactory”, and Class 4 as ”Unsatisfactory”.

The procedure clearly outlines the fact that each class of agricultural coops characterizes variant degree of capabilities to administer and manage the businesses and organizations. In addition, the implication highlights the fact that different classes of agricultural coops are exposed to varying degrees of different types of risks. The manner and the degree of induced responses to the risks vary accordingly.

With the imminent importance of risk management and the prevalent radical changes in international and domestic competition, coop managers have been challenged in selecting appropriate risk management methods in order to reduce the risk occurrences, protect against the risk impacts, and improve the coop performances. Risk management is both a set of tools and techniques, and a process that is required to implement the strategy of organization. Risk management includes all the management processes, and the organization design, required to implement efficiently the set of techniques and models which deal with risk measurement and control (Bessis, 1998). However, unlike general financial sector, most of the Thai agricultural coops managers are unaware of the existence of risks, and the impact of risks to the performance of the coops.

The purpose of this paper is to gain insight into the risk component of the Thai agricultural coops, and understand the cause and effect of risks inherent in the organizations. The study will examine the effect of each risk to the total cost of operation of the agricultural coops by applying a regression model. Further, this research will help develop a model structure to depict the degree of impact of each risk towards the total operational cost.

2. Research Process

2.1 Research problems and objectives

According to McGrath (1994), the principle of cooperative risks is usually defined by the adverse impacts of several distinct sources of uncertainty on profitability. Failure to respond to the risks threatening the operations, provides the agricultural coops with lesser opportunities to regain the profitability and competitive advantage. The managers of most of the agricultural coops possess limited knowledge on risk their organizations are exposed to. To implement the effective risk management methods and strategies, it is important for the managers of Thai agricultural coops to be aware of risk management, the types of impending risks, and understand the impact of risks on the performance of their coops.

This paper aims to identify the types and sources of risks existent in Thai agricultural coops and the effects of different kinds of risks on their performance, and the management plans and strategies commonly employed. The focus of the study is on exploring the sources and the effects of risks to the organization and the business operation by examining the views of managers of agricultural coops via questionnaire survey to answer the following questions:

1. What are the risk components in Thai agricultural coops?
2. What are the sources of those risks?
3. How do managers manage risks in their coops?
4. Does risk have an important impact in the performance of agricultural coops?
5. Does risk generate competitive disadvantage to agricultural coops?
6. Can risk decrease the overall return of the coops?

2.2 Research methodology

This study to adopts the deductive research method with efforts directed towards the testing of developed conceptual and theoretical structure of Paper 1 through empirical observations. According to Sekaran (2000), the hypotheico-deductive method involves the seven steps of observation, viz., preliminary data gathering, theory formulation, hypothesizing, scientific data collection, data analysis, and deduction. Deduction is the process of arriving at conclusions by interpreting the meaning of the data analysis results.

The concept of sources of risks and risk management in the agricultural coops, and the impact of the risks to the business performance. This research is comprised of two

sections of which the first section summarizes the fact-findings regarding the awareness of respondents about the risks inherent in the agricultural coops, and the employed risk management strategies. The study employed analytical survey, where the intention is to determine whether there is any relationship between different variables (Hussey and Hussey, 1997). In the first section, the critical variables are examined as to their influence in explaining the reason for the occurrence of problems and the corresponding solutions. However, the second section analyzes the relationship of risk and its cost to the agricultural coops, which can decrease the returns of the coops.

2.3 Population and sample selection

In a positivistic study, a representative is one in which the results obtained for the sample can be taken to be true for the whole population (Hussey and Hussey, 1997).

Most of the client coops of BAAC have business quantities higher than 50 million baht per year, and employ at least 10 people. Annually, BAAC prepares an internal report with the rating of the client agricultural coops based on their financial and operational performances. The study was designed to survey a list of client agricultural coops of BAAC with reference to the BAAC report. The list comprised of 749 client coops of under Class 1, Class 2, Class 3 and Class 4 from every region of Thailand, namely Northern, Northeastern, Eastern, Western and Southern Thailand, Completion of at least five consecutive years of business with BAAC was the additional criteria for the selection of the coops.

A simple random sampling might result in some members of the population being significantly under or overrepresented; whereas a stratified sampling overcomes the problem of simple random sampling as each identifiable strata of the population is taken into account. Sproull (1995) suggested the lack of statistical rationality in using an arbitrarily selected percentage of the population for sampling purposes. However, some researchers select arbitrarily a 5% or 10% sample of population. In this research, a 10% sample of the population was used. The survey sample consisted of 200 agricultural coops with the following composition: 1) Class 1 - 45 coops, 2) Class 2 - 40 coops, 3) Class 3 - 56 coops, and 4) Class 4 - 59 coops.

