Value Chain Integration for Rural Co-operatives: Comparative Analysis in the Rice Sector in Sri Lanka

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by

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To Pushpa, Gayindu and Sanula.....

DECLARATION

The thesis entitles "*Value Chain Integration for Rural Co-operatives: Comparative Analysis in the Rice Sector in Sri Lanka*" is submitted to Massey University for the degree of Doctor of Philosophy. I, Prageeth Sanjaya Fernando, declare that this thesis is the outcome of my own research work. The materials used from other resources are acknowledged. I also certify that the work contained in the thesis, or any part thereof, has not been previously submitted for a degree, diploma or other qualifications.

Signed

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ABSTRACT

Agri-food industry is transforming in developing countries due to trade liberalisation, globalisation and urbanisation trends. As a result, linking smallholder farmers to modern markets has been a concern among scholars, development agencies and policymakers. Although the transformation in agri-food industry has created many opportunities for smallholder farmers to elevate their income and welfare, they are confronted with many challenges such as poor access to technology, information, inputs, credits, and value-adding services. In this context; co-operatives are recognised to play an important role in improving smallholder farmers' market access. There is an ample amount of literature that discusses the advantages co-operatives are providing to their members/smallholder farmers.

Most recent studies on co-operatives have compared members to non-members in terms of benefits and performance. Nevertheless, member benefits and performance of vertically integrated co-operatives gain less attention despite their importance. Vertically integrated co-operatives perform a range of activities related to supply of inputs, services and market information. Yet, there is scant information on how co-operatives' vertical integration benefits their members/smallholder farmers.

This study aims to analyse and compare member benefits and performance of co-operatives vertically integrated into two levels: partially and fully integrated co-operatives. In particular, this study addresses whether there are better performance and members' benefits in fully integrated co-operatives than partially integrated co-operatives.

This study was conducted in one of the main rice-producing provinces in Sri Lanka using a mixed-methods approach. Co-operatives involved in rice business activities in the province were studied and divided based on their level of vertical integration: partially or fully integrated. Partially integrated co-operatives centrally control some of the successive activities of a value chain (supply of inputs, provision of services and information, production, and assembling and marketing of primary products). Fully integrated co-operatives centrally control all the successive activities of a value chain (supply of inputs, provision of services and information, production, assembling and marketing of primary products, processing, wholesaling, and retailing).

Cross-case comparisons of interview data complemented with financial data revealed that co-operatives' financial performance was not significantly different between partially and fully

integrated co-operatives and was comparably unsatisfactory at both levels. Further, the financial performance of co-operatives was affected by their governance, managerial, technical and financial attributes.

Survey data of 307 rice farmers were used to analyse and compare member-perceived benefits and performance between partially and fully integrated co-operatives. Exploratory factor analysis of data revealed five key areas of benefits: business and financial, livelihood, technology and information, low-cost inputs, and democratic control and education. It was found that business and financial, and technology and information benefits, were better among members in fully integrated co-operatives. Besides, propensity score matching analysis revealed better profits per kilogram of paddy rice and higher economic profit among members in fully integrated co-operatives. However, the regression analysis results showed varying financial performance among the members of co-operatives depending on their demographic and household, farm, and contextual factors.

Findings in this study provided some important theoretical and practical implications. The benefits studied in this research provide directives for managers in formulating rice-related business strategies that are well-aligned with members' interests. Contradictions between members' perceived benefits and their actual financial performance in fully integrated co-operatives suggest a lack of awareness among members about the benefits of value-added activities and emphasise a need for improving member communication and engagement. Policymakers should be encouraged to promote vertically integrated co-operatives and provide training to their managers (including directors) on formulating and executing competitive strategies, good governance, and revisions concurrent to changing market forces.

Keywords: Co-operatives, vertical integration, member benefits, financial performance, rice

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My motivation to pursue a Ph.D. came from the rural entrepreneurship short course organised by the Wageningen University in 2014. During the course, I was fortunate to learn the potential of co-operatives and collective action in uplifting the lives of poor farmer in the developing world. In turn, this learning inspired me to look deep into issues in the Sri Lankan co-operative system. As a result of a continuous search for a supervisor who could help to follow my academic aspiration, I was lucky to draw Dr. Elena's attention to my short proposal on benefits of vertically integrated co-operatives. She offered to be my supervisor taking an assessment on me. Dear Dr. Elena Garnevska, I am so grateful to you for having me as a Ph.D. student and proposing Prof. Nicola Shadbolt, and Dr. Thiagarajah Ramilan into the team.

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LIST OF ABBREVIATIONS

CBSL	Central Bank of Sri Lanka
CIB	Crop Insurance Board
CWE	Co-operative Wholesale Establishment
CFA	Confirmatory Factor Analysis
DAS	Department of Agrarian Services
DCD	Department of Co-operative Development
DOA	Department of Agriculture
DSD	Divisional Secretariat Division
EFA	Exploratory Factor Analysis
FAO	Food and Agriculture Organization
ID	Irrigation Department
LKR	Sri Lanka Rupees
MPCS	Multi-Purpose Co-operative Society
PCA	Principal Component Analysis
PMB	Paddy Marketing Board
UNDP	United Nations Development Programme
USDA	United States Department of Agriculture
WB	World Bank

1 INTRODUCTION

1.1 Introduction

This chapter introduces the thesis and includes five sections. The research background is presented in Section Two, following the introduction. Section Three introduces the problem statement. Research questions, research aims, and objectives are presented in Section Four. The chapter is completed by providing the structure of the thesis in Section Five.

1.2 Research Background

The agri-food industry in developing countries, including Asia, Africa and Latin America, has experienced a wave of transformation over the last few decades as a result of income growth, urbanisation, liberalisation and privatisation (M. Ahmed, Saint-Geours, & Gitau, 2021; McCullough, Pingali, & Stamoulis, 2008; Reardon & Timmer, 2007, 2014; Tray, Garnevska, & Shadbolt, 2021; Weerahewa, Dandeniya, & Marambe, 2020; Wu & Ding, 2018). Consequently, the demand for differentiated, quality and safe agri-food products has forced businesses to vertically integrate or form contracts to coordinate agri-food value chains (Abdul-Rahaman & Abdulai, 2020; Felicetta Carillo, Caracciolo, & Cembalo, 2016; Felicetta Carillo, Caracciolo, & Cembalo, 2017; Martinez, 2012; Swinnen & Maertens, 2007).

Agri-food industry transformation has restricted smallholder participation in modern markets due to a number of constraints such as poor access to inputs, information, technology, capital, value-adding services and connections to high value markets (Henegedara, 2002; Reardon, Barrett, Berdegué, & Swinnen, 2009; S. Singh, 2016; Wiggins, Kirsten, & Llambí, 2010). Nevertheless, smallholders are the predominant players in the agri-food value chains in developing countries. Over 80% of the farms in less developed regions are less than two hectares in size and 70% of the rural population relies on agriculture for their livelihood. Hence, increasing smallholder income has been a prime concern of policymakers (Corsi, Marchisio, & Orsi, 2017).

In this context, co-operatives, other forms of collective enterprises and vertical integration have attracted a renewed interest among scholars as potential instruments to link smallholders to modern markets and boost their income (Bernard & Spielman, 2009; Fischer & Qaim, 2012a; Markelova, Meinzen-Dick, Hellin, & Dohrn, 2009; Trebbin, 2014; Valentinov, 2007). Among various collective action forms, Hendrikse and Bijman (2002) argue that farmer co-operatives are efficient governance structures for overcoming coordination problems encountered by smallholder farmers. Through co-operatives, smallholder farmers have increased the degree of commercialisation,

extended their value chain from production to processing, sold directly to high value markets, and secured a larger share of value ultimately raising their incomes (Z. Huang & Liang, 2018; Upendranadh, 2021; Zhong, Zhang, Jia, & Bijman, 2018). Similarly, vertical integration has been considered more favourable for smallholder farmers to capture more value and uplift farming income (Glover & Kusterer, 2016; Macchiavello & Miquel-Florensa, 2017). Vertical integration in agriculture involves centralised control of successive activities of the value chain by business enterprises. Closely integrating the production, processing, and sales of agricultural products is conducive to improving agricultural production efficiency (U. Singh & Mishra, 2015). Vertical collaboration between farmers, co-operatives and other collective enterprises is conducive to saving transaction costs (Blandon, Henson, & Cranfield, 2009), avoiding market risks (Bellemare, 2015), maintaining price stability, and ensuring factor support (Fałkowski, 2012; Trifković, 2014) and it has a positive effect on promoting farmers' income and sustainable agricultural development.

The Sri Lankan government has also made substantial efforts to promote the development of collective enterprises such as co-operatives, farmer organisations, farmer companies, and credit societies (Birchall & Simmons, 2010; Esham & Kobayashi, 2013; Rosairo, Lyne, Martin, & Moore, 2012; Winslow, 2002). Nevertheless, not all of these organisations have been equally successful, and co-operatives attract special attention owing to their widespread use as a smallholder development strategy (Esham & Usami, 2005; Winslow, 2002).

According to the Department of Cooperative Development (2017), co-operatives contribute to Sri Lanka's social and economic development by overcoming the challenges created by liberalisation and globalisation. There are 14,000 co-operative societies operating in agriculture and other economic sectors with a total membership of 8.7 million people. Co-operatives in agriculture provide a range of services to farmers, including the supply of inputs, credits, marketing and processing of agricultural products and retailing (Jayaweera, 1998). However, research into the subject of co-operatives in general and their vertical integration is scant in Sri Lanka (for example: Amarasinghe & Bavinck, 2011; Birchall & Simmons, 2010; Galappaththi, Kodithuwakku, & Galappaththi, 2016; Hulme & Montgomery, 1994; Jayaweera, 1993; M. Senanayake, 2004; Winslow, 2002).

The Sri Lankan agriculture sector, as in other developing countries, is predominantly made up of smallholders and is increasingly involved in vertical integration and contracts (Athukorala, Ginting, Hill, & Kumar, 2017; H. Herath & De Silva, 2011; Kiriveldeniya & Rosairo, 2018; Weerahewa et al.,

2020). This is common in Sri Lanka's rice sector. For example, vertical linkages are being developed by the large-scale millers in the rice industry with wholesale agents and retailers such as supermarket chains (Kiriveldeniya & Rosairo, 2018). The sector occupies 34% of the country's total agricultural lands and accounts for approximately 40% of Sri Lanka's crop production. Rice is the single most important food crop in Sri Lanka with annual production of 5.12 MT of paddy rice (DCS, 2020). It is the staple food of a population of over 20 million in the country and 2.3 MT of rice is consumed domestically per year (DCS, 2015). Rice itself provides direct employment to about 1.8 million smallholder farmers (Korale Gedara, Ratnasiri, & Bandara, 2016). The contribution of the rice sector to the Sri Lankan economy accounts for 7 % of the GDP (Central Bank of Sri Lanka, 2018). The majority of rice farmers in Sri Lanka are smallholders with land plots of less than 0.4 ha. The rice industry is undergoing a transformation (Weerahewa et al., 2020), and the demand for quality rice is on the rise (Pallegedara, 2020).

1.3 Research Problem Statement

From the perspective of businesses enterprises, as actors within value chains, vertical integration strategies involve significant financial and non-financial commitment of the enterprise's resources (Harrigan, 1984; B. Klein, Crawford, & Alchian, 1978). Vertical integration organises internal control of few or all the successive activities of a value chain. It is argued that, by integrating vertically, business enterprises can gain competitive advantage, and increase an enterprise's value-added margin by reducing coordination and operational costs for a particular product within the value chain (Felicetta Carillo et al., 2016; Harrigan, 1985a; H. C. Peterson, Wysocki, & Harsh, 2001). Such claims have been evaluated in non-co-operative enterprises in the recent literature in various countries (Andreou, Louca, & Panayides, 2016; Felicetta Carillo, 2016; Hanf, 2016; Suzuki, Jarvis, & Sexton, 2011; Traversac, Rousset, & Perrier-Cornet, 2011). Nevertheless, except in very few studies (Ao et al., 2021; Cadot, 2015; J. S. Royer, 2007; Salazar & Gorriz, 2011) co-operatives' vertical integration has not been comprehensively examined even though it is affirmed that co-operative organisations are beneficial to farmers. More information is needed on this subject since vertical integration involves significant member investment (financial and non-financial).

Zhong et al. (2018), examined the member benefits of vertically coordinated dairy co-operatives in China. However, it was not clear whether higher levels of vertical integration brought better benefits to co-operative members in their study. Therefore, the aim of this study is to analyse vertical integration in rural co-operatives in Sri Lanka's rice sector. The important questions this study

addresses include: 1) whether the performance of fully integrated co-operatives is better compared to partially integrated co-operatives, 2) what key benefits do vertically integrated co-operatives offer and, 3) are the key benefits better in fully integrated co-operatives compared to partially integrated co-operatives?

Understanding vertical integration in co-operatives is important because of the benefits they bring to smallholders. Additionally, co-operatives have gained strong attention from policy makers, donor agencies, and practitioners as a smallholder development strategy. Therefore, the new information generated from this study will contribute to informing policy decisions related to co-operatives' vertical integration, ultimately contributing to the development of smallholder rice sector.

1.4 Research Aim and Objectives

The main aim of this study is to analyse vertical integration in rural co-operatives in Sri Lanka's rice sector. This analysis focuses on the performance and members' benefits of co-operatives and their performance.

The aim is translated into the following research objectives:

Objective 1: to develop a framework to analyse the benefits and performance of vertically integrated co-operatives.

Objective 2: to analyse and compare the performance of partially and fully integrated co-operatives in Sri Lanka's rice sector.

Objective 3: to analyse and compare members' benefits of partially and fully integrated co-operatives in Sri Lanka's rice sector.

Objective 4: to analyse and compare members' financial performance of partially and fully integrated co-operatives in Sri Lanka's rice sector.

1.5 Structure of the Thesis

Chapter 1 introduces the thesis and identifies the research problem, including a short discussion about previous research and the research gaps that are addressed in the study. It also states the research aim and objectives. The chapter ends with a brief outline of the thesis structure.

Chapter 2 provides a background of the agriculture sector in Sri Lanka and its importance in terms of food security, national income and employment. The chapter also provides information about the rice sector in Sri Lanka; particularly, it gives an overview on organisation of the rice value chain, including main actors and activities. Information about the development of co-operatives and collective enterprises in Sri Lanka and the rice sector is also presented towards the end of the chapter.

Chapter 3 reviews relevant theories and concepts applicable to the research problem. The review covers: theory of collective action, co-operatives, value chain, vertical coordination, and integration. It also provides the background for the development of the theoretical framework for this study.

Chapter 4 evaluates the applications of general theoretical concepts reviewed in Chapter 3 in the agriculture sector. Empirical work carried out in developing countries, and smallholder agriculture is given a particular emphasis. Research methods and designs employed are also identified. Towards the end of the chapter, the theoretical framework is presented.

Chapter 5 reviews various concepts of research methods and describes the methodology of this study. Accordingly, research philosophies, paradigms, approaches, designs, and data collection methods are evaluated first. This is followed by the description of the research process followed in this study. First, qualitative methodology is described, followed by the quantitative methodology, including data collection and analytical methods used. Validity and reliability of the research are evaluated in the latter part of the chapter. The chapter is concluded with a summary.

Chapter 6 presents the results of the qualitative study. The first half of the chapter describes the co-operatives studied in terms of development, governance, management and integrated value chain activities. A cross-case analysis of six co-operatives is performed in the second half of the chapter elaborating on organisational and value chain attributes, and financial performance of co-operatives. An initial discussion of the qualitative study is also included in this chapter.

Chapter 7 describes and summarises the sample of co-operative members included in the quantitative study. It provides a comparative overview of the characteristics of the two groups of co-operatives (respondents in partially integrated and fully integrated co-operatives). Information presented came from descriptive analysis, together with several statistical tests such as two-sample t-test and Chi-square test for comparisons in respondents' demographics, household, farm,

production, marketing, contextual, and financial performance characteristics across the two sample groups.

Chapter 8 presents the main results of the quantitative study. It includes analysis and comparison of the members' benefits and financial performance obtained following statistical techniques such as exploratory factor analysis, propensity score analysis, and regression analysis. The chapter also includes an initial discussion of the quantitative study.

Chapter 9 provides the general discussion and conclusions of this study. The interpretation and discussion of the results lead to specific theoretical and practical implications. Further, the limitations of this study and directions for future research are provided.

2 BACKGROUND

2.1 Introduction

This chapter describes the context in which this study was carried out. Section two provides a general introduction to Sri Lanka. Section three introduces the political environment of the country. Section four and five respectively discuss the importance of agriculture sector and the farming structure of the country. Country's agriculture policy is reviewed in section six. The importance of the rice sector is discussed in section seven. Background information about collective action and co-operatives in Sri Lanka are presented in section eight. The last section provides a brief summary of the chapter.

2.2 Introduction to Sri Lanka

Sri Lanka is an island nation located in the Indian ocean with a total landmass of 65,610 km^2. The country is characterized by a tropical climate. It gained independence from British colonial rule in 1948, and the present political system is a parliamentary democracy. The country has nine provinces and 25 administrative districts. Each province consists of two to three administrative districts (Figure 2-1).

Historically, Sri Lanka has made good progress in many aspects of social, political and economic development. According to the Central Bank of Sri Lanka (2018), the country has a total population of 21.7 million people. It has a labor force of 8.4 million with a relatively low unemployment rate (4.3%). Sri Lanka ranked as an upper-middle-income country and has an average annual per-capita income of US$ 4,102 (World Bank, 2019). The value of its Gross Domestic Product is estimated at US$ 88.9 billion. The three main economic sectors include service, industry, and agriculture with gross value added equal to 57.7%, 26.1% and 7% of the country's Gross Domestic Product (GDP). Sri Lanka's poverty level has declined over the years, and, in 2014, its poverty headcount index was 4.1. Sri Lanka ranked at 76th place according to the human development index (UNDP, 2018). Sri Lanka ranked 99th place in the World Bank's Ease of Doing Business Report for 2015. The same report reiterates the need to remove arbitrary political interventions in the market and uphold the rule of law to ensure an improved business environment in the country. Sri Lanka topped the region in terms of the fastest expansion of urban areas (World Bank, 2015).

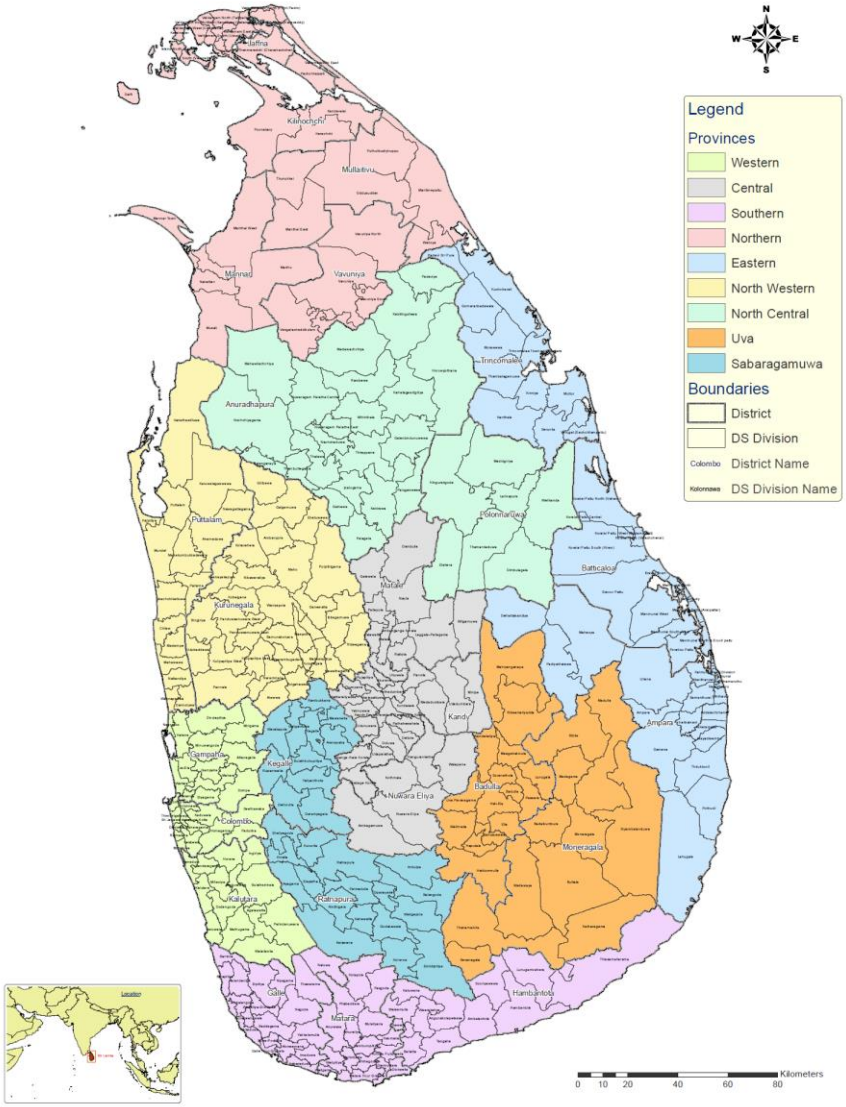

Figure 2-1: Provinces, districts and divisional secretariat divisions in Sri Lanka

Source: Department of Census and Statistics, 2013

2.3 Political Environment

Sri Lanka gained independence from British colonial rule in 1948. Sri Lanka had undergone a reasonably smooth transition to parliamentary democracy through a step-by-step transition from a colonial system through a succession of constitutional reforms. The population had enjoyed universal suffrage since 1931. The country is being alternatively governed by two main political parties; the more conservative United National Party (UNP) and left oriented Sri Lanka Freedom Party (SLFP). Respect for legal institutions and independence of judiciary system was well established. The present constitution was promulgated in 1978 as the third post-independence constitution of the country, which was amended in 19 consecutive occasions by 2015. The present

constitution of the country came into effect in 1978 as the third post-independence constitution and was amended 19 times by 2018. Its 13th amendment, in 1987, made a significant change in the country's governance structure by devolving power to the provincial councils. Sri Lanka experienced a three-decade long ethnic conflict which was ended in 2009. This ethnic conflict has severely undermined the economic progress of the country.

2.4 Sri Lanka Agriculture Sector

Despite the fact that its contribution remains 7% to the GDP, Sri Lanka's agriculture sector still plays a vital role in ensuring the food security, employment, and export (Central Bank of Sri Lanka, 2018). In 2018, the agriculture sector employed 25.5% of the country's labor force (Central Bank of Sri Lanka, 2018). The International Labour Organisation (2008) reports that approximately more than 80% of Sri Lanka's population lives in rural areas and the agricultural sector provides a significant source of employment for the country's rural labor. The share of informal and subsistence employment in the agricultural sector is among the highest across all sectors in Sri Lanka, estimated to be approximately 85 per cent in 2008 (International Labour Organisation, 2008).