After the permission from the Human Research Committee, Department of International Graduate School of Management, University of South Australia, a total of 200 managers were selected from the different classes of agricultural coops, as per the BAAC ratings.

2.4 Data collection method

The study adopted the questionnaire survey method. The research questions were formulated and based on the reviews of Paper 1 encompassing the issues of “risk components” and the “causes of each type of risk” in the agricultural coops as suggested by Willett (1999), Stefanson and Fulten (1997), and USDA (1997).

Close-end questions on 5-point Likert scale were used for respondents to indicate their responses in the questionnaire. A pilot test was conducted on ten respondents in the agricultural coops located in Bangkok and its suburbs in order to fine-tune the structure of the questionnaire. An analysis of the results was conducted by using the SPSS Program (Statistical Package for Social Scientists).

The Provincial Directors of BAAC were approached by telephone requesting for their assistance in recruiting two business development officers from their branch as a volunteer in handling the questionnaires. In order to provide a better understanding, the information letter and a sample of questionnaire were sent to the concerned provincial director of BAAC located near the selected agricultural coops. As the study was designed to survey 200 managers of the different classes of agricultural coops, a total of twenty business development officers were requested to administer the questionnaires so that all the completed responses could be collected within a limited period of time, and any doubts from the respondents regarding any question could be clarified on the spot. Moreover, the administrators were requested to introduce the research topic and motivate the respondents to answer openly and frankly as commended by Sekaran (2000).

There are distinct limitations when the researcher utilizes external parties to conduct the survey or administer the questionnaires, such as the understanding of the details of questionnaires, or the confidence of data (Hussey and Hussey, 1997). Thus, the researcher furnished a one-day orientation for the business officers requested for the distribution of the questionnaires. The orientation was conducted at the respective BAAC provincial offices under the approval of the respective provincial directors. The business officers, approved by the provincial director, were requested to attend the orientation before the conduction of the survey in order to minimize the above-mentioned limitation.

In the first session of the orientation, the researcher lectured and explained the objective of the questionnaire, the data section, and the details of questions. The second session of the orientation focused on the discussions and Q&A to ensure that the business officers clearly understood the objective and the details of the questionnaire.

3. Research Findings

The study consists of two sections. The first section constitutes the summary of fact-findings regarding the awareness of respondents to the risks inherent in their agricultural cooperatives, and the employed risk management strategies. The second section analyzes the relationship of risk and its cost to the agricultural coops, which can decrease returns of coops.

Section 1

Fact-findings obtained from the analysis of the data collected through questionnaires are summarized as follows:

Question 1 - Types of risks in Thai agricultural coops

From the view of all respondents, there are 4 types of risks inherent in Thai agricultural coops as follows: 1) credit risk, 2) liquidity risk, 3) operational risk, and 4) market risk (Table 1).

Type of risk	f_i	Percent
Credit risk	200	100%
Liquidity risk	166	83%
Operational risk	88	44%
Market risk	50	25%

Table 1. Risk component in Thai agricultural coops

From the findings of Paper 1, there are 6 types of risks in agricultural coops, which are 1) credit risk, 2) liquidity risk, 3) operational risk, 4) market risk, 5) interest rate risk, and 6) foreign exchange risk.

Foreign exchange rate risk does not exist in Thai agricultural coops because the coops, generally, do not borrow funds from overseas financial institutions, and do not participate in any form of overseas trades, or trades through exporters of the respondents, only one respondent argued that the agricultural coops are exposed to interest rate risk. However, in reality, the Thai agricultural coops set the deposit and loan interest rates based on their borrowing rates, which eliminates the interest rate risks for the Thai agricultural coops (CPD, 1998). Therefore, the single response indicating the existence of interest risk is considered not to bear significance in this study. Thus, the study of the two risks would not be conducted in this paper.

Question 2 - Sources of risk in Thai agricultural coops

The responses to Question 2 identified the sources of risks in Thai agricultural coops as follows:

- Source of credit risk

Credit risk, in fact, originates from the amount of bad debts, which are the non-earning assets of agricultural coops. From the survey, it was observed that every agricultural coop faced problems with bad debts. A total of 151 samples or 75.5% of sample size had bad debts up to 21-30% of their loan portfolios. The age of bad debts in most of the agricultural coops in Class 1, Class 2 and Class 3 was lesser than 5 years in average; while Class 4 had bad debts for a period higher than 5 years. Furthermore, 19% of the sample size had bad debts higher than 30% of their portfolios, whereas only 5.5% of the sample size had bad debts about 11-20% of their portfolios. The high levels of bad debts in their portfolios indicate that agricultural coops had lower loan extension quality. Especially while comparing the figures to bad debts of BAAC, which has similar business operations, BAAC bears bad debts about 12% of its loan portfolio (BAAC, 2002). The study highlighted that the higher degree of credit risk as an extension of the bad debts. The bad debts in the agricultural coops are basically the outcome of overdue payments from the farmer members, volatility of the

amount and the price of produces, incompetence of the coops staff, and feeble lending policy of the coops.