Of the total land mass in the country, 2 million hectares consist of agricultural land, of which 1.38 million hectares are owned by the state and cultivated by private farmers under different tenure conditions. Only 0.88 million hectares of agricultural lands are held under private ownership, and they are mostly concentrated in the wet zone of the country. The remaining 4.4 million hectares are occupied by urban, forest and reservation land uses (World Bank, 2007).

2.5 Farming Structure of the Country

The focus on crop agriculture is one of the salient features of the Sri Lankan agriculture sector and livestock component of the agriculture, unlike in other countries where it has often been addressed as a separate commodity/subject. Crop and livestock agriculture come under two separate Ministries, being the Ministry of Agriculture and Agrarian Services and the Ministry of Livestock and Rural Community Development (Government of Sri Lanka, 2016).

Almost 75% of the agricultural land is under smallholdings and the balance under estates. The number of smallholdings is estimated at 1.8 million, of which 90% are less than 2 hectares in extent. About 70% of the smallholdings are solely devoted to crop production, while the remainder has a mixture of crop and livestock and, in a few cases, are solely livestock (Department of Census and Statistics, 2014).

The two main sectors of crop agriculture include plantation and non-plantation crops. Plantation agriculture consists of tea, rubber, and coconut (three main export crops in the country) in large scale estates (land parcels consist of more than 50 hectares) and in smallholdings. They are mainly grown in the country's wet zones and intermediate zones, covering around 0.8 million hectares. Apart from these main plantation crops, spice crops such as cinnamon, pepper, clove, cardamom, beverage crops such as coffee, cocoa and sugarcane, and cashew, are also grouped into the plantation crops, and they cover around 75,000 hectares. Plantation crops are grown mainly for the export market, and the sector plays a dominant role in earning foreign exchange (Central Bank Annual Report, 2018). The contribution of plantation and other export crops to Sri Lanka's GDP is given in Table 2-1.

The non-plantation domestic agriculture sector covers around 0.9 million hectares of land mostly consisting of smallholdings averaging 0.5 hectares. Of the none-plantation crops, rice plays a dominant role. Rice is the staple food crop in the country and is grown in an area of 0.75 million hectares of lowlands. Other field crops such as maize, chilly, green gram, black gram, cowpea, groundnut, and vegetables are grown in uplands. Except for a small number of orchards, around 35 fruits and 40 vegetable crops are grown all over the country in small scale units (the majority are less than 0.5 hectares) which belong to the horticulture subcategory (Department of Census and Statistics, 2014; Department of Agriculture, 2013).

The contribution of the crop component, compared to the livestock and fisheries components of the agriculture sector, is shown in Table 2-1. The food crops comprising rice and other field crops (grains, pulses, and vegetables) have accounted for the largest share of agriculture GDP and are far above the collective contribution made by livestock and fisheries sub-sectors (Central Bank of Sri Lanka, 2018)

Animal production contributes just 0.6% to the GDP (Table 2-1), but it is an integral part of the rural economy providing draught power, manure, milk, and transport. The dairy sector is considered an important sub-sector of the livestock industry because of its potential influence on the rural economy (John & Tissa, 2009).

Table 2-1: GDP contribution of agriculture and its subsectors

Sector	2011	2012	2013	2014	2015	2016	2017	2018
	% of GDP							
Agriculture, forestry and fishing	11.2	11.1	10.8	10.1	7.8	7.1	6.9	7.0
Cereals	-	-	-	-	0.2	0.1	0.1	0.1
Rice	1.5	1.5	1.6	1.2	0.9	0.6	0.5	0.7
Vegetables	-	-	-	-	0.7	0.6	0.6	0.6
Sugar cane, tobacco and other non-perennial crops	-	-	-	-	0.0	0.0	0.0	0.0
Fruits	-	-	-	-	0.6	0.5	0.5	0.6
Oleaginous fruits (coconut, king coconut, oil palm	1.0	1.0	0.8	0.8	0.8	0.7	0.6	0.6
Tea	1.0	0.9	0.9	0.9	0.8	0.7	0.7	0.7
Other beverage crops (coffee, cocoa, etc.	-	-	-	-	0.0	0.0	0.0	0.0
Spices, aromatic, drug and pharmaceutical crops	0.4	0.4	0.4	0.3	0.7	0.7	0.7	0.7
Rubber	0.2	0.2	0.2	0.1	0.3	0.3	0.3	0.2
Other perennial crops					0.2	0.2	0.2	0.2
Animal production	0.8	0.8	0.8	0.8	0.6	0.6	0.6	0.6
Plant propagation and support activities to agriculture	-	-	-	-	0.1	0.1	0.1	0.1
Forestry and logging	0.6	0.6	0.6	0.5	0.6	0.6	0.7	0.6
Fishing	1.3	1.3	1.3	1.3	1.4	1.3	1.3	1.2

Source: Central Bank Annual Report (Various years)

Note: Empty cells in the Table are due to the changes in the sectoral composition in the national income accounts. Since 2015 the Central Bank explicitly identified national incomes of some of the agricultural subsectors which were considered as aggregates before. This made an inconsistency in sectoral composition before and after 2015, leading to inconsistency in annual data pertaining to each sector before and after the change.

In 1970, the domestic milk production covered 80% of the domestic milk demand but the introduction of liberal market policies and growing demand, resulted in a sharp increase in imports of Full Cream Milk Powder (FCMP). By 2009, domestic milk production satisfied just 20% of the local demand. John and Tissa (2009) also report that the large quantities of imported dairy products, valued over LKR 32 billion (USD 294 million) in 2008, represented about 2.1% of Sri Lanka's imports in the year. According to Perera and Jayasuriya (2008) the dairy sector is predominantly based on smallholders keeping 2-5 cows in most of the agro-ecological regions except for the dry zone. In the dry zone, the herds tend to be large, although the animals are mostly of the indigenous types with low milk yields. The estimated annual milk production in the country is 350 million liters and is produced in all the districts. The districts with landmasses of significant milk production are Kurunegala, Badulla, Anuradhapura, and Nuwara-Eliya.

2.6 Agricultural Policies in Sri Lanka

Agricultural policies in Sri Lanka can be distinguishable between two distinct periods; pre-and post-independence. The following section introduces the respective policy interventions made in each period.

2.6.1 Pre-independence Agricultural Policies in Sri Lanka (Period before 1948)

Pre-independent policies implemented in Sri Lanka basically aimed at governing the land resource. Among pre-independent policies, The Crown Lands (Encroachment) Ordinance (1840) brought significant changes to the land ownership. It ejected people from the possession of crown lands without probable claim or presence of title provided that possession did not extend to 30 years (Farmer, 1957). Some (Chandrapala, 1986; Henegedara, 2002) argue that this ordinance caused many people in the mid and up-country landless and put pressure for population transfer and establishment of new settlements in the dry zone. The ordinance in 1840 was later supplemented by the Waste Land Ordinance No. 1 in 1897 by appointing an empowered settlement officer to declare crown lands.

In 1935, The Land Development Ordinance came into effect. It paved the way for government-assisted land alienation programmes. Land Commissioner's Department was established to supervise and control the alienation and use of crown land. It gave the provision for allocating crown lands among different classes of people and for different uses providing user rights. Operation of this ordinance was reinforced by Irrigation Ordinance of 1946 enacted to provide irrigation water to settlements established under the Land Development Ordinance.

2.6.2 Post-Independence Agricultural Policies in Sri Lanka

Henegedara (2002) identifies three distinctive periods with regard to policy interventions in post-independence Sri Lanka. First period (1948 -1970) characterized by mixed; open and closed economic policies (Athukorala, 1986; Rajapatirana, 1988). Agricultural policies in this period basically aimed at expanding agricultural production and ensuring tenure security. Accordingly, the agricultural policies brought in this period aimed at;

1. Increasing extent under rice through expanding irrigation facilities.
2. Increasing agricultural production and productivity by research and development.
3. Developing farmer institutions like cultivation committees and credit institutions
4. Addressing land use land and land tenure issues
5. Providing input subsidies and credit facilities (Chandrapala, 1986).

The second period (1970-1977) was a more protectionist regime. Most of the first period policies were continued with greater emphasis on farm support services like credit, marketing and crop insurance (Henegedara, 2002). Rural banks, Paddy (rice) Marketing Board (PMB) and Crop Insurance Board (CIB) were established during this period. It has been a period characterised by restricted imports of food and agricultural inputs (Gunawardena & Somaratne, 2000). Aimed at gaining self-sufficiency, then ruling government adopted a quota system, rationing and permits as the main instruments to control the domestic economy while regulating trade and distribution of rice as a major agricultural commodity. A number of significant land reform policies were also introduced in this period by acquiring large scale tea, rubber and coconut estates managed and owned by plantation companies and imposed a ceiling on land ownership (Gunawardena & Somaratne, 2000).

The third is post-1977 period, in which Sri Lanka embarked more liberal economic policies than before. In this period, the economy was transformed from a close structure to an open economic system. It was a major policy shift of liberalising of pricing, trade, monetary, fiscal and institutional policies in the country. Several structural adjustment programmes were implemented during the time (Athukorala & Jayasuriya, 1994; Gunawardena & Somaratne, 2000; Henegedara, 2002). Concurrently to the introduction of liberal economic policies, agricultural policies were reformed to achieve four major objectives;

1. to achieve self-sufficiency in basic foods (rice, milk, sugar and pulsus)
2. to expand agricultural exports to support the balance of payments situation
3. to generate employment and to increase income of rural sector
4. to improve the nutritional status of people (Gunawardena & Somaratne, 2000).

2.7 Importance of the Rice Sector

Rice is the main staple food crop and the most important single food item in the Sri Lankan diet. It comprises approximately 40% of Sri Lanka's crop production (Korale Gedara et al., 2016). Sri Lanka is almost self-sufficient in rice (Food and Agriculture Organization, 2018). The contribution of the rice sector to the Sri Lankan economy accounts for 0.7 % of the GDP which was slightly declined from 0.9 in 2015 (Central Banka of Sri Lanka, 2018). Rice occupies 34% of the total agricultural land area in the country. It is dominated by smallholders who own mostly less than 0.4ha of land, contributing to about 70% of the total paddy production (De Silva, Weatherhead, Knox, & Rodriguez-Diaz, 2007). Rice, itself provides direct employment to about 1.8 million farmers (Weerahewa, Kodithuwakku, & Ariyawardana, 2010). Farmers cultivate under various tenure arrangements,

mostly including long-term and short-term leases. Rice is grown under irrigated and rain-fed conditions. The marketable surplus is around 90% of the harvest, and the national average yield was estimated at 4,542 kg/ha. Rice production and the yield have increased over the years reaching an almost self-sufficient level of production since 2005 (Department of Census and Statistics, 2020)

Annual per-capita consumption of 110 kg of rice contributes to 45% of the daily calories and 40% of the daily protein requirement of an average Sri Lankan. It is recorded as the highest nutritional contribution from a single food commodity in the Sri Lankan diet. The total annual consumption requirement of rice is 5.12 million metric tons (Department of Census and Statistics, 2020). Apart from that, the rice marketing system creates substantial direct employment to both rural and urban populations engaging in secondary activities associated with rice processing and marketing.

The rice market is also characterized by inefficiencies due to a high concentration of small-scale farmers and market power associated with some marketing channel members, such as large-scale millers and intermediaries (Korale Gedara, Ratnasiri, & Bandara, 2016).

2.7.1 Rice Producing Regions

Rice is grown in almost all parts of the country. However, a large part of the production arises mainly from the dry and intermediate zones. Production is organised under two main cropping seasons; *Yala* (March-August) and *Maha* (September-February) based on the bimodal rainfall pattern. During the *Maha* season, the country receives low, but widely spread precipitation from northeast monsoons covering most parts of the country. The *Yala* season is associated with southwest monsoons and rainfall occurring during these monsoons is confined to the southwest part of the island. According to the Department of Census and Statistics (2019), 63% of the country's annual rice production arises in the *Maha* season, whereas, 37% comes in the *Yala* season. Eastern, north-central and north-western are respectively first, second and third highest rice-producing provinces in the country (Figure 2-2). It is grown both under irrigated and rainfed conditions. In particular, in the *Yala* season, the rice is grown in the dry zone under irrigation using the water supplied from large and medium scale reservoirs.

As shown in Figure 2-2, the study province (north-central province) contributes respectively 20% and 19% of the country's rice production respectively in *Yala* and *Maha* seasons. North-central province has developed irrigation infrastructure facilities to provide water for rice production during both seasons.

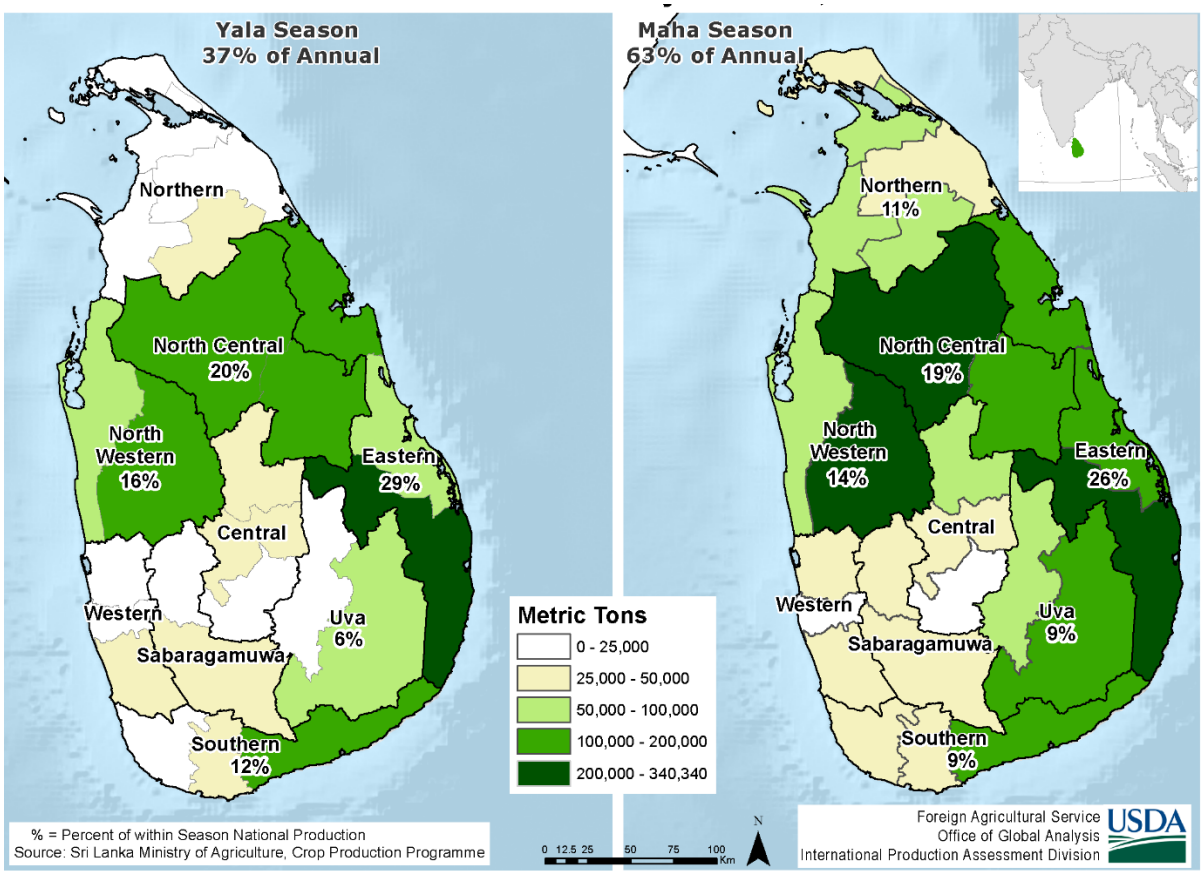

Figure 2-2: Sri Lanka rice production by province (2015/2016)
Source: https://ipad.fas.usda.gov/rssiws/al/crop_production_maps/sasia/SriLanka_Rice.png

2.7.2 Rice Production and Trade

As shown in Figure 2-3, the county's rice production continued to rise from 1999 to 2013. Production dropped drastically during the period from 2013 to 2017 due to severe drought, which had prevailed in the country. Subsequent to the favorable weather conditions, the country's rice production has started to grow since 2017, recovering from the adverse production drop from previous years. The country recorded its ever-highest rice production in 2013. Rice yield, on the other hand, has been increasing over the period from 1999 to 2018. Continuous growth in rice yield has resulted from the growth of technology such as application of inorganic fertiliser, use of improved high yielding seed varieties and agrochemicals (Davis, Gephart, & Gunda, 2016; Dhanapala, 2007; Weerakoon et al., 2011).

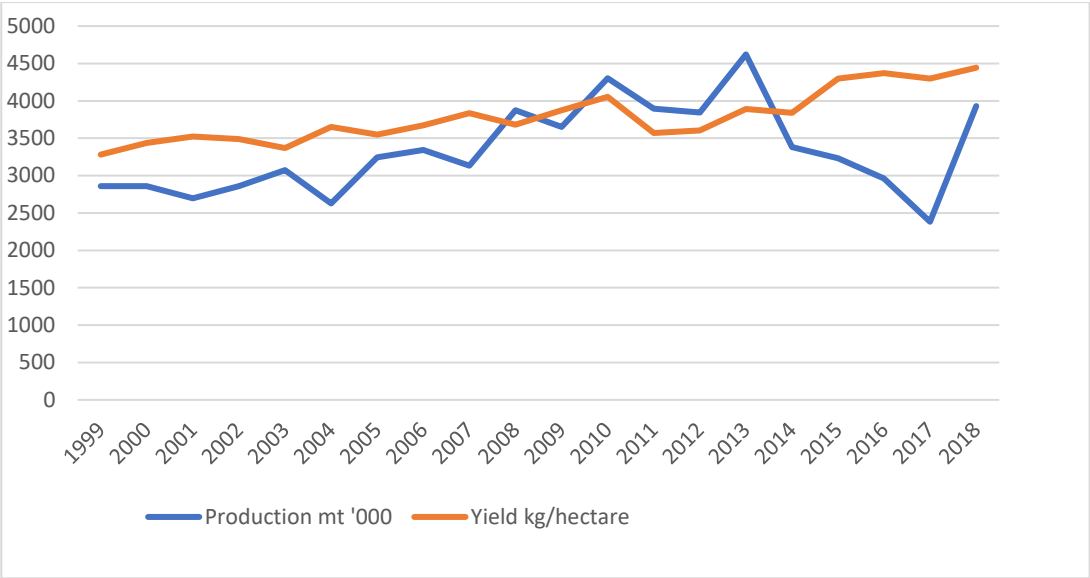

Figure 2-3: Rice production and yield in Sri Lanka
Source: FAOSTAT (http://www.fao.org/faostat/en/#search/rice)

Figure 2-4 shows the import and export of rice. As shown in the figure, Sri Lanka imported less than 100 metric tons of rice in general since the year 2000. Rice imports drastically increased in 2014, 2015 and 2017. To meet the consumption demand, more rice was imported during the period concerned. Rice export, on the other hand, continued to remain at a very low level over the period from 1999 to 2018 except 2013 in which Sri Lanka recorded ever highest rice production. More rice was exported in 2013 subsequent to the rise of surplus production. Low export of rice has been a result of high domestic consumption, lack of surplus production and the high cost of production (Tobias, 2012).

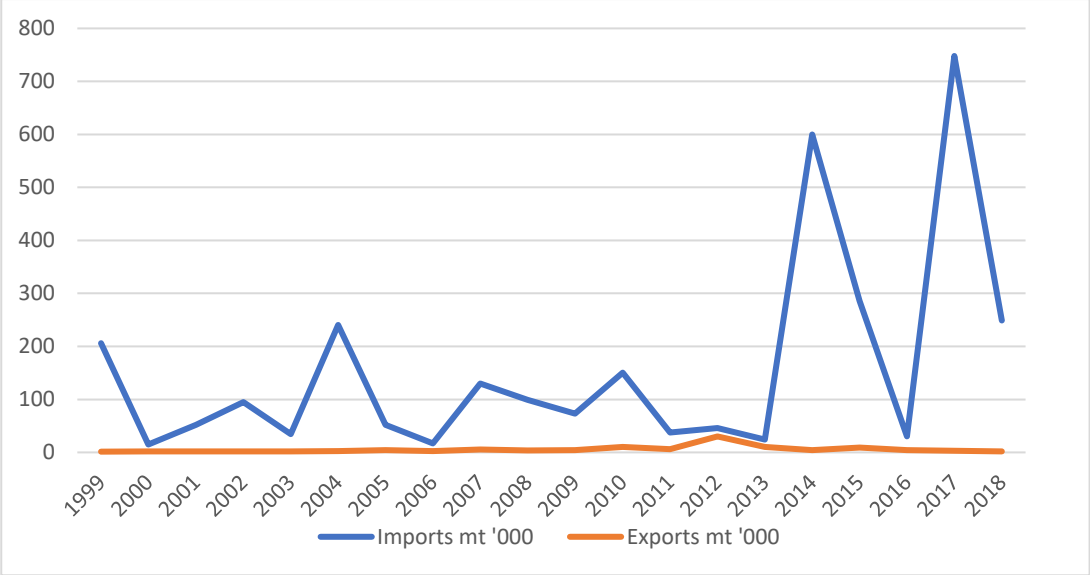

Figure 2-4: Import and export of rice
Source: (http://www.fao.org/faostat/en/#data/TM)

2.7.3 Policy in the Rice Sector

Rice sector policies primarily aimed at increasing rice production and upgrading the livelihoods of rice farmers. The country's achievement in self-sufficient rice production has been greatly influenced by the rice sector policies. Table 2-2 summarises the rice sector policies introduced by the pre-independent governments. Pe-independent policies were also directed towards increasing rice production and developing farmers' livelihoods. As shown in Table 2-2, various land settlement and irrigation infrastructure development programmes were implemented at that time to increase rice production. To ensure equitable distribution, a rice rationing programme was introduced during this period.

Table 2-2: Pre-independent policies in the rice sector

Period and ideology	Intervention
Pre-independence regime (before 1948)	• Development of irrigation infrastructure and establishment of land settlement to promote production of paddy/rice and other crops • Introduction of universal rice rationing system (RSS) to guarantee an equitable distribution of available food resources during World War II. • Introduction of internal purchase system (IPS). It made compulsory for every farmer to sell two bushels of rice in the *Maha* and one bushel in the *Yala* seasons. • Setting up of co-operative agricultural production and sales societies

Commercialisation of rice production was also promoted by making compulsory to sale part of farmers' rice harvest. Moreover, organisations such as co-operatives were also promoted to serve rice farmers and develop their livelihood. Information presented in Table 2-2 suggests that pre-independent governments also had used co-operatives as a strategy to develop rice sector.