- Cause of overdue payment

The survey demonstrates the causes of overdue payments of agricultural coops in Thailand as follows:

a) Farmer members

Overdue payments from farmer members depend on 1) post harvesting losses, 2) emergency expenditures, 3) farm production losses, 4) willingness of the farmer members to pay, and 5) geographical location of the farmers. From the survey, post harvesting loss had the highest average mean score at 4.49 on a scale of 1to 5. This denotes that majority of respondents felt that post harvesting loss has the major influence on the problem of overdue loans, followed by farm production loss, emergency expenses, willingness of farmer members to pay and the geographical location with mean scores at 4.30, 3.51, 3.20, and 2.51 respectively.

b) Loan Assessment and Credit Analysis

From the view of all respondents, there are 5 types of causes of default for loan assessments and credit analyses in Thai agricultural coops, which are as follows: 1) availability of information, 2) experience of credit staff, 3) default of credit analysis, 4) monitoring, and 5) credit policy of coops. The outcome of the survey highlighted the inadequacy of information as the most significant cause of default for loan assessments and credit analyses with the highest mean score of 4.59, followed by experience of credit staff with a mean score of 4.10, default of credit analysis with a mean score of 3.90, monitoring with a mean score of 2.10, and credit policy of coops with a mean score of 1.90.

Normally, high proportion of overdue loans restricts the ability of agricultural coops to extend new loans. Credit growth, as a result, will decline due to a greater degree of caution in providing loans to the farmer members (Sresang, 2002). The large amount of overdue loans will increase provision losses, which will, in turn, increase expenses, and subsequently reduce returns and earnings per share of members. Further, high levels of provision losses can lead agricultural coops to bankruptcy resulting in the lack of sources of funds for farmers. Henceforth, CAD suggests Thai agricultural coops to set provision losses at a level of about 5% of overdue loans. However, in practice, it is difficult for financial management because it does not reflect the real income of credit business, and there is a difference between accounting income, and actual income (BAAC 2002).

- Sources of Liquidity risk

Thai agricultural coops maintain and control financial liquidity through members' shares, members' saving accounts, and funds from other organizations. Liquidity problems arise when agricultural coops cannot liquidate assets to obtain funds as needed. Since the agricultural coops possess limited equity capital, borrowing from external sources deems necessary. BAAC is the main source of funds

for agricultural coops as the bank charges low interest rates, and allows an annual repayment. For agricultural coops, borrowing funds from financial institutions is difficult because agricultural production is a high-risk business. Factors like 1) mismatch between lending and borrowing maturity, 2) members' default, 3) instability of stocks and 4) decreasing deposits from members will discredit the cooperatives. Some members tend to withdraw their deposits and stocks due to the fear of operational loss in the near future. This, as a result, exacerbates the liquidity problem in Thai agricultural coops. 41% of respondents indicated that liquidity risk arises from the mismatch between lending and borrowing maturity.

- Sources of operational risk

Operational risk is the latent risk affiliated to the existence of other risks that makes Thai agricultural coops incompetent in the agricultural business. The risk is caused by various external events and the deficiencies in the internal processes, people, and systems, which results in an economic loss – whether anticipated to some extent or totally unanticipated. Operational risks are too diverse to manage by an individual person or division (Madura, 1996). The survey denoted the sources of operational risk in Thai agricultural coops as 1) risk due to people, and 2) risk due to technology. This study will focus on operational failures due to people, mainly staff and committee members, and technology. Both the risk factors can be reduced effectively under proper management. According to the survey, 53.5% of operational risks in agricultural coops arise from the people, namely committee and staff; while information technology contributes to 46.5% of operational risk. Based on the responses of Class 1, Class 2 and Class 3 agricultural coops, operational risks originates from the IT system, and misconduct of the staff. On the contrary, the Class 4 agricultural coops pointed out the default of staff and especially the default of committee members as the major source of operational risks.

a) Risk due to people

Most of the operational risk exposures in agricultural coops arise from the human aspect, i.e., staff and board members of the agricultural coops. Usually, the staff and board members lack the required managerial skills and experiences. Even though 72% of the respondents had obtained a bachelor degree, a mere 5% had the background in management; while 95% had majors in agriculture, economics, finance and accounting, and political science (Table 2). In addition, only 12% of all the respondents received management-related trainings within past three years. Consequently, 24% of risk due to people in Thai agricultural coops arises as an outcome of the wrong decisions from the committee and a major 76% as a result of the mistakes committed by the staff.