Table 2-3 summarises the post-independent policies in the rice sector under different time periods and ideology. As shown in Table 2-3, some of the policies are extensions of the pre-independent period. Every government under various post-independent regimes have supported the rice sector in numerous ways (Dayaratna-Banda, Jayawickrama, & Ranathilaka, 2008).

During the mixed regime (1948-1970) policies were mainly targeted at increasing rice production. Introduction of research and development programmes (introduction of high-yielding varieties), expansion of the extent under rice through the development of irrigation infrastructure and land settlements, provision of input subsidies such as fertiliser, and development of institutions (tenure policies) have been the main areas of trust in policy instituted in this period (Imbulana, Wijesekera, & Neupane, 2006). Revision of land tenure policies has been a significant policy intervention during 1948-1970 to provide farmer more rights in using and controlling their lands.

Protectionist regime (1970-1977) predominantly characterized by strengthening various institutions and organisations to serve rice farmers and the introduction of trade restrictions to protect rice farmers. The government recognised the importance of various forms of collective action organisations in fostering the rice sector's growth in particular. As identified in Table 2-3, farmer organisations, and co-operatives have been promoted by the government to service rice producers. In particular, government policy has recognised the importance of co-operatives in the socio-economic development of farming communities. Co-operatives have been empowered by the government, providing financial support to build their resources, enabling them to expand their services during this period. The government also supported both output and input markets by establishing government owned marketing board and agrarian service centers respectively to market rice and provide inputs and services to farmers. Access to credit was also increased by promoting rural banks during this period. Involvement of farmers in managing irrigation water was also promoted through establishing farmer organisations.

Table 2-3: Post-independent policies in the rice sector

Period and ideology	Intervention
1948-1970 Mixed regime (open and closed economic policies)	• Promotion of co-operative societies by providing long-term financial support to build storage houses and rice mills • Establishment of cultivation committees and rural banks • Revision of land tenure policies • Implementation of accelerated food production programme to substitute imports • Expansion of paddy/rice lands cultivated by the development of irrigation infrastructure • Promotion of research and technology to increase productivity • IPS was replaced by a scheme of Marketing of Home-Grown Foods • Implementation of guaranteed price scheme (GPS) • Provision of subsidised production inputs
1970-1977 Protectionist regime	• 1948-1970 policies continued • Provision of farm support services such as credit, marketing, and crop insurance gave greater emphasis. • Establishment of Paddy Marketing Board (PMB) • Establishment of Agrarian Service Centers as the state's institute of delivering services such as extension and credit • Establishment of rural bank and crop insurance board • Imposed restrictions on imports of food and agricultural inputs • Establishment of farmer organisations to promote irrigation water management • Responsibilities were entrusted on co-operatives in the field of agricultural production and marketing
1977-1988 The first wave of liberalisation	• Allowed the private sector to get involved in paddy/rice marketing
1989-1993 The second wave of liberalisation	• Reduced tariff on imports and distortions were corrected for agricultural commodities including rice
1994 to date Current policy regime	• Promotion of commercialisation of farming activities through farmer organisations • Control of rice imports • Dissolution of PMB • Establishment of Sri Lanka Agricultural Products Marketing Authority • Re-establishment of PMB

Source (Athukorala & Jayasuriya, 1994; Dayaratna-Banda et al., 2008; Henegedara, 2002; Jayaweera, 1998; Weerahewa et al., 2010).

First and the second wave of liberalisation (1977-1993) characterized by gradual removal of government control in the rice industry while promoting private sector involvement in rice

marketing and supplying inputs and services. The period after 1994 trade restrictions were removed gradually allowing import of rice. Commercialisation was promoted through farmer organisations.

Establishment of Paddy Marketing Board (PMB) in 1971 was a significant government intervention in the paddy rice market. The PMB was expected to involve in purchasing, and milling of paddy rice and supplying of processed rice. It maintained a monopoly in the paddy rice market and was responsible for purchasing of total paddy rice production of the country. However, in 1978, the PMB act was amended and allowed private sector to involve in marketing paddy rice based on competition. As a result of the intense competition, government's share of the market declined. By 1990 the Paddy Marketing Board became inactive and was dissolved in 2000 (Wijesooriya, Champika, Priyadharshana, & Vidanapathirana, 2017).

Following the abolition of PMB, Agricultural Products Marketing Authority was established in 2006. This was also not been successful. Then in 2005, the PMB was re-established. However, the purchasing programme of PMB was also not been effective. Consequently, farmers were compelled to sell paddy rice in the open market prices which were much lower than the guaranteed price. For instance, while the guaranteed price of paddy rice were Rs.50 a kg for short grain rice and Rs.45 for long grain rice, the open market price of respective grain types of paddy rice were Rs. 34.29 and 27.61 per kg in 2015 according to S. Senanayake and Premaratne (2016). However, the government made it compulsory for the co-operatives to buy paddy rice at the guaranteed price and hence the farmers were benefited selling to co-operatives rather than selling at open market.

2.7.4 Sri Lanka's Rice Value Chain

Main value-adding activities of the country's rice value chain include; input supply, production, marketing, processing, wholesaling, retailing and consumption as illustrated in Figure 2.5. Different types of actors or businesses are involved in the rice value chain activities. The types of actors include individuals, proprietors, collective enterprises, corporations, and state enterprises. A summary of the main value chain activities and the actors involved at each activity level is provided in Table 2-4.

Table 2-4: Rice value chain activities and actors

Value-adding activities	Activity description	Actors involved
Input supply	Supply of production inputs and services (fertiliser, herbicide, pesticide, seed, farm machinery, irrigation water, extension services, and credit.	Private traders, state organisations (Irrigation Department (ID), Department of Agriculture (DOA), and Department of Agrarian Services (DAS)), corporations, Multipurpose Co-operative Societies (MPCSs), Commercial banks and Farmer Organisations
Production	Growing of rice and management of all production operations	Smallholders (1.8 million), MPCSs, Farmer Companies (FCs),
Assembling and marketing of paddy rice	Purchasing of different varieties of paddy rice and storing	Village collectors, mobile collectors, private millers, MPCSs, Paddy Marketing Board (PMB)
Processing	Processing of paddy rice into consumer rice and packaging of rice	Private large and medium scale rice millers, PMB, MPCSs, Co-operative Wholesale Establishment (CWE)
Wholesaling	Trading of large quantities of consumer rice	Private rice millers, private rice wholesalers, CWE, MPCS
Retailing	Selling of small quantities of consumer rice directly to ultimate consumers	Private rural and urban retailers, MPCS's retail outlets, CWE's retail outlets, supermarkets
Consumption	Purchasing of consumer rice in large or small quantities of loose rice or rice bags	General consumers (rural and urban), institutes (hospitals, security forces, prisons), hotels and restaurants

Source: (Aheeyar, Henegedera, & Rupasena, 2005; Hilal, Ismail, & Mohamed Mubarak, 2013; Korale Gedara et al., 2016; Liyanapathirana, 2006; S. Senanayake & Premaratne, 2016)

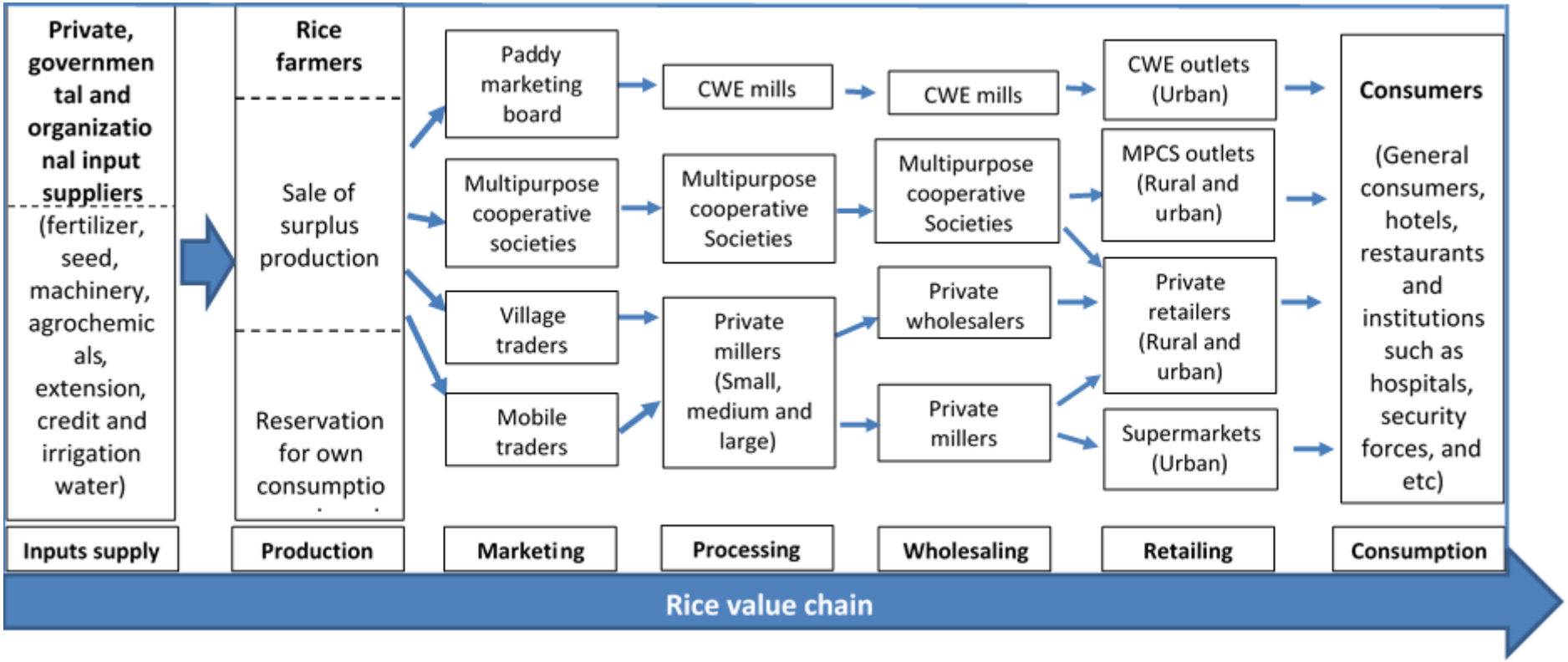

Figure 2-5: Sri Lanka's rice value chain

Source; adopted from Korale Gedara, Ratnasiri, & Bandara, 2016; Senanayake & Premaratne, 2016.

Abbreviations: CWE – Co-operative Wholesale Establishment, MPCS – Multipurpose Co-operative Societies

As shown in Table 2-4, various production inputs are supplied by different actors at the input supply level. Mainly, private traders, MPCS, farmer organisations, government organisations (DAS, DOA, and ID), corporations and commercial banks are involved in this stage. All production inputs, including fertiliser, agrochemicals, seeds, farm machinery, and credit and other financial services are provided to farmers. In this activity level, private traders play a dominant role. However, credit and other financial services are dominantly supplied by private and government banks, DAS, and various other societies, including MPCS, farmer organisations and other community societies (S. Senanayake & Premaratne, 2016). Irrigation and extension services are fully subsidised and provided respectively by the ID and DOA.

Rice production is organised under smallholdings. There are 1.8 million smallholders rice growers and constitute the largest group of actors in the rice value chain after the consumers (Weerahewa et al., 2010). Most popular rice varieties grown by the farmers are in the 3-3 ½ month age group. Commonly grown varieties include; Bg 94-1, Bg 300, Bg 352, Bg 358, Bg 359 and At 362 (Wang, Velarde, Walisinghe, Herath, & Rajapaksa, 2012). Farmers sell their surplus paddy rice in moist, dry, or in both forms, depending on the price and availability of drying facilities. Some of the farmers also store their rice to sell later, expecting a higher price.

Paddy rice marketing is performed by village traders, mobile traders, large scale and small-scale private millers, MPCS, and the PMB (S. Senanayake & Premaratne, 2016). Private traders and millers buy either moist or dry paddy rice at farms and transport in their fleets of trucks to their warehouses. Alternatively, farmers themselves transport their paddy rice to traders' warehouses. They also dry moist rice if they bought rice in that form. Other buyers, such as MPCS and the PMB buy only dry paddy rice containing 14% or less moisture. Traders/collectors transport paddy rice directly to mills (processing) or own warehouses using their fleets of vehicles.

Processing is done by the rice millers. Around 75% of the rice mills are medium and large-scale proprietors. Other mill owners include MPCS, CWE, and small-scale private millers and agribusiness corporations (Hilal et al., 2013; S. Senanayake & Premaratne, 2016). Millers process raw or parboiled rice or both. Processing includes; parboiling (if produce parboiled rice), milling (de-husking of paddy rice), polishing, de-stoning, packaging, and labelling. Going further step in the value chain, some processors produce rice flour (Korale Gedara et al., 2016).

Wholesalers sell large quantities of rice to institutional consumers, supermarkets and retailers. Private wholesalers, millers, CWE and MPCS are involved in rice wholesaling. Wholesaling is also predominately handled by the private wholesalers. They usually visit mills in producing regions, buy rice from the mills, and transport to retailers. Alternatively, millers also transport their rice in large quantities to wholesalers, institutional consumers and supermarkets in consumption areas (S. Senanayake & Premaratne, 2016).

Retailers sell rice in small quantities directly to the consumers. Retailers consist of CWE's retail outlets, supermarkets, MPCS's retail outlets, and private retailers. The majority of the retailers are private retailers, and they account for about 70% of the retailers. The other 30% constitutes all other retailers (S. Senanayake & Premaratne, 2016).

Despite there are different types of businesses, (private, government, corporations, co-operatives and farmer associations) are involved in the rice market, private sector plays the dominant role in each stage of the rice value chain (Riswan & Geretharan, 2021). Price determination is mainly handled by the private traders in the rice marketing channel, and it is mostly below the guaranteed price. Dominance of private sector in the rice value chain has been a result of their efficiency over other types of businesses. The effectiveness of farmer companies, co-operative societies, and CWE in the realization of guaranteed price remain at a low level because of less capability in handling market risks (Prasanna, 2019). On the other hand, private traders purchase both moist and dry paddy rice provide their own transport. Whereas, co-operatives, PMB and CWE purchase only dried paddy rice and the farmer needs to transport their paddy rice to purchasing point. Thus, co-operatives, PMB, and CWE do not provide drying facilities to farmers which involves significant handling and operational cost. Therefore, private traders are more attractive to farmers due to their relatively flexible terms of trade, price, and transport services. This has resulted a significant side selling by the members of co-operatives as well.

2.8 Collective Action in Sri Lanka

Sri Lanka has promoted various forms of collective action covering various sub-sectors of the economy, including agriculture, to stimulate economic growth. Collective actions in Sri Lanka have a long history (Wijayaratna, 1997). Among the promoted collective actions, co-operatives have been the prominent one that gained significant attention of the policymakers, international donner organisations, and practitioners. In Sri Lanka, co-operatives began in 1906 with the formation of a credit society; later known as thrift and credit co-operatives (TCCS) and a law was laid down by

introducing the Ordinance to provide for the Constitution and Control of Co-operative Societies (No 7 of 1911) to provide the basic rules for the sector. The TCCSs expected to solve the problem of rural credit and to assist progressive farmers in rising agricultural production.

The TCCS grew in significant numbers following their establishment. There have been 600 TCCSs by 1930s in the country with a membership of 240,000 (Birchall & Simmons, 2010). By 1964 there have been 4026 TCCSs (Hulme & Montgomery, 1994). These TCCSs collected savings from members and lent them to other members for commercial purposes and also for consumption. Rice farmers were significantly benefitted from TCCSs through quick and easy access to credit. However, in the mid-1960s the TCCSs began to encounter difficulties as state-supported multi-purpose co-operative societies (MPCS) grew in importance. The TCCSs dropped in number to around 1,300 by 1978 and faced dwindling numbers of members and the likelihood of closure when the existing leadership retired and was not replaced.

To service consumers, Sri Lanka established consumer co-operative societies during the Second World War. The government established consumer co-operatives to face food shortage and distribution problems experienced during the World War II. By 1945 there were over 4,000 consumer co-operatives with a membership of over a million people. More than half of the population were being fed through consumer co-operatives (Jayaweera, 1995). These co-operatives distributed food and other grocery items to consumers.

In 1947, the formation of agricultural production and sales societies (APSS) was begun. The APSSs was formed in many sub-sectors in agriculture, including dairy, small scale plantation crops, rice and other grains, fishery and so forth. Smallholders in the export sectors (rubber, coconut and tea) formed co-operatives for supplying inputs, marketing and processing export agricultural products. Dairy co-operatives were formed on a small scale to sell milk to the National Milk Board. Fishery co-operatives were formed to marketing and processing of fish. There have been 995 APSSs by 1956 which gained a predominant position. By mid-1950s there were 75 different types of single-purpose co-operatives in the country. However, they were small and often not viable, with one village having seven or eight different types (Rajaguru, 1996).

Cultivation committees are another form of collective action that can be seen in Sri Lanka's agriculture sector. They were introduced in 1958 by the Paddy Lands Act. Cultivation committees consisted of farmers in a particular geographical region. They were given the responsibility of operation and maintenance of minor irrigation systems in the country. Provision of irrigation water to rice cultivation especially in minor irrigation schemes came under the cultivation committees. In addition to that, those committees were allowed to run collective farms. In 1972, Agricultural Productivity Committees (APC) were established by the Agricultural Productivity Law as an apex organisation of cultivation committees. The responsibility of the APC was to oversee the functions of cultivation committees. APC has the authority over a particular geographical region determined by the minister of agriculture and included several cultivation committees.

Cultivation committees later replaced by the farmer organisations (FOs) and another variant of collective action emerged. FOs are supported the collective actions of farmers (Uphoff & Wijayaratna, 2000). Some of these organisations emerged as pressure groups and involved in managing water distribution, supplying inputs and sale of production in a limited scale. However, many of these farmer organisations failed to uplift small farmer social and economic wellbeing through profitable economic ventures. FOs were seen as a device for collective operations rather than an economic organisation (Wijayaratna, 1997).

The latest form of collective action in Sri Lanka agriculture sector is farmer companies. They were introduced following the failure of existing collective action forms to effectively improve the farmer economic situation. They were established in 1995 on pilot scale following the recommendations of Sri Lanka's National Development Council. Farmer companies are owned and patronised by smallholder farmers (Esham & Usami, 2007). Farmer companies are expected to coordinate smallholder's marketing activities. According to Tennakoon (1998), farmer companies have been developed as a result of issues related to governance, management and incentive problems in other collective action forms operating in the agriculture sector. Farmer companies were set up in different parts of the country, mostly in the irrigation schemes. By 2008, there have been 92 registered farmer companies in Sri Lanka (Rosairo, 2010).

2.8.1 Multipurpose Co-operatives

In parallel to land reform policies undertook during 1960s and 1970s, the government consolidated the then existed different kinds of co-operatives. Accordingly, TCCS, consumer co-operative societies, APSS, and industrial co-operatives were merged, and a nationwide network of Multipurpose Co-operative Societies (MPCS) was established (M. Singh, 1970). This merge of co-operatives with different purposes united a large membership under one umbrella organisation with a broader business scope. These MPCSs adopted an open membership policy and purchasing of at least one share is the minimum requirement to become a member. New members also entitle to enjoy comparable benefits to that of old members upon becoming a member.

Subsequent to the initial establishment, most of the MPCSs used their equity capital to expand the business. The MPCSs retain a portion of their earnings for the future investment in addition to the member share. However, the member share of these co-operatives is small (LKR 10 which is equal to about USD 0.05) and this amount has not been sufficient to undertake necessary investment. Understanding this, the government provided various supports for their development following the establishment. For example, for most of the MPCSs, government sponsored for constructing warehouses, installing of rice milling machines, procuring transportation trucks and so forth. Moreover, the government supported MPCSs to develop their human resource. In order to train and develop human resources of co-operative workers, government established a co-operative training school as well. Moreover, though not regular, the government assisted these co-operatives with operating capital to overcome some of the temporary cash flow problems faced by them (Jayaweera, 1998). It is clear from above discussion that the performance of these co-operatives has been influenced by the government support.

The MPCSs have a broader business scope and expected to serve both producers and consumers. Because of the merger of various co-operatives, there has been a large membership in MPCSs. They were supposed to provide almost all the services with a general person in society needs from birth to death. Apart from agricultural inputs, MPCSs have provided grocery goods, health care services, distribution of fuel, and construction materials. Accordingly, MPCSs have undertaken the functions of retailers, wholesalers and marketing agents (Jayaweera, 1993). The MPCSs involved in providing various government subsidy programmes. For example, they were involved in providing rice rations to the public and supplying subsidised credits to small farmers under the New Agricultural Credit Scheme (NACS) and later the Comprehensive Rural Credit Scheme (CRCS). The government also have

implemented its rice purchasing programmes via MPCSs. The government also has implemented a fertiliser subsidy programme through MPCSs. In particular MPCSs distributed subsidised fertiliser to rice farmers.

Subsequent to the establishment of MPCSs, the provision of the needs of rice farmers came under the purview of MPCSs. Since their establishment, MPCSs located in rice-growing areas have provided various services to rice farmers. The MPCS have provided credit and other financial needs of their members. Rice farmers also fulfilled their credit and other financial needs through MPCS. Supply of fertiliser, seeds, agro chemicals, extension, and farm machineries were also undertaken by the PMCSs. Rice farmers also obtained their production inputs from MPCSs. Some of the MPCSs have incorporated most of the activities of the rice value chain such as input supply, marketing, processing, wholesaling and retailing of rice (Jayaweera, 1993).

According to the co-operative by-laws, the general assembly is the highest governing body of an MPCSs. It consists of steering committee representatives of village-level divisions. The number of village-level divisions of a given MPCS varies. The steering committee of a particular village-level division is elected among the members belong to that division. The voting system is one member – one vote. Figure 2-6 illustrates the governance structure of MPCSs.

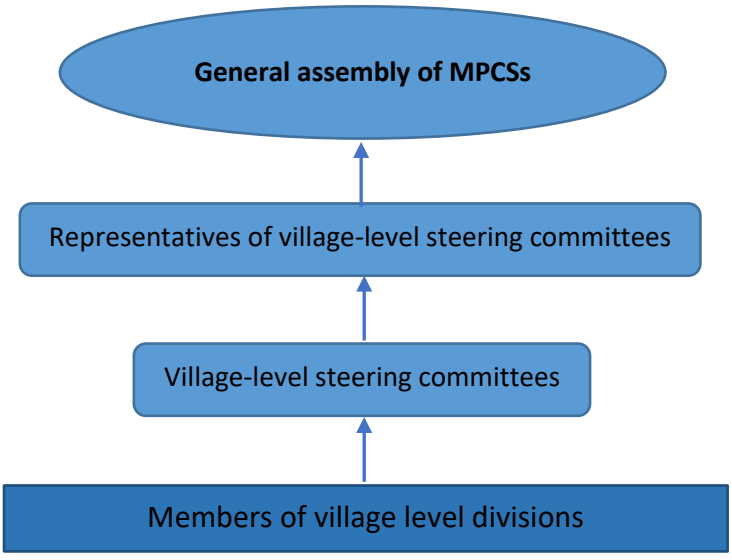

Figure 2-6: Governance structure of the multi-purpose co-operatives

Members of the general assembly are elected among the village-level steering committee representatives. The number of steering committee representatives of a particular village-level

division eligible to represent the general assembly is a proportion of the total number of members of that village-level division to the total members of the MPCS (all the members belong to all village-level divisions). Therefore, the number of general assembly representatives also varies among MPCSs depending on the total members' number.

The general assembly is responsible for policy-level decisions (review and approve the annual development plan, provide directions, appoint/resign directors, and chairman). The general assembly convenes annually unless there is a special reason to do so. The board of directors and the chairman are elected among the general assembly representatives for a period of three years. Each general assembly representative has a vote, and the board is directly accountable to the general assembly (Department of Co-operative Development, 2019).

All the co-operatives were more alike in their governance and management structure with only slight variations among them. They were multipurpose co-operatives with a broader business scope. The government promoted these co-operatives, which have undergone several waves of structural changes subsequent to various legislative enactments. Comparatively partially integrated co-operatives consisted of a larger membership. Development of these co-operatives' value-adding assets has been partly or fully supported by the government.

2.9 Summary

The background information demonstrates the importance of the country's agriculture sector and the rice sector, in particular, in terms of national income, employment and food security. Apart from that, a background to various forms of collective action promoted in the agriculture sector is also discussed. Recognising this importance, each successive government has made various policy interventions to accomplish growth in the agriculture sector, in general, and the rice sub-sector, in particular, along with raising farmers' incomes. Policy interventions in the form of price controls, subsidies, tenure reforms and institutional development (such as co-operatives, farmer organisations and farmer companies) have been used to improve the social and economic condition of the smallholders. Examination of the country's rice value chain also revealed important information. Smallholders predominate in rice production and are the second largest group of actors next to the consumers. Among others, involved in the rice value chain activities, input supply, marketing, processing, wholesaling and retailing activities predominantly operated by the private businesses. The role of public institutions and other forms of businesses, such as co-operatives, in these activity levels, remains low. More importantly, the processing is concentrated within large

and medium scale private millers. These observations suggest an existence of a power imbalance among the actors of the rice value chain and farmers seemingly at a disadvantageous position owing to their low bargaining position. On the other hand, the emergence of supermarkets in retail and presence of hotels and restaurants in the consumption side suggests the existence of high value consumer markets.

3 LITERATURE REVIEW

3.1 Introduction

This chapter reviews the concepts and theories applicable to the research problem and explains both horizontal and vertical integration. Following the introduction, Section Two reviews collective action theory. Section Three appraises the theories of co-operative enterprises. Section Four discusses the benefits of co-operative enterprises to their members. Section Five appraises value chain theory. Concepts of vertical coordination and vertical integration are examined in Section Six and Seven respectively.

3.2 Theory of Collective Action

The concept of collective action has its roots to provision of common goods (Olson, 1965). Subsequently, it was extended and applied in multiple disciplines. Building on human behaviour, the theory of collective action explains how incompletely rational individuals find optimum outcomes collectively based on norms in a diversity of social dilemmas (a setting in which individuals choose actions in an interdependent situation). The theory posits a set of structural variables presumed to affect the likelihood of individuals achieving collective action to overcome social dilemmas (E. Ostrom, 1990). Similarly, collective action is the "*voluntary action taken by a group to achieve common interests*" according to Rasmussen and Meinzen-Dick (1995, p. 19).

Commons (1931) says that collective action ranges all the way from unorganised customs to the many organised going concerns, such as the family, the corporation, the co-operative association, the trade association, the trade union, the reserve system, and the state. Thus, collective action occurs within different arenas, for example, the evolution of institutions to facilitate business trading (Greif, Milgrom, & Weingast, 1994), organisation of community water enterprises (Hicks & Peña, 2003), gaining international cooperation (Snidal, 1985), provision of national defense (Wallner, 2002), farmers managing irrigation systems (Shivakoti & Ostrom, 2003) and co-operatives (Olson, 1965).

3.3 Collective Action Elements

Lichbach (1995) identifies eight structural variables that could affect the success of achieving collective action in managing common pool resources. They are:

1. The number of participants involved
2. Whether benefits are subtractive or fully shared

3. The heterogeneity of participants
4. Face to face communication
5. The shape of the production function
6. Information about past actions
7. How individuals are linked
8. Whether individuals can enter or exit voluntarily

Of these, the first five are applicable, irrespective of whether the situation is repeated or not.

In regard to the first variable, Olson (1965) argues that there is a probability of a group achieving a public good decline as the size of a group increases leading to non-optimal outcomes. Olson gives two reasons to account for this situation. First, the difficulty of monitoring a single input in providing public good, leads individuals to think that their free riding will not be noticed. Second, making common strategies in larger groups involve higher transaction costs. Chamberlin (1974) further points those differences in group size also affect other key variables. Coulter, Goodland, Tallontire, and Stringfellow (1999), on the other hand, point to the difficulty of monitoring individuals when a group becomes large.

The success of collective action is argued to depend on whether the benefits are subtractive or fully shared. The benefits of goods and services with public provision are shared and subject to free riding by their users (E. Ostrom, Walker, & Gardner, 1992). Free riding is recognised as one of the major institutional weaknesses, particularly in traditional co-operatives. This is especially so when new members join a co-operative as they get access to all of the same resources as current members without bearing any of the historical costs. Sometimes, new members are allowed to trade with co-operatives on the same conditions as members (M. L. Cook, 1995; Iliopoulos & Cook, 1999; Sykuta & Cook, 2001).

Referring to heterogeneity of participants, Olson (1965) contends that there is the probability of a group achieving a public good increase when there is a strong interest among individuals. Similarly, others have argued that heterogeneity is a serious deterrent to cooperation (R. M. Isaac, Mathieu, & Zajac, 1991; R. N. Johnson & Libecap, 1982; Libecap & Wiggins, 1984). Heterogeneity in members can be observed in assets, information and payoffs. Jones (2004) contends that even though the presence of wealthy participants encourage trust in the beginning of the collective action and cooperation, inequality in distribution reduces the trust later in the process.

The fourth variable that is claimed to affect collective action success is face-to-face communication. This is particularly in the case of repeated situations where individuals use face-to-face communications to discuss deviations from promises made critically and moralistically. Face-to-face communication impels individuals to incorporate elements of honest information exchange, cooperation and trust leading to increasing joint returns (E. Ostrom, Gardner, & Walker, 1994; E. Ostrom & Walker, 1991; Valley, Moag, & Bazerman, 1998).

The shape of the production functions has been identified as the fifth important variable in collective action success. "*Social dilemmas involve individuals who could take actions that produce benefit for others (and themselves) at a cost that they themselves must bear*" says E. Ostrom (2007, p. 8). Accordingly, the form of the processes that relate group resources into an output of public good, determines the collective action's success. It is, thus, the group's power, or the ability of the group, to achieve its goals (Lichbach, 1995; E. Ostrom, 2007).

The sixth to eighth structural variables were regarded more relevant for situations where there are repeated interactions. The sixth variable, information about past actions that an individual can obtain, affects the level of cooperation achieved when choosing strategies in repeat situations. Seabright (1993) contends that cooperation can grow in situations where interactions are repeated. For example, a high level of cooperation is assumed to exist in families and small neighbourhoods (referring to small groups with frequent interactions) as a result of the trust which has built up over repeated interactions. When interactions are repeated, monitoring of an individual's actions increases the availability of more accurate information about a particular individual on a particular action in the past (Janssen, 2006).

The seventh structural variable reinforces the fact that how individuals are linked in a network is important to overcome social dilemmas collectively (K. S. Cook & Hardin, 2001). When individuals are directly linked to each other, each individual's resource contribution is presumed to increase the welfare of all the individuals who contribute their resources to a generalised pool from which individuals obtain benefits (Granovetter, 1977).

The eighth variable is whether individuals can voluntarily enter or exit. Some have argued (Hauk & Nagel, 2001; Orbell & Dawes, 1991) that the success of collective action is likely to increase when individuals have a choice to enter or exit the group working for the collective outcome. This allows careful identification of new entrants to the group about whom they have previous experience. In

such a way, the frequency of the success of co-operative outcomes increases. Giving entry and exit rights helps recognise trustworthiness in others (Janssen, 2006).

3.4 Collective Action Rules

Similarly, collective action theorists (Crawford & Ostrom, 1995; E. Ostrom, 2005) identify a set of rules that affects the structure of the collective action taken to provide, manage and govern a common pool resource to which the individuals have specific rights. E. Ostrom and Crawford (2005) state that rules are shared understandings of actions that must, must not, or may be undertaken by the individuals and the sanctions enforced on those who do not honour them in the group. Similarly, V. Ostrom (1999) considered rules to be self-conscious artifacts related to particular actions in specific situations.

An array of specific rules was identified by a number of scholars (Kiser & Ostrom, 2000; McGinnis, 1999a, 1999b, 2000; E. Ostrom, 1986; V. Ostrom, 1975) specific to different situations in designing the structure of the collective action. Crawford and Ostrom (1995) have summarised rules under seven broad types. They include:

1. Boundary rules. These rules specify how actors are to be chosen to enter or leave positions,
2. Position rules. These specify a set of positions and how many actors hold each one,
3. Choice rules. Which actions are assigned to an actor in a position are identified by the choice rule,
4. Information rules. The channels of communication among actors and what information must, may or must not be shared are defined by these rules,
5. Scope rules - specify the outcomes that could be affected,
6. Aggregation rules (such as majority or unanimity rules). These rules define how the decisions of actors translate into intermediate or final outcomes,
7. Pay-off rules. How benefits and costs are to be distributed to actors in positions is defined by the pay-off rules.

Expanding the theory onto a further level, scholars have identified specific rules that have been associated with the long-survival of collective action. Theorists (M. Cox, Arnold, & Tomás, 2010; E. Ostrom, 1990, 2005) have identified regularities among long survived collective actions. The term “design principles” was used by (E. Ostrom, 2000, p. 149) to characterise these regularities.

According to M. Cox et al. (2010) long-serving collective action, formed to manage natural resources, have embedded the following principles:

1 A. User boundaries. Clear and locally understood boundaries exist between legitimate users and non-users.

1 B. Resource boundaries. Clear boundaries that separate common pool resources from a large social-ecological system.

2 A. Congruence with local conditions. Appropriation and provision rules are congruent with local social and environmental conditions.

2 B. Appropriation and provision. Comparability of appropriation and provision rules. Putting it simply, the distribution of costs is proportional to the distribution of benefits.

3. Collective-choice arrangements. Most individuals affected by a resource regime are authorised to participate in making and modifying its rules.

4 A. Monitoring users. Accountability of users. Accordingly, being accountable to themselves, users monitor the appropriation and provision levels of users them.

4 B. Monitoring the resource. Individuals who use a particular resource are accountable in monitoring its conditions.

5. Graduated sanctions. Sanctions for violations of a rule gradually rise for repeated violations.

6. Conflict resolution mechanism. It is recognised that there are low-cost revolving mechanisms which exist to resolve conflicts among users and officers.

7. Minimal recognition of rights. The right of local users to make their own rules are recognised by the government.

8. Nested enterprises. Governance of a closely connected common pool resource to a larger social-ecological system is organised in multiple nested layers.

3.5 Co-operative Theory

Conceptualising co-operative enterprises in the broader context of collective action, this section explicitly examines the concepts applied to expand the understanding of co-operative enterprises

since it is the focal point of this study. Accordingly, the following section reviews different theoretical perspectives applied to co-operative enterprises, which explain their existence and effectiveness.

3.5.1 Theoretical Perspectives of Co-operatives

The co-operative theory has basically evolved along two lines of argument. One line of argument explains the existence of co-operative enterprises while the second line explains the effectiveness of co-operative enterprises. Table 3-1 classifies co-operative enterprise theories applied to explain the existence and performance of co-operative organisations.

Table 3-1:Classification of co-operative enterprise theories

Theory	Line of argument	Problem area
Neoclassical economic theory Transaction cost theory (NIE)	Existence of co-operative business	Economies of scale Efficient market failure
Principle agent theory (NIE)	Effectiveness of co-operative business	Follow-up or control problem
		Decision-making or influence cost problem
Property rights theory (NIE)		Horizon problem
		Free-rider problem
		Portfolio problem

Source; Karlson (2005)

Neoclassical economic theory

Development of co-operative theory begins with the application of neoclassical economic theory of the firm to analyse co-operative enterprises and their relationships within the market system. There has been a debate around defining co-operatives. Some scholars have considered a co-operative as a firm (Helmberger & Hoos, 1962) while others have treated it is an organisation (aggregation) of economic units (Emelianoff, 1942; Phillips, 1953; Robotka, 1947). The debate arose owing to the non-compliance of neoclassical assumption of profit maximisation of rationally behaving economic agents with the co-operative enterprise. Neoclassical economic theory has also failed to explain why other forms of economic organisations exist and how resources are allocated within those organisations. These questions have motivated scholars to use other theories to analyse different organisational forms and their relationships within the market system (J. S. Royer, 1999; Sykuta & Chaddad, 1999).

Attempts to generalise neoclassical assumptions about transaction costs and property rights have provided new insights into the existence of firms, the evolution of alternative economic

organisations, and the choice of organisational forms. Consequently, three distinct, but related methods, were applied to analyse co-operatives. They are transaction cost theory, principal agent theory and property rights theory. Collectively, they are referred to as New or Neo Institutional Economics (NIE) (M. L. Cook, 1995; Vitaliano, 1983).

Transaction Cost Theory

Transaction cost refers to the cost of organising and transacting exchanges. It includes the costs associated with negotiation, enforcing contracts and adverse consequences which arise from opportunism and efforts at preventing them (J. S. Royer, 1995). The theory was first introduced by Coase (1937) and subsequently developed by a number of scholars (Crawford & Ostrom, 1995; Williamson, 1971, 1981, 1985). The theory explains why so much of the economic activity occurs within formal organisations or firms if the markets are as powerful and effective in allocating scarce resources as argued by the economists. Coase (1937) accounts for this because transaction inefficiencies arise from imperfect information. As Coase argues, when the transaction costs of market exchange are high, coordinating transactions within a firm or formal organisation is less costly. Accordingly, co-operatives were also considered as a form of economic origination capable of economising on transaction costs (Williamson, 1979).

Transaction cost theory is applied to identify important dimensions of a transaction that would determine the most efficient institutional mechanism to conduct the transaction. According to Williamson (1985) those dimensions are asset specificity, frequency of transactions and uncertainty. Whether a transaction conducts through market or internal organisational arrangement, such as investor-owned firm or a co-operative, is dependent upon the relative significance of these dimensions embedded in a transaction.

Principal Agent Theory

Principle agent theory describes how principal agent relationships affect organisational effectiveness. Principle agent theory views economic organisation as a nexus of contracts (Fama, 1980; Staatz, 1989) and explains how principal agent relationships affect organisational performance. The theory posits that patrons (principle), as one party of a contraction, provide resources and accept the risk in exchange for the “residual claims” on the cash flow, whereas professional managers (agent), as the other party, manage resources for the best interest of the principle. It is argued that in a contract of which ownership and control rights are separated,

managers tend to pursue their own objectives at the cost of the owners (Fama & Jensen, 1983; Jensen & Meckling, 1979; Ross, 1973; Sykuta & Chaddad, 1999).

Thus, Fama and Jensen (1983) contend that operational mechanisms emerge within the organisations to control such behaviours and to minimise agency costs. The terms of agency relationships are defined in a contract between the agent and the principle, either explicitly or implicitly, and enforced legally or by reputation to maintain long-term relationships. However, contracts are always incomplete and it is hard to bind agents' objectives with those of the principals since there are opportunities for shirking due to moral hazard and imperfect observability (J. S. Royer, 1999). Application of principle agent theory to traditional co-operative enterprises has revealed the existence of a high degree of agency problems in them compared to investor-owned firms. Because, traditional co-operatives lack a clear profit motive, transferable ownership of shares and capital market disciplines (Richards, Klein, & Walburger, 1998).

Property Rights Theory

This theory stemmed from the work of Grossman and Hart (1986) and was subsequently, improved by several others (Hart, 1995; Hart & Moore, 1990) based on the importance of asset ownership and control. Property rights theory postulates that contracts are incomplete and cannot identify all possible contingencies as given in transaction cost theory. In contrast to transaction cost theory, property rights theory assumes efficiency in the bargaining process both in pre- and post-investment situations. Referring to non-human assets, Grossman and Hart (1986) claim that a firm has a set of assets under common ownership. When two or more assets are owned by a single owner, they are treated as a single firm, and referred to as two firms when they are owned by different owners. Any transactions between two firms occur through the market. Grossman and Hart (1986) state that residual rights refer to those rights kept by the owner of an asset when the other party grants the right to use it, including those rights that are not explicitly specified in the contract. Control of operating decisions reverts to the party who holds the residual rights of control over those assets relevant to the transaction when operating decisions are non-verifiable and, hence, cannot be completely contracted. Application of property rights theory to co-operatives revealed three unique problems in co-operatives; horizon problem, free-rider problem, and portfolio problem as shown in Table 3-1. These problems have discussed in detail in Section 3.5.5 below.

3.5.2 Definitions of Co-operatives

The International Cooperative Alliance (n.d.) defines a co-operative as "*an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise*".

Taking a slightly different view from ICA, United States Department of Agriculture (1994, p. 1) defines a co-operative as "*a user-owned and controlled business from which benefits are derived and distributed equitably on the basis of use or as a business owned and controlled by the people who use its services*". This definition does not embed an element of democratic control as in ICA's definition. However, both definitions reflect the fundamental feature of collective action taken to achieve a common objective.

According to Barton (1989, p. 4) "*a co-operative is a private business owned and controlled by users and operated principally to provide benefits to users*". Holding a comparable position, Staatz (1987a) defines a farmer co-operative to include three elements. Accordingly, farmers are the stockholders and major users of the co-operative's services. The benefits a stockholder receives from committing capital to a co-operative are tied largely to patronage, and the formal governance of the business by the stockholders is structured "democratically".

All the how definitions presented above suggest that they share the essence of collective effort taken by individuals to achieve a common objective nevertheless there could be certain differences on how individuals accomplish it.

3.5.3 Rationale for Co-operatives

There are six widely accepted justifications supporting the existence of a co-operative business model. The first justification refers to the co-operative's ability to counterbalance market power as a form of market failure. Co-operatives are believed to empower people increasing their countervailing power (Bonus, 1986; Hansmann, 1988; J. S. Royer, 1999; Staatz, 1987a).

The second accounts for co-operatives' ability to provide missing services which is also a form of market failure (M. L. Cook, 1995; Hansmann, 1996; Ortmann & King, 2007a; J. S. Royer, 1999; Richard J Sexton & Iskow, 1988; Torgerson, Reynolds, & Gray, 1998; Valentinov, 2007). When the marketplace has failed to provide goods and services at an affordable price and acceptable quality, individuals form institutional mechanisms such as co-operatives to countervail market failure.

Risk reduction has been identified as the third justification. Co-operatives are argued to serve insurance functions, and co-operatives' horizontal and vertical organisation also lets members share risk or shift risk from members to non-members. In addition, co-operatives minimise the risk of their members being exposed to the risk of ex-post opportunistic behaviour (M. L. Cook, 1993; Iliopoulos, 2009)

The fourth is the co-operatives' ability to gain from economies of scale. Economies of scale justifies the operation of one large business entity in the form of co-operatives instead of many scattered small firms (M. L. Cook, 1993; Schroeder, 1992; Staatz, 1987a).

The fifth justification refers to the achievement of additional marketing margins. This is accomplished by controlling supplying and/or improving products and providing services (Iliopoulos & Cook, 1999).

The sixth justification recognises co-operatives as an alternative efficient governance structure. It is argued that co-operatives are formed owing to their ability to economise on transaction costs (Bonus, 1986), and co-operatives balance the cost of market contracting and ownership (Hansmann, 1996).

3.5.4 Principles of Co-operatives

Co-operative principles evolved over time and explain the way a co-operative operates. Those principles are supposed to have evolved from the business practices followed by the Rochdale Society (Zeuli, Cropp, & Schaars, 2004). They distinguish co-operatives from non-co-operative business.

The International Co-operative Alliance (ICA) (n.d.). adopts seven internationally recognised co-operative principles. First principle is voluntary and open membership. This principle states that membership is open to all individuals who are willing to accept the responsibilities and use services of co-operatives as voluntary organisations without any gender, social, racial, political or religious discrimination.

The second principle is democratic member control. This principle recognises co-operatives as democratic organisations controlled by their members. As this principle stipulates, every member has the same right to involve in formulating policies and making decisions with equal voting rights (one member, one vote). Moreover, elected representatives are accountable to the membership.

The third principle is member economic participation. This principle specifies that members equally contribute to the capital of their co-operative and democratically control it. Its further states that at least part of the capital remain as a common property of the co-operative. Members usually receive limited compensation, if any, on their capital contribution and allocate surpluses for developing their co-operative.

The fourth principle is autonomy and independence. Co-operatives are autonomous, self-help organisations controlled by their members. Therefore, any agreement with other organisations and governments, or support of capital from external sources, should not undermine their democratic control and autonomy.

Education and training recognise as the fifth principle. Co-operatives provide training for their members, elected representatives, managers, and employees so they can contribute effectively to the development of their co-operatives. They inform the general public and opinion leaders about the nature and benefits of co-operation.

Cooperation among co-operatives is the sixth principle. This principle stipulates those co-operatives serve members and strengthen the co-operative movement by working together through local, national, regional and international co-operative organisations. The seventh principle; concern for the community implies that co-operatives work for the sustainable development of their communities through policies approved by their members.

Taking a slightly different position United States Department of Agriculture (USDA) (1994) captures three principles. USDA's three principles are user ownership, user control and proportional distribution of benefits. The user-owner principle implies that the people who use the co-operative (members) help finance it and therefore, own the co-operative. This principle shares a common meaning with ICA's third principle and implies shared ownership.

The user-control principle means that members of the co-operative govern the business directly by voting on decisions and indirectly through their representatives on the board of directors. This correspondents to the ICA's fourth principle that emphasises autonomy and independence. This principle stipulates that control rights held by are members by tying voting rights only to them.

The third principle; distribution of benefits on the basis of use describes a principle of proportionality. This states that members should share the benefits, costs, and risks of doing business in equal proportion to their patronage.

3.5.5 Problems of Traditional Co-operatives

Application of new institutional economic concepts to co-operative enterprises has focussed on describing problems inherent in traditional co-operatives that create disadvantage for co-operatives and their members. A number of studies (M. L. Cook, 1995; P. K. Porter & Scully, 1987; J. S. Royer, 1999; Staatz, 1987b; Vitaliano, 1983) have contributed to this analysis which is discussed below. Five intrinsic problems observed and frequently analysed are horizon, portfolio, control, free-rider, and influence cost (M. L. Cook, 1995).