b) Technology risk

Technology is an important factor in agricultural coops. Agribusiness faces a high degree of competition in both the domestic and international markets. Companies and cooperatives need modern technology, particularly Information Technology-related systems in order to facilitate the management of information essential for decision-making purposes. Failure to update information, slow information system, or information distortions can cause serious problems in the operation of the cooperatives. Based on the views of respondents, 56% of technology risk arises from hardware of the IT system; while 44% arises from the software. The use of inefficient hardware and software delays the data processing. This might deprive the committee and the managers of vital information increasing the probability of wrong decisions. This, in turn, surfaces as a cause of risk due to people as observed in the previous section (a), which highlighted one of the causes of people risk as the mistake in decision-making from the committee members at 24%. It is obvious that these problems need to be managed and solved to increase the efficiency of internal work processes, and boost the capability to compete with others.

Educational Level / Major Course	Lower Bachelor		Bachelor		Grand Total	
	f_i	%	f_i	%	f_i	%
Agriculture	44	79	52	36	96	48
Economics	-	-	28	19	28	14
Finance and Accounting	12	21	47	33	59	30
Management	-	-	7	5	7	4
Other	-	-	10	7	10	5
Total	56	100	144	100	XX	XX
Grand Total	56	56	144	72	200	100

Table 2 Qualification and major course of respondents

- Sources of market risk

Market risks arise from the price and the quantity of goods. There are 3 main types of goods for the purpose of buying & selling in Thai agricultural coops; 1) agricultural produces, 2) farm equipments, and 3) consumer goods. About 80% of the total goods are agricultural produces, which are affected by the price fluctuations because of the seasonality of the outcomes to the market.

The prices of farm equipments and consumer goods have undergone lesser degree of fluctuations in the past five years Ministry has been controlling the prices (Commerce Ministry, 2002). So, the major portion of the market risks in Thai agricultural coops arises from the price variations of agricultural produces.

The respondents agreed that the agricultural produces have the highest exposure to market risks. The result of the survey approaches the study conducted by BAAC in 2001, whereby a major (54%) of respondents considered the impact of price as being higher than that of quantity; whereas the remaining 46% pointed out quantity bearing higher significance than price. This finding implies that the price and the quantity of agricultural produces are important factors that impact performance of agricultural coops in the market. In fact, the prices of agricultural produces are difficult to control due to the constant variations. Usually the prices of Thai agricultural produces have been fluctuating around 10-15% per year in average, which is solely depends on the "Demand and Supply" in the market (Office of Agricultural Economic, 2003).

Similarly, the quantity of agricultural produces affects the market risk. The market risk due to quantity originates from agricultural produces that agricultural coops purchase from their members for the distribution to the market. The agricultural coops will have to bear the market risk in future until the produces are sold to the market. Meanwhile, the agricultural coops will have to bear the storage-related costs depending on the quantity and the type of produce.

Moreover, if the price of the agricultural produces decrease, the agricultural coops will face with the consequent loss.

Therefore, agricultural coops that store agricultural produces in large amounts have greater chances to experience higher loss than agricultural coops with smaller amounts of agricultural produces.

The price and quantity of agricultural produces deliver major impacts to the operation of agricultural coops in the form of market risk. Thus, agricultural coops should gather information and take a balanced approach while making marketing decisions.

Question 3 - Risk management in Thai agricultural coops

- Credit risk management

Thai agricultural coops manage loan portfolios by 1) checking historical information of members for past 3-5 years, 2) controlling the amount of lending to members, 3) following up regularly on overdue loans, 4) adding collateral, and 5) using legal action as the last resort. None of the agricultural coops uses credit scoring to analyze loans quality. Agricultural coops of Class 1, Class 2 and Class 3 apply the previously-mentioned methods 1, 2, 3, 4 and 5 as the management tools to reduce the possible effects of credit risk. However, 40% of Class 4 apply method 1 as the only tool to manage the credit risk. The process of sanctioning loans combines the science of obtaining and analyzing the facts of a loan request, and the art of making judgments about the available information, the feasibility of the business, the credibility of the borrower, and the follow-up on loan repayment. Therefore, developing sound credit judgment takes time and experience.

- Liquidity risk management

Techniques that agricultural coops use to manage liquidity are 1) mobilizing funds from shareholders, 2) mobilizing deposits from members, and 3) borrowing from financial institutions. All agricultural coops with liquidity problems favor the borrowing of funds from financial institutions as the first choice to manage liquidity followed by mobilizing funds from shareholders and mobilizing deposits from members as their second and third preferences respectively. BAAC is, ultimately, the main source of funds for Thai agricultural coops based on the facts that 1) BAAC charges lower interest rates than any other financial institutions, 2) the agricultural coops can pay back on yearly basis, and 3) the loan can be prepaid without any prepayment fee. If the agricultural coops borrow funds from other financial institutions, the interest rates charged are higher than the rates of BAAC, the pay back of the loan and interest should be on a monthly basis, and the prepayment of loans have to be covered by a prepayment fee. The loans from BAAC provide ample funds from the loans and ensures the agricultural coops to operate their businesses. Hence, BAAC is popular among Thai agricultural coops in cases of liquidity crises.