Horizon Problem

It is the failure of an investor to claim full returns generated by an asset resulting from a mismatch of time horizons between termination of the investor's right to residual claim on cash flow generated by an asset and the asset's useful life (M. L. Cook, 1995; P. K. Porter & Scully, 1987). As such, return to the investor is less than returns generated by the asset he/she invests. This problem appears in co-operatives due to the structure of the rights to residual claims which are generated from a member's patronage and distributed as current payments. This situation motivates members to enjoy benefits from investments that are limited to the period they expect to patronise the co-operative (Vitaliano, 1983). Consequently, members have different investment preferences, and a tendency to limit investments to an expected time horizon of patronage rather than investment in assets with long-term pay offs. The horizon problem thus causes tension among directors and managers of co-operatives to increase current pay-offs to members rather than investing in additional assets and equity building.

Portfolio Problem

This is more related to investment and it is the inability of members to diversify their asset portfolios according to their level of wealth and risk preferences. M. L. Cook (1995) refers to this as another problem of equity acquisition. This problem in co-operatives is mainly a result of non-transferability of assets (Jensen & Meckling, 1979) and proportionality of investment to patronage (J. S. Royer, 1999). Restricted membership of co-operatives further excludes outside investors investing in co-operatives to diversify risks accommodating members to bear the risk by themselves. This situation leads to sub-optimal investment because risk-averse members pressure the board of directors and

managers to invest in low risk, even though it results in lower returns. J. S. Royer (1995) contends that the problem worsens when members' investments in the co-operative represent a significant portion of their off-farm assets and the risks associated with co-operative enterprise and their own farming are high.

Control Problem

Control problem refers to the agency costs that arise from the efforts to prevent the divergence of interest between membership and their representative board of directors and managers (M. L. Cook, 1995; P. K. Porter & Scully, 1987) in any organisation having separate ownership and control. This problem is severe in co-operatives because of the market absence for exchanging equity shares and lack of equity-based management incentive mechanisms (J. S. Royer, 1999). Non-tradability of equity shares restrains the concentration of equity in the hands of the shareholders, thereby, reduces the incentives for members, managers and board of directors to take important decisions. Monitoring and evaluation of management's performance and the co-operative's value is difficult for members due to lack of performance indicators like share price in the absence of an equity market. Lack of equity-based incentive schemes for managers, on the other hand, would be a disadvantage for co-operatives to retain and attract good managers. Harte (1997) contends that lack of equity-based incentive schemes for managers provide motivation to convert their co-operatives to corporations. J. S. Royer (1999) points out that restriction of membership itself can also contribute to the control problem when co-operatives expand in scope. As co-operatives expand in scope, boards of directors with different skills are required for strategic decision-making and monitoring managers' performance. However, restriction of membership prevents specialists in different disciplines coming into the board of directors (Jamison, 1960).

Free Rider Problem

The free-rider problem is interchangeably used as a common property problem. In traditional co-operatives, that emerges when property rights are not transferable, ill-defined and non-enforceable to ensure individuals bear the full costs and benefits of their actions. The free-rider problem is a situation where individuals cannot be excluded from benefiting from a common property without paying for provision of it (M. L. Cook, 1995; J. S. Royer, 1999).

This problem is often associated with co-operatives, either externally or internally. Sykuta and Cook (2001) claim that the free-rider problem arises in co-operatives owing to the very nature of binding the rights to residual claims to the level of patronage instead of investment/equity capital. As a

consequence, members have little or no incentive to finance assets because benefits from investment not only accrue to the member who made the investment, but also to the others, including new members who do not even make any up-front investment.

Iliopoulos and Cook (1999) state that the external free-rider problem arises when non-members are given the opportunity to conduct transactions on the same terms of trade enjoyed by members. It is like subsidising non-members at the cost of returns to existing members and, hence, members are reluctant to invest in the co-operative, leading to a shortage of equity capital (Vitaliano, 1983). Vitaliano (1983) suggests charging a substantial entry fee and the adoption of base capital financial plan to control the external free-rider problem. The free-rider problem could result in decisions leading to high cash flows per member and conflicts among groups of members vested with different preferences based on the time period they hold residual rights.

Influence Cost Problem

Those costs associated with influence activities of members with different objectives in a co-operative is known as influence cost problem. According to M. L. Cook (1995) influence activities arise when co-operatives make decisions regarding the distribution of wealth and other benefits among members or constituent groups, and when decisions are aligned to pursue selfish interests and affected individuals or groups attempt to influence decisions to their benefit. This common problem appears in co-operatives which handle a wide range of activities and members with different objectives. Influence costs consist of direct costs of influence activities and costly decisions resulting from successful exercise of influences (cost of resource mis-allocation due to influences). According to Milgrom and Roberts (1990) the size of influence cost depends on (1) the existence of central authority capable of affecting distribution of costs and benefits, (2) the procedures that govern decision-making, and (3) the degree of homogeneity or conflicts among members.

Royer (1999) accounts high influence cost in co-operatives to the diversity of members' objectives compared to common objective of wealth creation in investor-owned firms. Staatz (1987b) further suggests that co-operatives may have higher decision costs compared to investor-owned firms.

3.6 Members' Benefits of Co-operatives and other Collective Enterprises

The literature shows wider advantages to members from their co-operatives and other collective enterprises. They have been seen as potential organisational strategies to reduce transaction cost by transmitting information, mediating transactions, facilitating the transfer and enforcement of

property rights and contracts, and managing the degree of competition (Markelova et al., 2009; Miehlbradt, McVay, & Tanburn, 2005; Shiferaw, Hellin, & Muricho, 2016; Valentinov, 2007; World Bank, 2003).

Varying terminology have been used in the literature to identify wider advantages of various forms of collective enterprises to their members. The common terms used include benefits, impacts, effects, and performance. Since co-operatives principally emphasise "user-benefit", the term "benefit" is used in this study.

Co-operatives and other collective enterprises have multiple objectives such as social, economic, community, and environmental. Members, on the other hand, hold multiple responsibilities such as suppliers, consumers, and owners (Barton, 1989). Accordingly, member benefits of co-operatives and other collective enterprises are classified in six key themes based on the literature. They are: 1) production and marketing benefits, 2) benefits in supplying inputs, services and information, 3) ownership benefits, 4) community benefits, 5) social benefits, and 6) environmental benefits.

3.6.1 Production and Marketing Benefits

Production and marketing benefit items cited in the literature are given in Table 3-2. Scholars have identified various financial, production, and marketing benefits. The most common benefit dimensions in this group include financial benefits in terms of better prices, income, and profits associated with production (Alho, 2015; Barton, 1989; Baviskar, 1990; Bernard, Taffesse, & Gabre-Madhin, 2008; M. Fulton & Ketilson, 1992; Shumeta & D'Haese, 2016; Wollni & Zeller, 2007). Growth in production, yield, marketable surplus and commercialisation are production and marketing-related. They are also termed as impacts of membership resulting from access to various production inputs and services (Bernard & Spielman, 2008; Mojo, Fischer, & Degefa, 2017).

Some other dimensions of benefits in this group were services that enable entering markets such as product and quality certificates (Costales et al., 2003; Narrod et al., 2009). Another production-related benefit dimension includes growth of members' assets in terms of savings, properties and other farm assets that are helpful in building their livelihoods (Bacon, Ernesto Mendez, Gómez, Stuart, & Flores, 2008; Fischer & Qaim, 2012a; Getnet & Anullo, 2012). Collective enterprises themselves have served as markets for members' products. Members have been able to sell their production to co-operatives (Bernard & Spielman, 2009; Shiferaw et al., 2016; Zeuli et al., 2004).

Members have also benefited through improved bargaining power against traders and gaining economies of scale (Bonus, 1986; Hansmann, 1996; Schroeder, 1992).

Table 3-2: Production and marketing benefits

Benefit item	References
Better price for products	(Alho, 2015; Barton, 1989; Baviskar, 1990; Bernard, Taffesse, et al., 2008; M. Fulton & Ketilson, 1992; Shumeta & D'Haese, 2016; Wollni & Zeller, 2007)
Enhance income and profit	(Baviskar, 1990; Fischer & Qaim, 2012a; Getnet & Anullo, 2012; Ito, Bao, & Su, 2012; Mascarenhas, 1988; Vandeplas, Minten, & Swinnen, 2013)
Increased yield	(Francesconi & Ruben, 2012; Verhofstadt & Maertens, 2014)
Commercialisation, scaling up production, and marketable surplus	(Bernard, Taffesse, et al., 2008; Fischer & Qaim, 2012a; Holloway, Nicholson, Delgado, Staal, & Ehui, 2000)
Enhance credibility and safeness of producers' products	(Costales et al., 2003; Narrod et al., 2009; Naziri, Aubert, Codron, Loc, & Moustier, 2014)
Build livelihood assets	(Bacon et al., 2008; Bratton, 1986; Fischer & Qaim, 2012a; Getnet & Anullo, 2012; Sisay, Verhees, & Van Trijp, 2017b)
Provide a market for outputs	(Bernard & Spielman, 2009; Shiferaw et al., 2016; Zeuli et al., 2004)
Enhance bargaining power against traders and economies of scale	(Bonus, 1986; Hansmann, 1996; Schroeder, 1992)

3.6.2 Benefits in Supplying Inputs, Services, and Information

Table 3-3 summarises various items of member benefits in supplying inputs, services, and information. As can be seen in the table, most of the inputs, information and services related benefits are linked with their accessibility and affordability. Members have been able to obtain most of their inputs from their co-operatives and/or collective enterprises.

Increased access to inputs has been a prominent benefit to members in co-operatives and other collective enterprises. Members have benefited from increased access to Inputs such as agrochemical, fertiliser, technology, and seed (Abebaw & Haile, 2013; Baviskar, 1990; Getnet & Anullo, 2012; Haque, Deb, & Medeiros, 2009; R. P. King, 1992; Markelova et al., 2009).

Similarly, co-operatives and other collective enterprises increased the affordability of inputs, services and information. Members have obtained their inputs, services and information at a lower than market prices on cash or credit. Often, fertiliser, seed, agrochemicals, transport services and credit have obtained by members at subsidised price (Baviskar, 1990; Getnet & Anullo, 2012; R. P.

King, 1992; Markelova et al., 2009). More importantly, most of the information and technical services have been free of charge to members (Abebaw & Haile, 2013; Coulter et al., 1999)

Likewise, members have benefitted in terms of access to a variety of services. Services that members of collective enterprises gained better access to include finance, transport, healthcare, extension, processing services, retail goods, and compliance services such as production certificates (Barham & Chitemi, 2009; Baviskar, 1990; Bernard, Taffesse, et al., 2008; Bratton, 1986; Holloway et al., 2000; Morton et al., 1999; Yadoo & Cruickshank, 2010).

Furthermore, members have benefitted from facilitation or coordination services performed by the co-operatives and other collective enterprises. For example, coordination of farmers' production activities (R. P. King, 1992; Markelova et al., 2009), pooling of members financial resources to undertake investments (Lapar et al., 2006; Markelova et al., 2009), and promotion of technology and development (Abebaw & Haile, 2013; Fischer & Qaim, 2012a; Haque et al., 2009) can be identified.

Table 3-3: Benefits in supplying inputs, services and information

Benefit item	**References**
Provision of production inputs such as agrochemicals, fertiliser and seed	(Baviskar, 1990; Bernard, Taffesse, et al., 2008; Hellin, Lundy, & Meijer, 2009; Narayanan & Gulati, 2002; Sisay, Verhees, & van Trijp, 2017a; Verhofstadt & Maertens, 2014; World Bank, 2003, 2007)
Provision of subsidised inputs and services, and information at cash or credit.	(Baviskar, 1990; Getnet & Anullo, 2012; Kaganzi et al., 2009; R. P. King, 1992; Markelova et al., 2009)
Provision of services such as extension, training, banking, credit, funeral services, retail goods, transport, processing, machinery hire, compliance and certification services, and health care	(Barham & Chitemi, 2009; Baviskar, 1990; Bernard, Taffesse, et al., 2008; Bratton, 1986; Hellin et al., 2009; Holloway et al., 2000; Hulme & Montgomery, 1994; IFAD, 2003; Kaganzi et al., 2009; R. P. King, 1992; Lapar et al., 2006; Morton et al., 1999; Narayanan & Gulati, 2002; Yadoo & Cruickshank, 2010)
Coordinate farmers' production activities	(R. P. King, 1992; Markelova et al., 2009)
Pool financial resources to support investments	(Lapar et al., 2006; Markelova et al., 2009)
Promotion of technology and development	(Abebaw & Haile, 2013; Fischer & Qaim, 2012a; Haque et al., 2009)
Obtain market, price and technical information	(Bernard, Collion, De Janvry, Rondot, & Sadoulet, 2008; Coulter et al., 1999; Digal & Concepcion, 2005; Fischer & Qaim, 2012a;

	Holloway et al., 2000; IFAD, 2003; Lapar et al., 2006; Markelova et al., 2009; Narrod et al., 2009; Staatz, 1987a)

As a result of technology promotion and development, members have been able to advance the technology they apply in productive operations and become updated on new technology (Abebaw & Haile, 2013; Fischer & Qaim, 2012a; Haque et al., 2009). Members also have been able to increase their access to a variety of information through their co-operatives and collective enterprises. Information about new markets (Coulter et al., 1999; Digal & Concepcion, 2005; Holloway et al., 2000; IFAD, 2003; Markelova et al., 2009; Narrod et al., 2009; Staatz, 1987a), price and technical information (Bernard, Collion, et al., 2008; Fischer & Qaim, 2012a; Lapar et al., 2006) have been obtained by members from their collective enterprises.

3.6.3 Ownership and Control Benefits

Members, as owners of co-operatives and other collective enterprises, are entitled to unique ownership benefits. Table 3-4 summarises various items of ownership benefits found in the literature. Collective ownership in co-operatives empowers members' bargaining position against more powerful businesses. The elevation of members bargaining position help prevent them from exploitation (Birchall, 2012; M. Fulton & Ketilson, 1992; Markelova et al., 2009).

Furthermore, some of the direct financial benefits are exclusively tied to co-operative membership. For instance, patronage refunds or rebates are often paid only to the members. Thereby, members have benefitted from receiving direct financial payments from their enterprises (Barton, 1989; Birchall, 2012; Kyriakopoulos, 1998). Likewise, members are entitled to claim dividends on their investment in co-operatives and other collective enterprises. Also, co-operatives provide avenues to pool investment capital and distribute financial risk among members. Accordingly, the return on investment and distribution of investment risk have been regarded as important member benefits in co-operatives and other collective enterprises (Barton, 1989; Birchall, 2012; Hansmann, 1996).

In the majority of cases, members are the owners of co-operatives and other collective enterprises. Holding ownership allows members to gain greater control and be involved in the governance in their enterprises. Thereby, members get a greater chance to formulate business strategies aimed at the growth of their businesses (Birchall, 2012; Dunn, 1988; Österberg & Nilsson, 2009).

Table 3-4: Ownership and control benefits

Benefit item	References
Empower members' bargaining position	(Birchall, 2012; M. Fulton & Ketilson, 1992; Hansmann, 1996; Markelova et al., 2009; Narrod et al., 2009; Rist, Feintrenie, & Levang, 2010)
Patronage refunds/rebates	(Barton, 1989; Birchall, 2012; Kyriakopoulos, 1998)
Share risk of investment and pay dividends	(Barton, 1989; Birchall, 2012; Hansmann, 1996)
Provide a greater control on business, involve in their governance and strategy formulation	(Birchall, 2012; Dunn, 1988; Österberg & Nilsson, 2009)

3.6.4 Community Benefits

Table 3-5 summarises the community benefits cited in the literature and, by their nature, these benefits are exclusive to a particular community of members. They are in the form of common support and are limited to a particular group of members. Co-operatives have provided members a space to meet and have acted as community platforms to share experiences (M. Fulton, 1999; Putnam, 2001; Tolbert, Irwin, Lyson, & Nucci, 2002; Wilkinson, 1991). Regular meetings in co-operatives and other collective enterprises have paved the way for frequent interactions among members and build a sense of community (M. Fulton, 1999). Moreover, members have benefitted from co-operatively provided community health services and improved access to health and medical services (You & Kobayashi, 2009).

Table 3-5: Community benefits

Benefit items	References
Provide common meeting platforms to interact and share experiences	(M. Fulton, 1999; Putnam, 2001; Tolbert et al., 2002; Wilkinson, 1991)
Develop a sense of community	(M. Fulton, 1999)
Promote community health and improved access to medical services	(You & Kobayashi, 2009)
Support during unexpected circumstances such as death, sudden illnesses, crop damages and natural hazards.	(Duffey, 1990; Stafford, 1990; Tirivayi, Nennen, Tesfaye, & Ma, 2018)

Co-operatives and other forms of collective enterprises acted as social safety nets. Members themselves have been able to support each other during difficult times and unexpected circumstances such as deaths, illnesses and natural hazards. Such supports have acted as community insurance (Tirivayi et al., 2018). Furthermore, members have benefitted sharing production risk and received financial support to recover from crop and property damages encountered by them (Duffey, 1990; Stafford, 1990).

3.6.5 Social Benefits

The various items of members' social benefits discussed in the co-operative and collective action literature are summarised in Table 3-6. Social benefits diffuse to the wider society beyond a particular community of members. These benefits have the feature of public goods and services. Particularly, co-operatives contribute to the wider society by promoting principles of democracy and equality, empowering individuals in the society holding them accountable for their actions (Fairbairn, 2004; Hoyt, 2004; Hussein, 2001; Merrett & Walzer, 2001; Nugussie, 2010). Moreover, co-operatives contribute to leadership development and society has benefitted from capable leaders (Richardson, 2000; Torgerson, 1990; Zeuli & Radel, 2005).

Table 3-6: Social benefits

Benefit item	References
Promulgate principles of democracy and equality, empower individuals (participate, negotiate, influence, control and hold accountable), build leadership	(Fairbairn, 2004; Hoyt, 2004; Hussein, 2001; Merrett & Walzer, 2001; Nugussie, 2010; Richardson, 2000; Torgerson, 1990; Zeuli & Radel, 2005)
Contribute to human capital development through education and training.	(Bacon et al., 2008; Fairbairn, 1991; Richardson, 2000; Torgerson, 1990)
Creation of livelihood opportunities and employment	(Ekepu, Tirivanhu, & Nampala, 2017; Hussein, 2001; R. King, Adler, & Grieves, 2013; Nugussie, 2010)
Build and maintain social capital	(Bauwens & Defourny, 2017; Majee & Hoyt, 2009; Paldam & Svendsen, 2000)
Provide a distribution channel for government services such as various subsidies and food rations	(Hussi, Murphy, Lindberg, & Brenneman, 1993; Korten, 1980; Spielman, Cohen, & Mogues, 2008)
Contribute to maintain law and order and prevent crime	(Kahan, 2002; Schneider, 2007)

Human capital development through education, training and sponsoring education was also identified in the literature as a social benefit of co-operatives. Thereby, the wider society has benefitted through acquired skills, knowledge and experiences (Bacon et al., 2008; Fairbairn, 1991; Richardson, 2000; Torgerson, 1990). Co-operatives and collective enterprises create livelihood opportunities and employment and society has benefitted having more income generating opportunities (Ekepu et al., 2017; Hussein, 2001; R. King et al., 2013; Nugussie, 2010). Others (Bauwens & Defourny, 2017; Majee & Hoyt, 2009; Paldam & Svendsen, 2000) have found that co-operatives and collective enterprises have contributed in building and maintaining social capital and claim that increase in trust, cooperation, and civic-minded behaviour are greater advantages for a society.

Co-operatives and other collective enterprises have been used by governments to channel their services and implement various social security programmes such as distribution of food rations and various other subsidies such as essential food commodities, clothes, fertiliser, and so forth. Accordingly, individuals in the society were benefitted by gaining access to those services through co-operatives and other collective enterprises (Hussi et al., 1993; Korten, 1980; Spielman et al., 2008). Contribution of co-operatives and other collective enterprises in maintaining law and order was considered as another important social benefit. Decline of crimes in communities has been recognised as a great social benefit provided by the collective action taken by individuals (Kahan, 2002; Schneider, 2007).

3.6.6 Environmental Benefits

A review of environmental benefits shows that members of co-operatives and collective enterprises had benefitted in a number of ways. Various dimensions of environmental benefits cited in the literature are given in Table 3-7. These dimensions of benefits reflect ethical and environmentally friendly practices of members that have advantages for them and implications for sustainability. For example, efficient use of resources such as water and soil, could enhance productivity and reduce resource depletion (V. Kumar, Wankhede, & Gena, 2015; Uphoff & Wijayaratna, 2000).

Table 3-7: Environmental benefits

Benefit dimension	References
Promote efficient and sustainable resource use such as soil and water	(E. Ostrom, 1990, 2010; Uphoff & Wijayaratna, 2000; Wade, 1987) (V. Kumar et al., 2015)

Information sharing related to ecological sustainability, Sustainable harvesting of natural resources, and build ecological resilience	(Galappaththi et al., 2016; Mojo, Fischer, & Degefa, 2015; Ovando et al., 2013)
Help rejuvenate depleted soil and polluted water bodies and promote sustainable use of chemicals	(Ma, Abdulai, & Goetz, 2017b; Perthen-Palmisano & Jakl, 2005)
Information sharing and promotion of learning and innovation for sustainable production	(Kroma, 2006; Mojo et al., 2015)

Members also have benefitted from getting access to information pertaining to environmental sustainability, being aware of sustainable harvesting practices and enhanced resilience in ecology (Galappaththi et al., 2016; Mojo et al., 2015; Ovando et al., 2013). Co-operatives and collective enterprises have been involved in reducing soil and water degradation. Thereby, members have been able to rejuvenate degraded soils, polluted water bodies and been aware of the sustainable use of chemicals (Ma et al., 2017b; Perthen-Palmisano & Jakl, 2005). Similarly, members have benefitted from information sharing, innovation and learning of sustainable production practices (Kroma, 2006; Mojo et al., 2015).

3.7 Performance of Co-operatives, other Collective Enterprises and their Members

Performance measurement is the ongoing process of assessing progress toward achieving predetermined objectives (Bourne & Nee, 2003). Performance of any enterprise depends on their objectives which are defined in different ways in the literature. Venkatraman and Vasudevan (1986) identify three domains of business performance. They include; (1) financial performance, (2) financial performance + operational performance (business performance), and (3) organisational effectiveness. Financial performance assumed to reflect the fulfilment of the economic goals of the firm and it is the dominant model in strategy research. It examines such indicators as sales growth, profitability (reflected by ratios such as return on investment, return on sale, and return on equity), earnings per share and so forth. The second domain financial + operational performance (business performance) is a broader conceptualisation of business performance and it includes measures such as market-share, new product introduction, product quality, marketing effectiveness, manufacturing value-added, and other measures of technological efficiency. The third domain, organisational effectiveness argued to more relevant if the organisation has multiple and conflicting goals.