- Operational risk management

Proper direction and appropriate control is essential for the successful operation of an organization. However, most Thai agricultural coops do not set strategic plans. Committee, managers, and staff of the coops lack the sound knowledge of operational risk management and internal controls to safeguard against operational risk. Nevertheless, Thai agricultural coops demonstrate the efforts to manage operational risk in their businesses. For instance, as an effort to control the current operations, monthly performance checking are conducted, and the monthly operational reports are submitted to the responsible managers;

however, the reports prepared usually lack proper conduct, thorough understanding and sufficient details (BAAC, 2001).

In fact, the Thai government has established CPD, which has network to all over Thailand, as a consultant for cooperatives, particularly agricultural coops. In addition, CAD was also established to audit the accounts and operations of the cooperatives in order to maintain the same standard of conduct.

However, only 29% of sample size used service from CPD, which fall under Class 1. In the current situation, the committee, managers, and staff should try to increase the knowledge of management, and conduct more brain-storming sessions in order to avoid inappropriate operations, improve management competencies, and achieve the organizational goal.

- Market Risk Management

Most of Thai agricultural coops do not have appropriate marketing plan, and strategies. Even in the annual plan, market risk management does not appear (Kitiwatanapong, 1997). This indicates that committee, managers, and staff lack the proper knowledge and are unaware of the importance of the market risk management. In addition, Thai agricultural products markets are deficient of the tools to protect against market risk unlike in other countries. 1) Buying and selling of produces in a day, 2) storage of goods for increase in price, and 3) processing of produces are the methods commonly applied to deter the marketing risk in Thai agricultural coops.

Class 1, Class 2 and Class 3 agricultural coops employ the above-mentioned strategies 1, 2, and 3 to ward off the possibilities of loss due to market risk. On the other hand, most of the Class 4 agricultural coops use the strategy 1; while only some agricultural coops under Class 4 apply the strategies 2, and 3 as well. The limited availability of capital is the major reason that restricts most of the agricultural coops under Class 4 from investing in warehouses for storage and purchasing equipments for further processing the produces.

Additionally, some agricultural produces cannot be stored for a long period such as onions and garlic because of the possibilities of reduction in weight and formation of Alfa toxin. In the absence of specialized knowledge and experience among the staff, some agricultural produces that can be stored in warehouses may be damaged. To illustrate, crops like paddy and maize cannot be stored in general warehouses since they need temperature and moisture control. Under inappropriate storage conditions, high moisture will degrade the quality resulting in the reduction of price. So, agricultural produces need to be stored in special warehouses called Silos. While some agricultural coops may possess the essential knowledge and experience about post-harvesting and storage of agricultural produces, they might lack the capital to invest. The building of Silos requires high investment, which many agricultural coops cannot afford. Further, these investments have lower rates of return.

Question 4 - Impact of risks to the overall performance and success of Thai agricultural coops:

For question 4, the overall mean score of the responses was relatively high, at 4.41 points on a scale of 1 to 5, as most managers strongly felt that risk has an important impact on the performance of agricultural coops. The majority (51%) of the respondents indicated the highest rating of "5", which implied that the impact of risk to the overall performance and success of agricultural coops was "extremely important". Of the remaining respondents, 39% rated "4", and only 10% of the respondents rated "3". None of the respondents marked the ratings at either "1" or "2" levels. Therefore, the derivation asserts that most, though not all, respondents realize the importance of risk and understands the impact on to the overall success of the coops.

The agricultural coops under Class 4 scored the highest at 4.61 even above the overall mean score of 4.41, followed by Class 1 at 4.49, Class 2 at 4.30, and Class 3 at 4.20 respectively.

Question 5 - Risk as a source of competitive disadvantage:

For question 5, the overall average score was still a high figure at 4.29, though slightly lower compared to the previous Question 4 (Q4). The majority (49%) rated "4" on the issue that risk generates competitive disadvantage for the cooperatives. 40% marked a rating of "5"; whereas 11% chose gave a rating "3". Alike the responses for Q4, no responses pointed out "1" and "2" levels. The outcome revealed a slight uncertainty about the link between risks and competitive disadvantage in the business, which could be due to the indirect impact of risk on the competition of agricultural coops, as supported by researchers such as Bessis (1998), and Crouhy, Galai and Mark (2001).

Nevertheless, a correlation analysis conducted on the responses for Q4 and Q5 demonstrated a relatively high figure of 0.54 - an indication of a positive relationship between the responses for the two questions as expected and understandable, i.e., the opinions on the impact of risk to the overall success of the cooperatives are related to the views on risk being responsible for competitive disadvantage to the coops.