Measuring performance in co-operatives and collective enterprises remain complex. This complexity is brought by the multiple and conflicting goals as suggested by Venkatraman and

Vasudevan (1986). Theoretically, collective enterprises have maintained three distinct views on their organisational form; a vertically integrated firm, an independent business enterprise, and a coalition of firms. Due to the different views of their organisational form, collective enterprises may also vary in their objectives (LeVay, 1983). Measuring performance in such enterprise become further complex owing to double commitment of their members as users and owners. They have dual performance objectives including short term remuneration (for the users) and long-term value creation (for the owners). Accordingly, the performance of co-operatives and other collective enterprises have overlooked from many facets. They include economic (technical, scale, and allocative efficiency), financial and non-financial, objective and subjective measurements.

Taking this complexity into account, with respect to social enterprises, Bagnoli and Megali (2011) develop a performance measurement system to measure the success. The system incorporated economic-financial performance, social effectiveness, and institutional legitimacy aspects. The economic-financial performance linked to the determination of general performance (profits, value added, and so forth) and analytic results (production-cost of services, efficiency indicators). Social effectiveness assumed to measure the quantity and quality of work undertaken and to identify its impact on the intended beneficiaries and the community. Institutional legitimacy expected to verify conformity with law and mission statement. In integrating these aspects, authors developed a multidimensional controlling framework that is appropriate to the management of a social enterprise.

Nikša, Jurica, and Liljana (2014) examined the performance measurement of non-profit organisations. Authors argue that it is challenging to define the non-profit performance as exactly as with the for-profit sector. The challenge is brought by the large diversity of organisational missions and objectives. Non-profit organisations are also constituent of multiple stakeholders whose perceptions and priorities could be significantly different. Hence, overall performance of a non-profit is almost always socially constructed.

With respect to co-operatives Richard J Sexton and Iskow (1988) noted two categories of performance those based on concept of economic efficiency and financial ratios. Among the economic efficiency studies, (P. K. Porter & Scully, 1987) utilised a production function approach to estimate the efficiency of co-operatives and compare it with investor-owned firms. Richard J

Sexton, Wilson, and Wann (1989) tested the allocative efficiency of co-operatives to assess co-operatives' capital utilisation. Findings concluded that there was not an underutilisation of capital as it was argued in the literature. Akridge and Hertel (1992) compared cost differences between co-operatives and investor-owned firms. They found a small but statistically insignificant efficiency advantage for co-operatives applying a trans log multiproduct cost function. These efficiency comparisons however have not accounted the other services co-operatives provide such as information sharing, community services, lobbying activities and so forth. These services obviously contribute to co-operatives' costs. Hence, mere economic performance alone may not have provided a complete picture about their performance as argued by Richard J Sexton and Iskow (1993).

Several authors have studied the performance of co-operatives based on the second criteria mentioned above; financial ratios. Schrader, Babb, Boynton, and Lang (1985) conducted a comparative study of performance of co-operatives and proprietary businesses using financial reports and opinion surveys. They estimated the rate of return on assets and found that proprietary businesses have higher rate of return on assets compared to co-operatives. Leverage on the other hand was high in co-operatives compared to their counterpart proprietary businesses. Similarly, (Lerman & Parliament, 1990) also used financial ratios to compare performance of co-operatives and investor-owned firms. Authors found comparable leverage in both co-operatives and investor-owned firms and generated similar rates of return to equity. Moreover, greater liquidity and asset efficiency were found in investor-owned firms compared to co-operatives. Thus, their findings were mixed, similar to those reported by Schrader et al. (1985). (Parliament, Lerman, & Fulton, 1990) compared the financial performance of the two types of dairy firms; co-operatives and investor-owned firms. Authors found significantly better performance in co-operatives with respect to leverage, liquidity and asset efficiency. However, rates of return to equity were comparable between co-operatives and investor-owned firms. Financial indicators also have used by some authors to measure the performance of co-operatives that have internationalised their activities. For instance, Ebneth and Theuvsen (2005) used balance sheet analysis to measure the performance of European co-operatives extended their activities to international level. Financial ratios such as return on equity, return on assets, net profit ratio, and net debt to equity ratio was employed in their analysis. Financial ratio-based analysis of performance in co-operatives however have been

criticised by some authors (Richard J Sexton & Iskow, 1993) for their lacking of economic basis despite they have been popularly used.

In most recent literature, performance of collective enterprises included sustainability paradigm as well. For example, Marcis, de Lima, and da Costa (2019) contribute to the theory of sustainable operations by providing a model for sustainability performance assessment that is applied to agricultural co-operatives. Authors assessed the adherence of a set of sustainability performance indicators to form an assessment model to agricultural co-operatives' operations. Empirical data collected from five case studies revealed a better adherence of the studied agricultural co-operatives to the model and concluded that the model is feasible to apply, useful, and easy to comprehend and use.

This review of measuring performance in co-operatives and other collective action shows multiplicity and complexity of the approaches. Also, there are considerable discrepancies over different approaches as well. Double commitment of co-operative members, as users and owners, co-operatives face a problem of dual performance objectives. Thus, none of the approaches encompass multiple objectives on the other hand. This debate makes it very challenging to choose among different approaches to measure co-operatives' performance. However, this study will follow the tradition of business sciences to measure the performance based on financial ratios. Furthermore, vertical coordination in this study is seen from a managerial perspective and emphasis on control of organisation's value adding activities. Financial ratios provide information about the success or failure of business activities and thus form a basis for the decisions of management, shareholders and creditors.

3.8 Value Chain Theory

The use of the concept of value chain dates back to the 1960s and 1970s in an attempt to chart a path of development for mineral exporting economies (Girvan, 1987). It was also adopted in French planning literature in the form of the *filiere* (thread). However, with Porter's, (1985, 1990) writing, and Womack and Jones (2010, p. 5) work which used the term "value stream", value chain analysis has become widely used. Recent prominence of the use of the value chain concept, particularly in relation to developing countries, arose from the work of (Gereffi, 1999a, 1999b).

Value chains have been defined in a number of ways by different authors. Several common terms have been used interchangeably, such as commodity chain, activities chain, production network,

value network and input-output analysis. M. E. Porter (1985, p. 36) defines a value chain as "*a set of activities that an organisation carries out to create value for its customers*". Referring to an organisation's value chain, M. E. Porter (1985) contends that an organisation is more than a random compilation of machinery, equipment, people and money. An organisation's activities are linked to its competitive position. Accordingly, value chain analysis evaluates which value each particular activity adds to the organisation's products or services. Porter argues that the ability to perform particular activities and managing the linkages between them is the source of competitive advantage of the firm.

Porter distinguished primary activities of a value chain. Primary activities connected to the creation or delivery of product or service, whereas support activities help to increase the efficiency or effectiveness of primary activities. Primary activities include; inbound logistics, operations, outbound logistics, marketing and sales, and services. Support activities include: procurement, technology development (R & D), human resource management, and infrastructure (systems for planning, finance, quality, information management etc). Margin refers to the organisation's profit margin that depends on its ability to manage the linkages between all activities of a value chain. The basic model of Porter's value chain is illustrated in Figure 3-1.

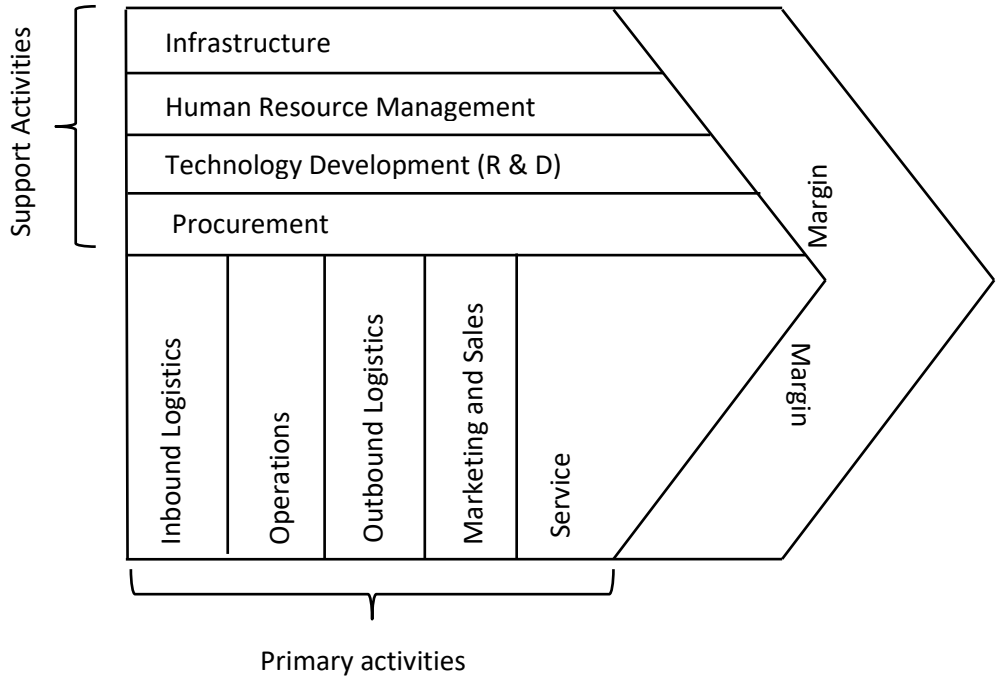

Figure 3-1: Porter's value chain (Source: (M. E. Porter, 1985))

Porter (1985) further argues that it is uncommon to operate all activities of a value chain by a single organisation. Hence, he contends that organisations are elements of the whole value system or supply chain and, therefore, value chain analysis, should encompass the whole value system in which the organisation operates.

Kaplinsky (2000, p. 121) defined the value chain as "*the full range of activities which are required to bring a product or service from conception, through the intermediary phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use*". Kaplinsky (2000) illustrated the most elementary form of the value chain that consists of three activities as shown in Figure 3-2.

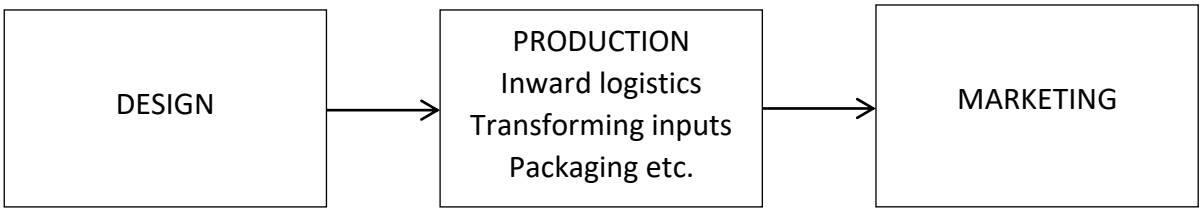

Figure 3-2: A sample value chain (Source: (Kaplinsky, 2000))

Sturgeon (2001, p. 11) defines a value chain as "*the sequence of productive (value added) activities leading to and supporting end use*". He also distinguished "value chains" from "networks" and these distinctions are summarised in Table 3-8. Considering the process of analysis that takes into account the entire chain of productive activities, it has been commonly referred to as a value-chain, commodity chain, activities chain, production network, value network, and input-output analysis.

Table 3-8: Value chain vs. production network

Name	Definition	Metrics	Other names
1. Value chain	the sequence of productive (value added) activities leading to and supporting end-use	the bundles of activities that various actors do, or do not, engage in	supply chain commodity chain production chain activities chain product pipeline
2. Production network	a set of inter-firm relationships that bind a group of firms into a larger economic unit	the character and extent of inter-firm relationships	value network supply base

Source; (Sturgeon, 2001)

Sturgeon (2001) further argues that value chain exists within a complex of institutions and supporting industries. It is sustained by a variety of critical inputs such as human resources, infrastructure, capital equipment, and services. The extended value chain proposed by Sturgeon (2001) is illustrated in Figure 3-3.

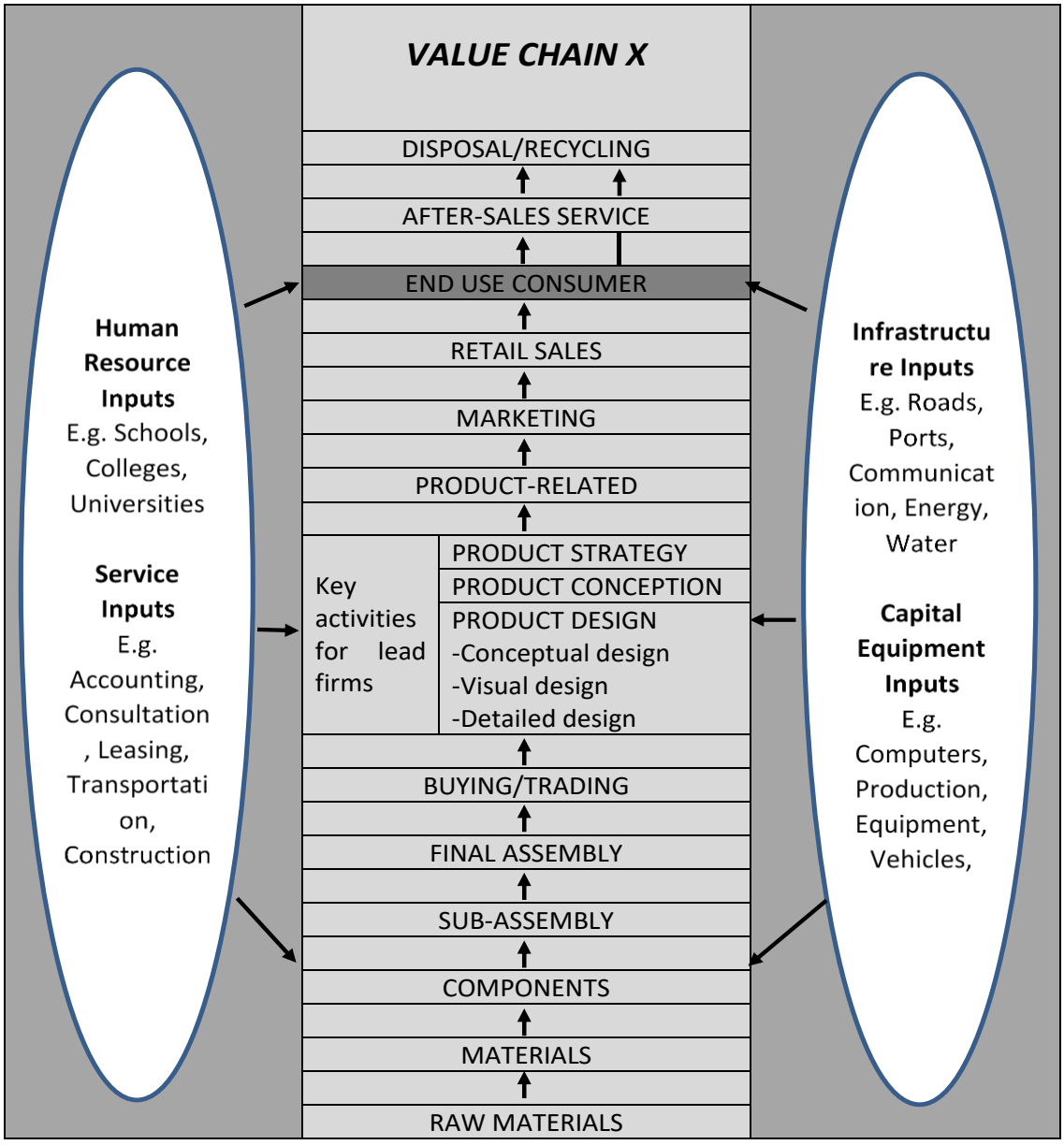

Figure 3-3: Extended value chain with inputs
Source: (Sturgeon, 2001)

With regard to global value chains, Kogut (1985, p. 15) define value added chain as "*the process by which technology is combined with material and labour inputs, and then processed inputs are assembled, marketed, and distributed*". This was subsequently adopted by Gereffi, Humphrey, and

Sturgeon (2005). Kogut (1985) also contends that the firm may consist of only one link in this process, or it may be extensively vertically integrated.

3.8.1 Dimensions of Value Chains

Value chains constitute important dimensions. They include organisational scale, spatial scale and value-chain productive actors. These dimensions are discussed below.

Organisational Scale

Sturgeon (2001) argues that organisations have a breadth and a length. Breadth is denoted by the term "value thread" and it is defined as the product-based thread of activity that runs through a large constellation of activities embedded in a value chain at a given time. Length of a value chain refers to the segment of a value chain from the lead firm (the firm that initiates the flow of resources and information through the value chain by developing and marketing final products) and suppliers. Distinctions were identified among value threads, supply threads, value chains and supply chains based on the organisational scale as summarised in Table 3-9. Accordingly, the supply chain encompasses a whole range of activities that lead to and support the end use of products or services including the lead firm.

Table 3-9: Value chain organisational scale

Name	Definition	Metrics
1. Value thread	The productive (i.e., value added) activities that lead to and support the end use of a particular product or service	The bundles of activities that various actors do, or do not, engage in
2. Supply thread	The productive (i.e., value added) activities that lead to and support the end use of a particular product or service, excluding the activities of the lead firm	The bundles of activities that suppliers do, or do not, engage in
3. Value chain	The productive (i.e., value added) activities that lead to and support the end use of a set of related products or services, including lead firm(s)	The bundles of activities that various actors do, or do not, engage in
4. Supply chain	The productive (i.e., value added) activities that lead to and support the end use of a set of related products or services, excluding the activities of the lead firm(s)	The bundle of activities that suppliers do, or do not, engage in

Source (Sturgeon, 2001)

Spatial Scale

Spatial scale describes a value chain's geographical spread. Spatial scale, according to Gereffi (1999a), range from the firm level through, local, subnational, national, regional to international levels. Gereffi (1999a) distinguishes global commodity chains (GCC) from the concept of Porter's (1990) organisational value chain linking the international dimension in one end. At the other end, the scale is extended to sub-national levels and local levels adding industry specific agglomerations (Storper & Christopherson, 1987) and industrial districts (Piore & Sabel, 1984). Industrial districts are related to value chains and production networks since the firms depend on each other to bring a product or service to market. These approaches made a dichotomy between global versus local scales (Shoenberger, 1994). Table 3-10 presents a nomenclature of spatial scale and common synonyms used to cover the entire range of a value chain's spatial scale of local chains to global chains.

Table 3-10: Value chains/production network spatial scale

Name	Scale of operation	Other names
Local	Commute area	Industrial districts Specialised industrial cluster Regional economy
Domestic	Single country	Supply base National production system
International	More than one country	Cross-border production network International production network
Regional	Confirmed to a multi-country trade block (e.g., EU, ASEAN, AFTA, NAFTA)	Regional production system Regional production network
Global scale	Actors coordinate activities across at least two continents or trade blocks	Global commodity chain Global production network

Source (Gereffi, Humphrey, & Kaplinsky, 2001; Sturgeon, 2001)

Gereffi et al. (2001) introduced a parallel concept to value chain/production network scale. They link the scale into value chain analysis and identify four levels from which a value chain analysis can be conducted. Those levels are global, macro, meso or micro and factors considered are different at each level as illustrated in Figure 3-4. In the first case, the whole chain is taken into consideration while, in the last case, the position of the producer is focussed. Macro level analysis would refer to studying the chain at the national level, while meso usually refers to regional or city level activities.

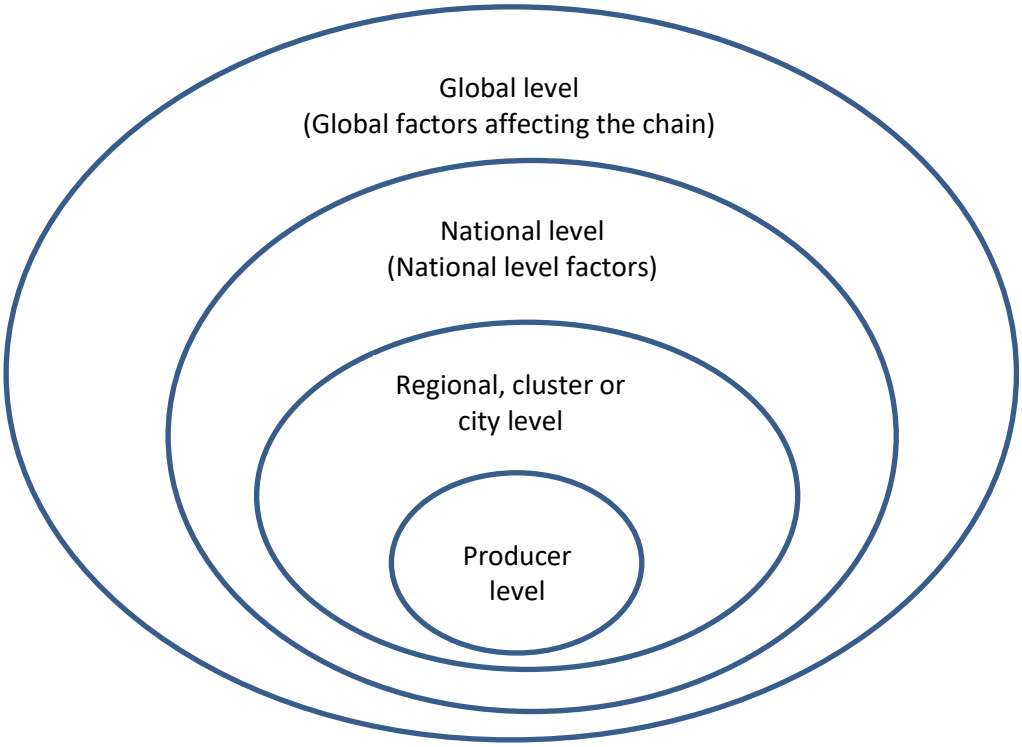

Figure 3-4: Levels of value chain analysis

Source: (M. P. Van Dijk & Trienekens, 2012)

Productive Actors

The third important dimension of value chains or production networks is the productive actors. The use of heterogeneous terms in different industries has become a great challenge in identifying similar patterns in value chain or production network structures that remain or emerge in industries. For example, suppliers who provide complete sets of manufacturing related services for their customers, such as investments in production facilities, component and material sourcing, manufacturing, quality assurance, in-bound and out-bound logistics, are referred to as contract manufacturers in the electronic and pharmaceutical industry, full package suppliers in the apparel industry, and systems or first-tier suppliers in the motor vehicle industry. However, they all occupy a similar terrain within the value chains or production networks of their respective industries. Sturgeon (2001) attempts to resolve the ambiguity of terminology by positioning specific bundles of activities in which firms are engaged, instead of firms or sectors within the value chain or production

network. Table 3-11 summarises the value chain/production network actors proposed by Sturgeon (2001).