At the agricultural coops level, the agricultural coop under lass 1 scored 4.44, relatively higher than the average score of 4.29, followed by Class 4 with the score of 4.41, Class 2 with 4.20, and Class 3 at 4.11.

Question 6 - Risk and decrease in return:

With regard to the issue of risk and the decrease in the overall return of the cooperatives in Q6, the average score was 4.56. The outcome highlights that a majority of respondents believe that risk bears a strong impact on the overall return of the cooperatives. The output average value of the responses is higher in comparison to the values of responses in Q4 and Q5 discussed above. A total of 56% of the respondents marked the rating of “5”; and the remaining 44% indicated

the rating of "4". No responses were observed at the "1", "2", and "3" levels. The agricultural coops under Class 4 scored the highest mean of 4.67, followed by Class 1 with a mean value of 4.59, Class 2 with 4.51 and Class 3 with that of 4.47 respectively.

Based on the derivations of Q4, Q5, and Q6, the agricultural coops of Class 1 and Class 4 are consistently above the average scores of the overall responses; whereas the agricultural coops of Class 2 and Class 3 implied the scores below the overall average values. The result refers that Class 1 and Class 4 possess stronger views about the influence of risks on the agricultural coops than Class 2 and Class 3. The suggestion can be sustained based on the assertion that the dissimilarities in opinions arise from the differences in business operations, and the variations in business sizes in each class, which causes deviations of the effects of risks (Crouhy, Galai and Mark, 2001).

In summary, the above discussions from Q1 to Q6 have assisted in exploring the risk components and the impacts of risks on the agricultural coops. The reference of the results on the relationship between the types of risks and the impacts of risks that the agricultural coops face is shown in Table 3. The 4 main types of risks in Thai agricultural coops, namely credit risk, liquidity risk, operational risk, and market risk and the respective sources are as follows:

1) Credit Risk: Credit risk arises from the errors in loan assessments and the default of payments from farmer members.

2) Liquidity Risk: Liquidity risk originates due to the inequality or mismatch of loans and deposits.

3) Operational Risk: Operational risk emerges from the incompetence of the concerned parties and the inefficient IT systems.

4) Market Risk: Market risk exists due to the price fluctuations and the quantity of agricultural produces.

Further, the respondents are aware of the significance of the adverse impacts of the identified risks in the organizations in terms of performance, return, and competitive advantage as shown in Figure 1.

The section 1 provides answers for Q1 to Q6. The section has highlighted the types of risks, the impact of risks, and the risk management in Thai agricultural coops. However, the study in section 1 could not define the degree of impact of each type of risk on the total risk, it can measure in total cost of the coops. Thus, the following section of the study helps identify and define the degree of impact of each type of risk on the total cost of operations in Thai agricultural coop.

Type of Risk	Impact
Credit Risk	- Increase of bad debts and provision loss - Decrease in loan quality - Loss of interest income due to bad debts
Liquidity Risk	- Liquidity shortage - Loss of opportunity for business expansion
Operational Risk	- Decline in trust-worthiness - Decrease in efficiency of work - Higher probability of wrong decision-making
Market Risk	- Incline in perishability of agricultural products - Loss from sale of agricultural products

Table 3 Impact of risks

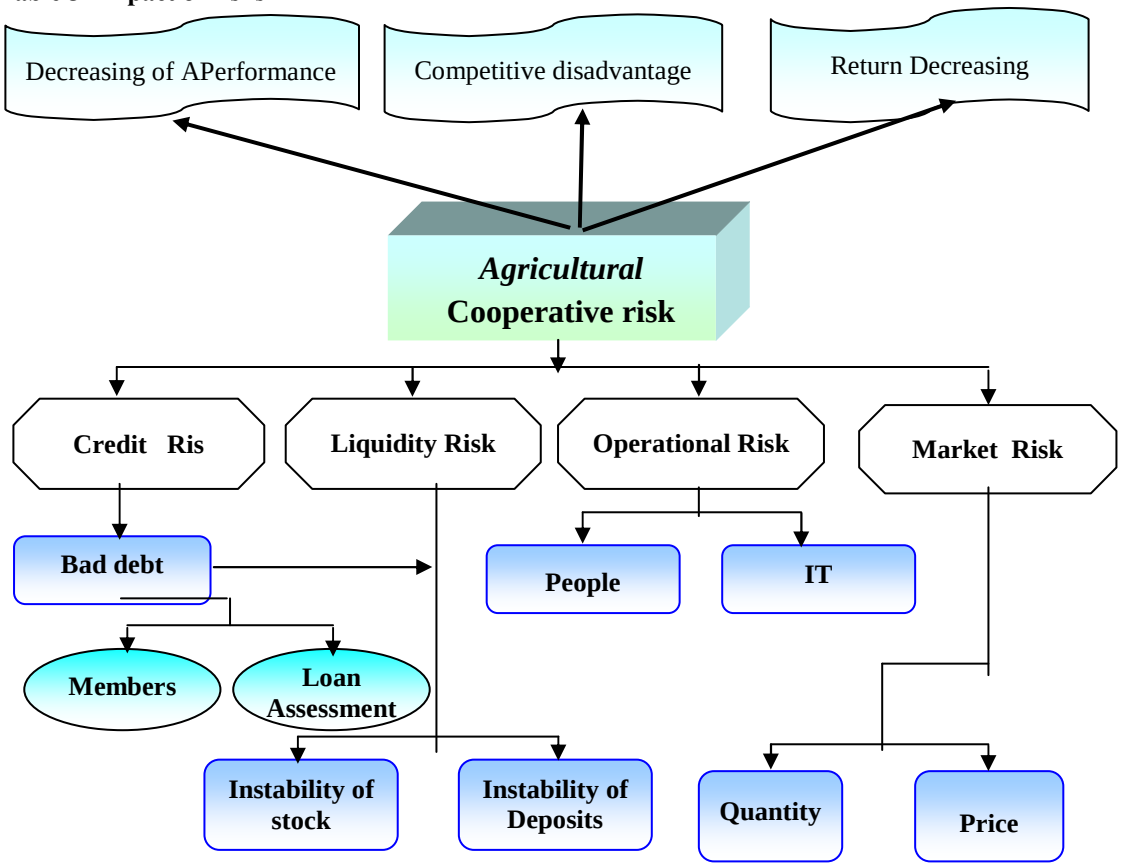

Figure 1 Sources and impacts of aggregate risk in Thai agricultural coops

Section 2

The study in this section focuses on understanding the impact of risks faced by the Thai agricultural coops as indicated from the result of study in Section 1. The regression model is used to analyze and recognize the result of the estimation of the cost and risk effect equation. The equation method is based on the regression equation applied for the correlation between independent and dependent variables. This method is adopted tospecify the degree of loss from risks that affect the cost of thai agricultural coops and subsequently reduce their profitability.

The result is based on the secondary data of 100 samples of agricultural coops comprising of the Class 1, Class 2, Class 3 and Class 4 from BAAC by random sampling. The cost and risk effect equation is as follows:

Cost & risk effect equation

$$\hat{Y} = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4$$
$$\hat{Y} = a_0 + a_1 X_1 + a_2 X_2 + a_3 X_3 + a_4 X_4$$

Where,

$\hat{Y}$ = **Total risk (Total cost : baht)**
X_1 = **Credit risk value (baht)**
X_2 = **Liquidity risk value (baht)**
X_3 = **Operational risk value (baht)**
X_4 = **Market risk value (baht)**

Empirical Result

The result in empirical analysis is determined by the integration of each variable concerned. The regression equation is as follows:

Empirical result of the effect of each risk on the total cost of the agricultural coops under Class 1 is as follows:

$$\hat{Y} = 165079 + 0.158X_1 + 0.740 X_2 + 1.942 X_3 + 6.786 X_4$$

Where,

t-statistic = $(0.050)^{ns}$ (7.710)** (4.160) ** (2.206) **

R^2 = 0.89

F = 38.677 **

** = Level of significance at 0.05

ns = non-significant

From the results of the regression estimate of cost and risk effect, adjusted R^2 is quite high, about 0.89, which means that the explanatory variables included in the equation can explain about 89% of the variation among the variables.

From the estimation of the total cost in Class 1 agricultural coops and the study of the relationship with liquidity risk loss, operational risk loss, and market risk loss, there is the evidence of positive effect on the total cost. The coefficients of the relationships are found to be significantly positive.

This indicates the rise of liquidity risk loss, operational risk loss, and market risk loss , which results in the increase of the total cost.

The credit risk loss is found to have a positive effect but the coefficient is insignificant. This is probably due to the differences on the setting of provision loss ratios in the Thai agricultural coops. Normally agricultural coops set provision losses at about 5% of all the bad debts but some agricultural coops with low bad debts set provision losses lower than 5% upon the advices of the account auditors of CAD

Empirical result of the affect of each risk on the total risk of the agricultural coops under Class 2 is as follows:

$$\hat{Y} = 192204.877 + 0.131X_1 + 0.733\ X_2 + 1.917\ X_3 + 6.514\ X_4$$

Where

t-statistic = $(0.041)^{ns}$ (7.570)** (4.074) **

(2.111) **

R^2 = 0.881

F = 37.034 **

** = Level of significance at 0.05

ns = non - significant

In the estimated regression result of cost and risk effect, the adjusted R^2 is reasonably high at about 0.88. This signifies that the explanatory variables included in the equation can explain about 88% of variation in the dependent variable.