Table 3-11: Value chain/production network actors

Actor	Scope of activity	Other names	Firm examples
Integrated firm	Product strategy Product definition Design Manufacturing Sub-assembly Component manufacturing Marketing, sales and distribution	Modern corporation Dinosaur	Old IBM Old Ford
Retailer	Sales Marketing Value-added packaging and system Integration	Marketer Distribution Reseller Value-added reseller (VAR)	Amazon.com Sears
Lead firm	Product strategy Product definition Product design End-user sales End-user marketing	Brand-name firm OEM Anchor firm	Dell Nike Ford IBM
Turn-key supplier	Complex parts and services Process R&D	System supplier OEM supplier First-tier supplier Contract manufacturer Full-package supplier Global supplier	Celestica Solectron T Ups, FedEx Arthur Anderson
Component supplier	Discrete elements (component parts and services)	Lower-tier supplier Specialised supplier Sub-contractor Commodity producer	Intel, Microsoft BF Goodrich

Source (Sturgeon, 2001)

3.8.2 Theoretical Approaches to Value Chains

Four theoretical approaches of value chains have emerged over the history based on the perspectives on inter-company relationships (Lazzarini, Chaddad, & Cook, 2001). They include: 1) global value chain analysis, 2) supply chain management, 3) new institutional economics, and 4) network approach. Table 3-12 summarises the perspectives addressed by different theoretical approaches. Accordingly, the global value chain analysis examined the relationship between multinational companies. Supply chain management approach emphasises the management of operations along the network of actors. New institutional economics look into the choice of

governing transactions between and within companies. Network approach on the other hand analyses the horizontal and vertical business support relationships among companies.

Table 3-12: Theoretical approaches to value chains

Theoretical approach	Perspective addressed	Contributors
Global value chain analysis	Relationships between multi-national companies (lead firm and other participants in international value chains)	(Gereffi, 1994; Gereffi et al., 2005; Gibbon, 2001; Gibbon, Bair, & Ponte, 2008; Kaplinsky, 2000; Kaplinsky & Morris, 2001; Nadvi, 2004; Sturgeon, 2001)
Supply chain management	Management of operations among a network of actors. (Supply chain management regarded as customer-oriented)	(Bowersox, Closs, & Cooper, 2002; M. C. Cooper, Lambert, & Pagh, 1997)
New institutional economics (basically transaction cost theory and principal agent theory)	Choice of governance regarding in-company and inter-company organisational relationships	(Eisenhardt, 1989a; Rindfleisch & Heide, 1997; Williamson, 1985, 1991)
Network approach	Horizontal and vertical business support relationships. (Argue that opportunism arising from asset specificity can be dampened by trust, reputation and mutual dependence)	(Coleman & Coleman, 1994; Humphrey & Schmitz, 2000, 2002a; Uzzi, 1997)

3.8.3 Key Elements of Value Chains

The literature identifies several important analytical elements of value chains. These include; value added, value capture, network structure, types of value chains, and governance. Following sections will review the key elements according to the literature.

Value-Added

According to Bowman and Ambrosini (2000) there are two classes of value. They are use value and exchange value. The use value is the specific qualities of a product perceived by customers in relation to their needs hence it is a subjective judgement. Accordingly, customers assess the overall value of a product on the perceptions of what is given and what is received (Zeithaml, 1988).

Exchange value refers to price. It is the monitory amount realised at a single point in time when the exchange of the good takes place.

Value added on the other hand related to quality, costs, delivery, flexibility and innovativeness (Trienekens, 2011). Value added is created at different stages and by different actors throughout the value chain. Value chains combine many value added links. Production alone represents a kind of value-adding (Kaplinsky, 2000). Value added is seen as the contribution of each link or player to the market value (Kogut, 1985). The size of the value added in the value chain is decided by the end-customer's willingness to pay and it can only be determined at the point of sale. Opportunities for a value chain actor/s to add value depend on a number of factors. They include market characteristics, the technological capabilities of the actor and availability of market information on process and product requirements (Kaplinsky, 2000).

Value Capture

Value capture is about how organisations/actors/firms in the value chain appropriate value. Putting it another way, it is about how actors capture their share of value/return/wealth arising from value-added activities (design, production, marketing, coordination and recycling) deployed by them (Kaplinsky & Morris, 2001). Value is captured by the parties who are capable of protecting themselves from the competition (Kaplinsky & Morris, 2001).

From the perspective of strategy (M. E. Porter, 1985), value capture refers to the configuration of the organisation's/actor's/firm's primary and support activities to maximise and sustain competitive advantage. From the resource base view of the firm (Barney, 1991), value capture refers to identifying the types of resources that can act as isolating mechanisms against the potential competitors. Barney (1991) argues that rare, inimitable, non-substitutable and valuable resources limit competition acting as isolating mechanisms. Sirmon, Hitt, and Ireland (2007), on the other hand, argue that value capture results from resource management. According to them, actions of structuring resource portfolios, bundling resources to build capabilities, and leveraging capabilities to exploit market opportunities, create and exploit value for customers, as well as owners.

Network Structure

Network structure refers to organisation of horizontal and vertical inter-relationships in a value chain (Lazzarini et al., 2001) as illustrated in Figure 3-5.

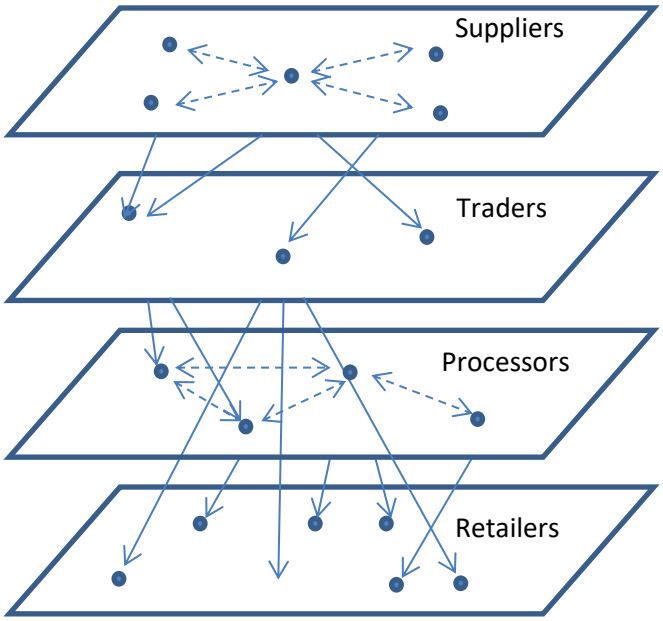

Figure 3-5: Illustration of network structure (net chain) of a value chain
Source: (Lazzarini et al., 2001)

Horizontal relationships exist between same level actors (e.g., between farmers, between processors, between retailers, etc.) while vertical relationships exist between actors of different levels (e.g., between producer and trader, between supplier and processor, etc). Vertical relationships may follow all stages or may skip some links (e.g., retailer can directly link to supplier by passing processors or traders). Horizontal relationships could be a price agreement between traders or a farmer co-operative, for example. Lazzarini et al. (2001) also contend that the network structure depends on the market channel which can be defined as a value chain or a supply chain that channels products or services which are intended for sales in a certain market.

Types of Value Chains

Gereffi (1999b, p. 1) has identified two types of value chains; producer-driven chains and buyer-driven chains, building on the concept of governance. “Producer-driven commodity chains are those in which large, usually transnational, manufacturers play the central roles in coordinating production networks (including their backward and forward linkages)”. This was commonly found in capital - and technology-intensive industries such as automobiles, aircraft, computers, semiconductors, and heavy machinery.

According to Gereffi (1999b, p. 1) “Buyer-driven commodity chains refer to those industries in which large retailers, marketers, and branded manufacturers play the pivotal roles in setting up decentralised production networks in a variety of exporting countries, typically located in the third

world". These types of commodity chains were commonly found in labour-intensive, consumer goods industries such as garments, footwear, toys, housewares, consumer electronics, and a variety of handicrafts. In this system, production specification was generally provided by the large retailers or the marketers and production carried out through a network of contractors. Key characteristics of these two types of value chains are summarised in Table 3-13.

Table 3-13: Characteristics of producer and buyer-driven commodity chains

Character	**Producer-Driven Commodity Chain**	**Buyer Driven Commodity Chain**
Drivers of global commodity chains	Industrial capital	Commercial capital
Core competencies	Research and development; production	Design; marketing
Barriers to entry	Economies of scale	Economies of scope
Economic sectors	Consumer durables, Intermediate goods, capital goods	Consumer non-durables
Typical industries	Automobiles, computers, air crafts	Apparel, footwear, toys
Ownership of manufacturing firms	Transnational firms	Local firms predominantly in developing countries
Main network links	Investment-based	Trade-based
Predominant network structure	Vertical	Horizontal

Source (Gereffi, 1999b)

Governance of Value Chains

Gereffi (1994, p. 94) defined value chain governance as *"authority and power relationships that determine how financial, material and human resources are allocated and flow within a chain"*. Gereffi et al. (2005) identified five types of value chain governance relevant to global value chains. They include market, modular, relational, captive and hierarchy as shown in Figure 3-6. This typology is based on the competence a supplier has in determining the extent of subordination to a buyer as introduced by Humphrey and Schmitz (2000, 2002a).

Kaplinsky and Morris (2001, p. 67) defined governance as *"relationships among actors of a value chain and regulatory institutions that influence the operations or range of activities required to bring a product or service from inception to its end use"*. Altenburg (2006) contends that governance is broader than power to control and it deals with cooperation between all the stakeholders. The "governance" element of value chain has become important, particularly on global value chains as

a result of the changing nature of trade in the era of globalisation. The nature of occurring trade has changed from arm's-length relationships (market) to more complex relationships from late nineteenth/early twentieth to late twentieth century (Feenstra, 1998; Hummels, Ishii, & Yi, 2001). The complex nature of trade in the globalisation era (international trade in late twentieth century) requires sophisticated forms of coordination, not only in logistics, but also in the design of the final products and quality standards. Governance reflects the coordination of the roles that generate dynamic rents in the value chain and assigning roles to key players.

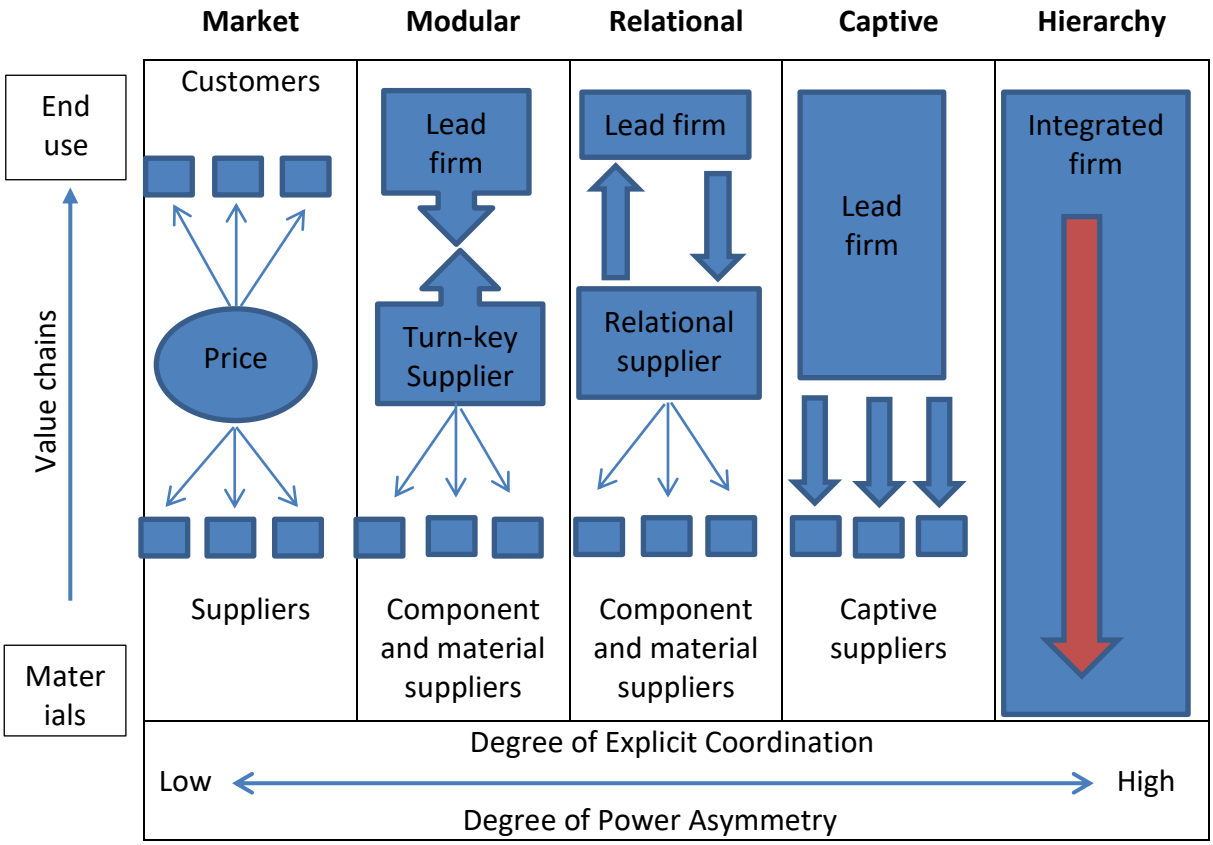

Figure 3-6: Global value chain governance types
Source: (Gereffi et al., 2005)

Kaplinsky (2000) identifies and distinguishes three forms of governance extending Gereffi's (1994) concept based on principles of civic governance. They include legislative, judicial and executive governance. The setting of the basic rules that define the condition for participation in the value chain has been defined as 'legislative governance'. 'Judicial governance' has been seen as the auditing of performance and checking of compliance to these rules. Executive governance has been referred to as the form of proactive governance required in order to meet the rules of participation

which provides assistance to value chain participants in meeting these operating rules. Roles of governance by parties internal to, and/or external to the value chain are summarised in Table 3-14.

Table 3-14: Governance roles of external and internal parties to a value chain

	Exercised by parties internal to value chain	**Exercised by parties external to value chain**
Legislative governance	Setting standards for suppliers in relation to on-time deliveries, frequency of deliveries and quality	Environmental standards
Judicial governance	Monitoring the performance of suppliers in meeting these standards	Monitoring labour standards by NGO Specialised firms monitoring conformance to ISO standards
Executive governance	Supply chain management assisting suppliers to meet these standards Producer associations assisting members to meet these standards	Specialised service providers Government industrial policy support

Source (Kaplinsky, 2000)

Focussing explicitly on governance of disintegrated and vertically integrated chains, their relationships and network structures, a number of researchers (Gereffi et al., 2005; Gereffi & Memedovic, 2003; Giuliani, Pietrobelli, & Rabellotti, 2005; Humphrey & Schmitz, 2002a; Pietrobelli & Saliola, 2008) have studied different forms of cross-border organisation of industries and their drivers.

3.9 Vertical Coordination

The term “coordination” has been defined as managing dependencies between activities (Malone & Crowston, 1994). Vertical coordination has been evident from different industries worldwide. Some (Hobbs & Young, 2000; World Bank, 2006) argue that in most of the developed countries, the concept of vertical coordination started some time ago, although it is a more recent phenomenon in developing countries. Many economic factors affect an industry’s vertical organisation at national, regional and global levels. Changes in technology, regulations, financial factors as well as consumer preferences, such as quality and safety concerns, are some of the contributory factors for closer vertical coordination.

As defined in the pioneering effort by (Mighell & Jones, 1963) vertical coordination includes all the ways of synchronising vertical stages of production and marketing systems. According to Sporleder (1992), vertical coordination aligns and control price, quantity, quality and terms of exchange along

the vertical stages of production and marketing. There are a number of theories regarding the motives for vertical coordination.

3.9.1 Theoretical Perspectives towards Vertical Coordination

Vertical coordination was seen from different theoretical perspectives such as transaction cost theory, strategic management theory, and behavioural science approaches. The following sections describe those theoretical perspectives.

Transaction Cost Economics Perspective

Transaction cost economics theory is the most widely used approach to vertical coordination. It provides valuable insights into the presence of vertical coordination. Incentives for vertical coordination arise as a result of market imperfections. Accordingly, vertical coordination exists as a result of the costs associated with transactions between economic agents under the circumstances in which the neoclassical assumption of perfect and costless information is violated. New institutional economists (Hennessy, 1996; Shelanski & Klein, 1995; Williamson, 1981) show that information asymmetry, bounded rationality and opportunistic behaviour of economic agents create transaction costs. Moreover, Cheung (1983) argues that transaction costs can be associated with *ex-ante* (before), during and *ex-post* (after) situations of transaction.

Williamson (1971) argues that transaction characteristics have an influence on transaction costs and, hence, the choice of the governance structure. Integration of transactions (internal coordination) allows firms more opportunities to coordinate and control transactions by reducing coordination costs and transaction risks that would be higher otherwise through the spot market.

Scholars (B. Klein et al., 1978; Williamson, 1971) identify three important characteristics of a transaction that determine a suitable governance structure for efficient outcomes. They are asset specificity, uncertainty and transaction frequency. Asset specificity is the sunk costs of an investment made by a party involved in a transaction. The risk of opportunistic behaviour by the other party to the transactions rises when the asset specificity is high. Scholars (Hobbs, 1996; B. Klein et al., 1978; Williamson, 1979) argue that the likelihood of choosing vertical coordination (in the form of contracts and vertical integration) has increased as the preferred form of governing transactions.

Parties involved in a transaction face various uncertainty (Barzel, 1982). For instance, a buyer faces uncertainty on the reliability of supply in terms of time, quantity and quality that impose costs on

sorting, screening, and monitoring to the buyer. A producer, on the other hand, faces uncertainty in finding a buyer, especially when the products have specific quality. Such uncertainties raise the information or search costs and monitoring costs of the producer and buyer leading to a high transaction cost. Higher uncertainty increases the likelihood of choosing vertical coordination as an appropriate governance structure over the spot market (Hobbs, 1996).

The frequency of transactions is somewhat self-explanatory, and if the transactions happen more often in low uncertainty situations, they are carried out in the spot market. Repeated and frequent transactions induce learning and build reputation mitigating opportunistic behaviour (Williamson, 1979).

Drawing from transactions cost economic literature, the emergence of vertical coordination in the recent past have been examined by many scholars (Fałkowski, 2012; Hobbs & Young, 2000; B. Klein et al., 1978; Martinez, 1999, 2012; Schulze, Spiller, & Theuvsen, 2007) in their recent work.

Strategic Management Perspective

Most management theories employ a strategic or an organisational theoretical perspective to explain vertical coordination. Management scholars (Harrigan, 1985a; R. P. King, 1992; H. C. Peterson et al., 2001) took a different approach and conceptualised vertical coordination as a strategy which aligns decision making across segments of production or marketing systems. Accordingly, vertical coordination is considered as an organisational structure that shares decision making responsibilities among different actors in a production/marketing system.

Based on this view, R. P. King (1992, p. 1218) defines vertical coordination as the "*alignment of direction and control across segments of a production/marketing system*". According to the strategic management theorists (Barry, Sonka, & Lajili, 1992; M. E. Porter, 1980) vertical coordination is a way of influencing the competitive forces in an industry or of gaining and sustaining competitive advantages and power. Influenced by organisation theory, vertical coordination of food chains has been considered as a decision-oriented concept by the scholars (Borys & Jemison, 1989; McCann & Galbraith, 1981; Van de Ven, Delbecq, & Koenig Jr, 1976) and analysed accordingly.

Social Network Perspectives

Behavioural science scholars explain the vertical coordination from a social network perspective. It is argued that the choice of vertical coordination as a governance structure depends on behavioural factors. Accordingly, trust (Batt, 2003; M. H. Hansen, Morrow, & Batista, 2002), attitude (N. Key &

McBride, 2003; Roe, Sporleder, & Belleville, 2004; World Bank, 2006) and preferences for entrepreneurial freedom (N. Key, 2005; N. D. Key & MacDonald, 2006) are important factors for choosing efficient governance structures.

Further, some scholars (Bradach & Eccles, 1989; Granovetter, 1979) argue that the risk that arises from a high degree of uncertainty and high specific investments cannot only be reduced by ties of ownership-rights or contracts as explained in transaction cost approach, factors such as trust also play a significant role. Behavioural approaches further point to many trade-offs between the dimensions of control and the intrinsic motivation of a business partner (Frey & Jegen, 2001).

3.9.2 Methods of Vertical Coordination

H. C. Peterson et al. (2001) have suggested five major categories of vertical coordination strategies a firm can choose to coordinate market relationships, as presented in Figure 3-7. Vertical coordination is a continuum consisting of several methods having spot market and vertical integration (hierarchies) at the two extreme ends. A range of other methods exists in between including contracts, strategic alliances, partnerships, joint ventures, non-profit organisations (Joskow, 1987; Osborn & Baughn, 1990), information sharing and joint planning (Noordewier, John, & Nevin, 1990; Palay, 1985), different forms of networks (Thorelli, 1986) or hybrid governance structures (Borys & Jemison, 1989; W. W. Powell, 1987).

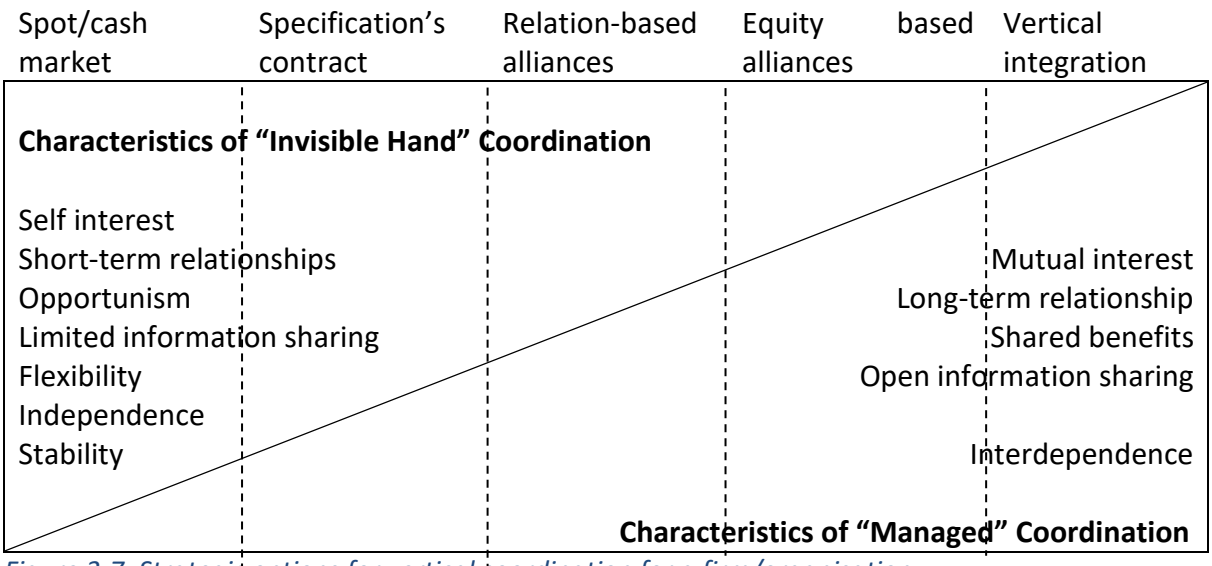

Figure 3-7: Strategic options for vertical coordination for a firm/organisation

Source: (H. C. Peterson et al., 2001)

Spot market coordination happens through price signals, whereas other coordination mechanisms work on a combination of pre-determined factors. Different changes in market forces cause the shift of coordination from spot market towards more organised vertical coordination (e.g., contracts or vertical integration). Vertical integration assumes full ownership of each successive stage in a value chain or market chain (R. P. King, 1992; Mighell & Jones, 1963). True hierarchy is achieved by merging two parties to a transaction, with one party committing resources to replace the market function of the other party (H. C. Peterson et al., 2001).