From the estimation of the total cost in the Class 2 agricultural coops liquidity risk loss, operational risk loss, and market risk loss appear to have a positive effect and the relationship coefficients are found to be significant. With the increase of liquidity risk losses, operational risks losses, and market risk losses in the agricultural coops under Class 2, there are corresponding increases in the total cost. Test on the relationship of credit risk loss with the total cost indicates that the relationship is statistically insignificant. This can also be explained by the same reason as is in the case of agricultural coops Class 1.

Empirical result of the effect of each risk on the total cost of agricultural coops under Class 3 is as follows:

$$\hat{Y} = -225998.753 + 3.142\ X_1 + 0.390\ X_2 + 1.736\ X_3 + 7.463\ X_4$$

Where,

t-statistic = (3.257) ** (3.194) ** (4.132) **

(2.945) **

R^2 = 0.916

F = 54.408 **

** = Level of significance at 0.05

ns = non - significant

In the estimated regression results of cost and risk effect, the adjust R^2 is significantly high at about 0.92 indicating that the explanatory variables included in the equation can explain about 92% of the variation in the dependent variable.

From the estimation, the total cost in the Class 3 bear positive effects on credit risk loss, liquidity risk loss, operational risk loss, and market risk loss. The coefficients appear significant. The results clarify that the rise in credit risk loss, liquidity risk loss, operational risk loss, and market loss results in a

subsequent increase in the total cost of this group of agricultural coops.

Empirical result of the effect of each risk on the total cost of agricultural coops under Class 4 is as follows:

$$\hat{Y} = - 248235.984 + 3.306 X_1 + 0.370 X_2 + 1.759 X_3 + 7.327 X_4$$

where,

t-statistic = (3.560) ** (3.108) ** (4.312) ** (2.936) **

R^2 = 0.958

F = 56.389 **

** = Level of significance at 0.05

ns = non - significant

The results of the regression estimate of the relationships of cost and risk effect highlights the adjusted R^2 at a high level of about 0.96. This implies that the explanatory variables included in the equation can explain about 96% of the variation in the dependent variable.

The estimation clarifies that the total cost of agricultural coops under Class 4 is positively affected by credit risk loss, liquidity risk loss, operational risk loss, and market risk loss. The respective coefficients indicate significance in the relationships. As the credit risk loss, liquidity risk loss, operational risk loss, and market risk loss increase there will be a corresponding increase in the total cost of the agricultural coops under Class 4.

From the afore-mentioned results refers to the understanding that the credit risk loss bears a positive effect on the total cost of agricultural coops under Class 1 and Class 2; however, the coefficients are found to be insignificant due to the differences in criteria of provision loss system. On the other hand, the credit risk loss has significant impact on the total cost of the agricultural coops under Class 3 and Class 4. Generally agricultural coops set the provision loss at the level of 5% of the bad debts; whereas, in case of higher bad debts, account auditors set the provision loss at levels higher than 5% based on the amount of bad debts. This reflects the loan quality of agricultural coops. Moreover, the setting of high provision loss is considered as an indirect order to agricultural coops to direct the efforts in reducing bad debts.

Studying the level of effects, it is understood that the market risk has the highest influence on the total cost of the Class 1 and Class 2' followed by the operational risk and the liquidity risk respectively; whereas the credit risk does not cast a significant impact on the total cost. For Class 3 and Class 4, the market risk delivers the highest influence to the total cost as in the case of Class 1 and Class 2, followed by the credit risk, the operational risk, and the liquidity risk respectively.

4. Conclusion

The analyses of the data gathered from the 200 managers of Thai agricultural coops who responded to the survey emphasized several findings. Based on the outcomes, there are four important risks, namely 1) credit risk, 2) liquidity risk, 3) operational risk, and 4)

market risk. Additionally, all the four types of risks influence the overall performance, competitive advantage, and the rate of return in agricultural coops. The findings, further, highlight the different sources of risks as follows: 1) Credit risk arises from the errors in loan assessments and the default of payments from farmer members; 2) Liquidity risk originates due to the inequality of stocks and deposits, and the amount of overdue loans, 3) Operational risk emerges from the incompetence of the concerned parties and the inefficient IT systems; while 4) Market risk exists due to the price fluctuations and the quantity of agricultural produces. Moreover, from the study in Section 2, a conclusion can be derived that the different types of risks apparent in agricultural coops affect the total cost in varying degrees. The market risk has the highest influence on the total cost of agricultural coops among all the other risks.

The result provides support to the findings of Manforedo, Richards and McDermott (2003), Polster and Huang (1999), and Prakash (2001) that risks impact on performance, and a variety of risks exist in the agricultural coops.

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