Martinez and Reed (1996) have identified three methods of vertical coordination referring to the synchronisation stages of marketing and production with respect to quantity, quality and timing of product flows. They include open production (also referred to as open, or spot, market), contract production and vertical integration (Figure 3-8). In open production cash (or spot) prices coordinate resource allocation in successive stages of production and marketing and firms have no commitment to sell their production before completing the production. In contract production, goods are produced for future delivery to a particular buyer. The interaction between buyer and seller determines the allocation resources and risk. Contracts can be market-specific contracts or resource-specific contracts. In vertical integration, a single firm controls two or more successive stages of vertical market. The resource allocation is determined by management directives.

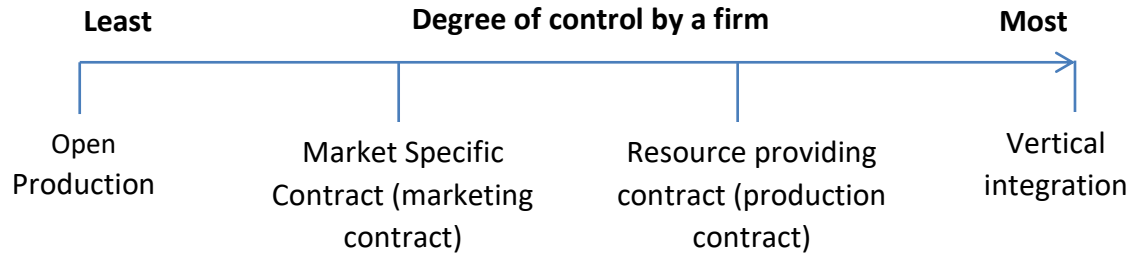

Figure 3-8: Methods of vertical coordination according to the degree of control over individual market stages
(Source: (Martinez & Reed, 1996))

Along the vertical coordination continuum, the process of control shifts especially across the middle strategies. The continuum moves from low levels of coordination control intensity (spot market) to high levels (vertical integration) while passing through several transitional levels of ever-increasing intensity (specification contracts, relation-based alliances, and equity-based alliances). The nature

of control also transits from *ex-ante* to predominantly *ex-post*. Table 3-15 provides a summary of how control intensity changes across the continuum.

Table 3-15: Control intensity across the vertical coordination continuum

	Spot market	**Specification contract**	**Relation-based alliance**	**Equity based-alliance**	**Vertical integration**
Intensity of control	Low (*ex-ante* dominate)	Moderately low (*ex-ante* dominate)	Moderate (mixed *ex-ante* and *ex-post*) relationship	Moderately high (*ex-post* dominate)	High (*ex-post* dominate)
Focus of control	Immediate transaction	Contract terms	Relationships	Property rights of stakeholders in limited joint entity	Property rights of stake holders in full entity
Ex-ante control process	Price discovery Yes/no decision to transact	Setting specifications Setting incentives	Relationship building Setting informal parameters	Negotiating the formal decentralised *ex-post* governance structure	Negotiating the formal decentralised *ex-post* governance structure
Ex-post control process	Yes/no decisions to repeat the transaction	Decision to renew/re-negotiate contract, or seek third party enforcement	Mutual resolution or dissolution	Execution of governance policies and procedures in the limited entity	Execution of governance policies and procedures in the full entity

Sources (MacDonald et al., 2004; H. C. Peterson et al., 2001)

3.10 Vertical Integration

3.10.1 Definitions of Vertical Integration

Table 3-16 provides definitions of vertical integration introduced by theorists from different perspectives. Most definitions stemmed from transaction cost, strategic management, supply chain/value chains management and social network perspectives. The definitions rooted from transaction cost perspectives emphasise both ownership and centralised control as the key dimensions. Whereas, strategic management and supply chain/value chain perspective include centralised control as the key dimension. Social network perspective sets contractual relationships as the key dimension. Overall, centralised control remains as the common dimension in almost all the definitions irrespective of the perspective they are born. On the contrary, the definition rooted in the social network perspective recognises autonomous control with relational contracts.

Table 3-16: Definitions of vertical integration, key elements and perspectives

Author	Definition	Dimension/s	Perspective
Martinez (1999)	Vertical integration is defined is a method of vertical marketing system synchronisation in which coordination of two or more stages occur under common ownership via management directive.	Unified ownership and centralised control	Transaction cost
Joskow (2005)	Vertical integration is the internal organisation of vertical relationships involving suppliers of intermediate goods and services ("upstream") and the purchasers of those goods and services ("downstream").	Unified ownership and centralised control	Transaction cost
H. C. Peterson et al. (2001)	Any event, coordination control is exercised within the policies and procedures of a single organisation	Centralised control	Strategic management
L (1983)	Vertical integration is a combination of decisions regarding whether the firm should provide goods and services in-house through its own business units, or purchase them from outsiders instead	Centralised control	Strategic management
Sturgeon (2001)	Engaging of entire range of value chain activities, from product strategy through to component manufacturing by a single firm	Centralised control	Supply chain/Value chain management
Robinson and Casalino (1996)	Virtually-integrated structures in which coordination is achieved through contract	Autonomous ownership and contractual relationship	Social network

The above discussion shows that vertical integration emphasises on centralised control of one or more upstream or downstream stages/activities of a value chain or vertical marketing systems by a single firm with or without a common ownership. Only transaction cost perspective emphasises the common ownership as an important element. However, all other definitions emerged from other perspectives suggest that it is possible for an enterprise in a product value chain to centrally control its upstream and downstream activities without a common ownership. Accordingly, this study also assumes that co-operative enterprise also centrally controls a few, or all of upstream and downstream value adding activities of a product value chain with or without a common ownership. Relying on this discussion the definition for co-operatives' vertical integration in this study is introduced in the following chapter.

3.10.2 Theoretical Perspectives of Vertical Integration

Vertical integration has been analysed from multiple perspectives based on academic discipline. Institutional economists (B. Klein et al., 1978; P. Klein, 1998; Shelanski & Klein, 1995; Williamson, 1971, 1979) view vertical integration as a means of economising transaction costs. Strategic management scholars (Harrigan, 1983, 1984, 1985a; H. C. Peterson et al., 2001) consider vertical integration as a management innovation and contend it is a corporate/business level strategy. Supply chain management scholars (Bowersox et al., 2002; M. C. Cooper et al., 1997) discuss vertical integration as a way of optimising logistic planning and operations. Social network theorists (Borgatti, Mehra, Brass, & Labianca, 2009; N. Lin, 2017; Uzzi, 1997), on the other hand, emphasise inter-firm relationships (such as trust, reputation and dependencies).

Transaction Cost Economic Perspective

Transaction cost economics theory is the widely used approach to vertical integration. This perspective asserts that vertical integration exists as a result of the costs associated with transactions between economic agents. New institutional economists (Hennessy, 1996; Shelanski & Klein, 1995; Williamson, 1981) show that information asymmetry, bounded rationality and opportunistic behaviour of economic agents related to a transaction create transaction costs. According to Cheung (1983) transaction costs exists both *ex-ante* (before), during and *ex-post* (after) situations of a transaction.

Williamson (1971) and B. Klein et al. (1978) argue that transaction characteristics (asset specificity, uncertainty and transaction frequency) have an influence on transaction costs and, hence, the choice of the governance structure. Vertical integration (internal coordination) allows firms more opportunities to coordinate and control transactions by reducing coordination costs and transaction risks that would be higher otherwise through the spot market.

When the assets are more specific, the risk of opportunistic behaviour by the other party to the transactions rises and the likelihood of choosing vertical integration increase as a result (Hobbs, 1996; B. Klein et al., 1978; Williamson, 1979). Producers and buyers face uncertainties due to lack of proper information especially when the products have specific quality (Barzel, 1982). Such uncertainties raise the information or search costs and monitoring costs of the producer and buyer leading to a high transaction cost. Higher uncertainty increases the likelihood of choosing vertical integration as an appropriate governance structure over the spot market (Hobbs, 1996). The frequency of transactions is somewhat self-explanatory, and if the transactions happen more often

in low uncertainty situations, they are carried out in the spot market. Repeated and frequent transactions induce learning and build reputation mitigating opportunistic behaviour (Williamson, 1979). Drawing from transactions cost economic literature, the emergence of vertical integration and other vertical coordination options have been examined by many scholars (Fałkowski, 2012; Hobbs & Young, 2000; B. Klein et al., 1978; Martinez, 1999, 2012; Schulze et al., 2007) in their recent work.

Strategic Management Perspective

Strategic management scholars (Harrigan, 1983, 1984, 1985a; H. C. Peterson et al., 2001) contend that vertical integration as a corporate/business-level strategy for effective management to gain a competitive advantage. Vertical integration, according to strategic management scholars has been a way of increasing a firm's value-added margin. This idea is contrary to the transaction cost economics, supply chain management and network theories discussed in this section. This theory views vertical integration from strategic decisions related to providing goods and services at a corporate level. Corporates can provide goods and services in-house or can purchase from outside. Harrigan (1985a) contends that in vertical integration, a firm may (1) control vertical relationships without even fully owning the adjacent business units, (2) may enjoy benefits of vertical integration without transferring all of their output internally, (3) may (or may not) perform a variety of integrated activities at a particular stage of processing, or (4) may engage in many (or few) stages of processing activities. Vertical integration can be described as backward (such as integrating production operations by a processor) and forward (such as integrating retailing activities by a processor) based on the stages of a market chain integrated by a particular player.

Supply Chain Management Perspective

Supply chain management literature explains management of operations in supply chains. It focusses on logistics planning and operation of inventories across the supply chain. From this perspective, vertical integration means the integration of business planning and balancing supply and demand along the supply chain from initial producer to the ultimate customer. Accordingly, supply chain integration also includes information and communication systems (Bowersox, Closs, & Cooper, 2002; Cooper, Lambert, & Pagh, 1997) and discusses how they are internalised. The focus of supply chain is on primary processes, that is, transformation and transaction processes in and across vertically-related companies. Accordingly, supply chain management focusses on the process of quality improvement and optimisation of distribution processes.

Social Network Perspective

Network theory explains the structure and the duration of inter-firm relationships. This theory argues that inter-firm structures and relationships are not only shaped by economic considerations, but also by other concepts such as trust, reputation and power (Borgatti et al., 2009; N. Lin, 2017; Uzzi, 1997). The theory posits that network relations may enhance the social capital of firms by leveraging access to information, transfer of knowledge, technological expertise and financial support (Burt, 1997; Coleman & Coleman, 1994) (Humphrey & Schmitz, 2002a). Consequently, network relations improve access to market-reducing transaction costs (R. Gulati, 1998). Horizontal and vertical relationships have also supported efficiency and effectiveness of business networks (Giuliani, Pietrobelli, & Rabellotti, 2005). Network theory maintains that inter-firm horizontal and vertical relationships (trust, reputation, dependencies) reduce opportunistic behaviour (Gereffi et al., 2005; Lindgreen et al., 2008).

In summary, vertical integration has seen mainly from four perspectives; transaction cost, strategic management, supply chain management, and social network perspective. Of them strategic management perspective considers vertical integration as a management strategy to increase firm's value-added margin and gain a competitive advantage through strict control of upstream and downstream value adding activities within the enterprise itself. As discussed in the previous literature, how effective an enterprise in managing its value-added links decides its competitive position. This view of vertical integration has great relevance in the current context where there is a transforming agri-food industry particularly in the developing countries. Accordingly, co-operative's vertical integration in this study was considered as a strategy to increase their value-added margin and gain competitive advantage.

3.11 Summary

This chapter reviews applicable theories to the research problem. In summary, the review of collective action theory informs that co-operatives as a form of horizontal integration share some of the collective action principles. For instance, a co-operative itself is a collective action formed by a group of individuals to pursue a common objective. Collective action theory is about collective action taken to pursue a common goal.

According to the literature, co-operative enterprises embrace some efficiency degrading organisational weaknesses compared to investor-owned firms. Particularly, traditional co-operatives have portfolio, horizon, free rider, control and influence cost problems. These

institutional weaknesses are likely to hamper their performance. Collective enterprises including co-operatives are also identified to have many advantages for their patron-owners. However, the co-operative's ability to realise its potential performance and distribution of benefits to members depends critically on the co-operative's structure and practices.

Moreover, vertical integration has been analysed from multiple perspectives. Strategic management recognises vertical integration as an organisational level strategy to gain a competitive advantage by optimising an organisation's operation by centrally controlling them. The principal competitive advantages of integration are improved marketing and technological intelligence, the ability to control the organisation's economic environment, and product differentiation. The main internal benefits of vertical integration include the organisation's profitability.

4 APPLICATIONS OF RELEVANT THEORIES IN AGRICULTURE AND THEORETICAL FRAMEWORK

4.1 Introduction

This chapter reviews the application of relevant theoretical concepts discussed in the previous chapter. The chapter proceeds as follows. Section Two discusses applications of collective action theory in agriculture. Section Three reviews empirical studies on co-operatives in agriculture. Applications of value chain theories in agriculture are discussed in Section Four. Section Five reviews empirical evidence on vertical coordination and vertical integration in agriculture. Section Six discusses co-operatives' vertical integration in agriculture. Last, the theoretical framework used in this study is described in Section Seven.

4.2 Collective Action in Agriculture and their Forms

Taking insights from the collective action theory, scholars (Bijman, Muradian, & Schuurman, 2016; Fischer & Qaim, 2012a; Hellin et al., 2009; Markelova et al., 2009; Olson, 1965; Staatz, 1987a; Valentinov, 2007) have conceptualised various forms of collective attempts taken by individuals involved in agriculture (producers in particular) to solve their common social and economic problems as a collective action. Several studies (Bendor & Mookherjee, 1987; Feiock, 2013; Morck & Yeung, 2003; Olson, 1965, 2009; E. Ostrom, 2003; Rosairo et al., 2012) have argued that, in principle, individuals form groups voluntarily to pursue shared objectives. However, none of the above studies explicitly evaluate the principal elements of collective attempts taken by individuals in agriculture against the action theory.

Collective action in agriculture is argued to exist in the form of more formal associations, societies, co-operatives, unions, federations or firms that have been established to promote the interest of individuals involved in agriculture (Bijman & Wollni, 2008; Corsi et al., 2017; Markelova et al., 2009). Similarly, Shiferaw et al. (2016) identify social networks and informal institutions as informal forms of collective action, whereas producer organisations and co-operatives are considered more formal types of collective action. Clearly, different names have been used to identify organisations, or associations of individuals, abiding to similar fundamental principles, for example, producer groups (Banaszak, 2008), farmer associations (Shen, Rozelle, Zhang, & Huang, 2005), agricultural co-operatives (M. Fulton & Ketilson, 1992; Hussi et al., 1993; Staatz, 1987a), agricultural producer organisations (Rondot & Collion, 2001), farmer organisations (Stockbridge, Dorward, & Kydd, 2003), and farmers co-operatives (Garnevska, Liu, & Shadbolt, 2011).

Subsequent to the transformation in the agriculture and food industry, various forms of collective organisations have regained attention among scholars, policy-makers and donor organisations as a smallholder development strategy. Emerging new markets have produced both opportunities and challenges for smallholders, particularly in developing countries. In response, there was a growing concern related to enhancing farmers' access to markets, especially through high-value products, by engaging value-adding activities, such as processing of agricultural products and group marketing (Birthal, Joshi, & Gulati, 2005; Gulati, Minot, Delgado, & Bora, 2007; IFAD, 2003; Maspaitella, Garnevska, Siddique, & Shadbolt, 2018; Miehlbradt et al., 2005; Patrick, 2004; Shepherd, 2007; Warning & Key, 2002; World Bank, 2007). As Barton (1989) argues among various forms of collective action, co-operatives hold a unique position as private business organisations which has been widely used for more than 100 years.

New market opportunities have grown in response to rapid growth in global markets, in addition to the expansion of middle-income population and urbanisation in developing countries (Barghouti, Kane, Sorby, & Ali, 2004; Birthal et al., 2005). Producers supplying more sophisticated value chains, deliver processed and branded products to urban consumers instead of supplying basic staple foods to markets. This process has been accompanied by the changes in the retail markets characterized by an increasing number of supermarkets, particularly in developing countries (Julio A Berdegué, Balsevich, Flores, & Reardon, 2005; S. Henson & Reardon, 2005; D. Hu, Reardon, Rozelle, Timmer, & Wang, 2004; Reardon, Timmer, Barrett, & Berdegué, 2003).

In the process of delivering value-added products to the markets, smallholders are often confronted with lack of market information, struggle to meet the quality demands of buyers, comply with traceability requirements and are seldom able to supply standard products on a continuous basis (Gulati et al., 2007). Therefore, smallholders have to upgrade or diversify their production in order to compete effectively, stay in emerging high value markets and benefit by participating (Barrett, 2008). In the meantime, many (Hellin et al., 2009; Markelova et al., 2009; Shiferaw et al., 2016) have demonstrated that collective action empowered smallholder producers to become competitive with large businesses by providing economies of scale and minimising transaction cost.

4.3 Empirical Studies of Co-operatives in Agriculture

This section reviews recent studies of co-operatives in the agriculture industry emphasising farmer or producer co-operatives. The review covers studies from both developed and developing regions while paying more attention to paying more developing countries. Co-operatives studies in the

agriculture industry detail various aspects, including member benefits and performance, and they are discussed in the following sections.

4.3.1 Co-operative Formation, Development and Success

A few recent studies have looked into the aspects of co-operative formation, development and their success. For example, Garnevska et al. (2011) identified factors for the successful development of farmer co-operatives in Northwest China using two cases of successful farmer co-operatives in China. According to the result, a stable legal environment; a dedicated initiator and leader; government financial and technical support; farmer understanding and participation of co-operative activities and appropriate external support from professional NGOs have been the key factors for the successful development of farmer co-operatives. Moreover, Garnevska, Joseph, and Kingi (2014) explored the development and challenges of cocoa co-operatives in Papua New Guinea. Co-operatives were found to emerge in response to government initiatives to provide access to processing facilities, overcome market difficulties, reduce unemployment and improve living conditions.

First, Abate (2018) studied a sample of agricultural co-operatives in Ethiopia. The authors found that those co-operatives tend to exist in locations connected to major roads with relatively well-developed market structures. A farm household's decision to join and use agricultural co-operatives; on the other hand, was strongly related to their location, scale of operation, specialisation, and human and relational capital.

Dejene and Regasa (2015) studied the factors influencing the success of agricultural marketing co-operatives (AMCs) from member's perspective in Becho Woreda. The study surveyed 220 members and interviewed ten officers and co-operative leaders of AMCs. Survey data were analysed using descriptive statistical tools. In essence, the authors of this study identified that participation in co-operative governance, mutual trust, membership homogeneity, communication medium, interpersonal skills and market access have highly influenced the success of AMCs.

Azadi, Hosseininia, Zarafshani, Heydari, and Witlox (2011) studied the factors influencing the success of animal husbandry co-operatives in Southwest Iran from a survey of 95 managing directors of the co-operatives. They found that individual attributes such as interest, technical knowledge, and understanding of the concept of co-operative; economic variables such as income and current

investment; and external factors such as market access have a significant correlation with the success while structural variables have no significant relation.

Drawing on interview and census data Bennett (2017) employed the theory of club goods to examine how the neo liberalisation of Mexican fisheries policies in the 1980s and 1990s has affected co-operatives' ability to provide members with collective benefits, and thus the success and failure of fishing co-operatives in the region. The result showed that neo liberalisation has reduced support to fishing co-operatives and generated more significant challenges for their success.

4.3.2 Ownership and Governance

Ownership and governance also have gained some attention among scholars. The scholars have studied ownership structure, problems of traditional co-operatives and conversion of traditional structures to various hybrid organisational structures. In addition, some researchers have studied the relationship of ownership structure to performance. For instance, emphasising on structure, culture, and market orientation, in a sample of 52 co-operatives in the Netherlands, Kyriakopoulos, Meulenberg, and Nilsson (2004) applied regression analysis to explain self-reported performance. The authors found that proportional voting and deviation from the traditional 'one-member one-vote' system negatively affect the co-operative's performance.

Similarly, Kalogeras, Pennings, Benos, and Doumpos (2013) used principal component analysis to find the best financial ratios to inform the solvency, liquidity, and efficiency of 14 co-operatives. The result showed that both best and worst performing co-operatives had formed hybrid ownership structures with equity and patronage proportionality or non-member investment in subsidiary businesses. The study illustrated a positive impact of ownership restructuring on liquidity but not on efficiency. Moreover, Benos, Kalogeras, Verhees, Sergaki, and Pennings (2016) use data from 114 Greek co-operatives to study the effect of ownership structure on co-operative performance. Results in their study demonstrated a mixed effect of non-traditional ownership and governance characteristics on performance. A similar conclusion was drawn by Grashuis and Cook (2017) in their study of 370 US co-operatives following the comparison of mean financial ratios of co-operatives included in their study.

Ownership and governance aspects of developing country co-operatives likely have gained less attention. Only a small number of studies are reported in that context. In their exploratory study of BZI vegetable co-operative in China, Liang, Hu, and Jia (2019) report a unique way of allocating

control rights. As authors claim, in the studied co-operative, the chairman had a dominant control over the decision making and income rights of the co-operative. At the same time, the chairman serves as the president of a corporation that buys BZJ co-operatives' products. According to the empirical studies reviewed, there is no clear empirical evidence to suggest that non-traditional ownership or governance is linked to superior performance. However, ownership structure may impact the willingness of members to invest equity, improve product quality, or commit supply.

4.3.3 Member Benefits

Literature discusses various dimensions of member benefits in co-operatives. Co-operative members have been benefited in numerous ways from their membership. Those benefits are linked to production and marketing, supplying production inputs and services, community and social support services received by the members from their co-operatives. Following section reviews, these dimensions of benefits addressed in empirical research.

Benefits Related to Production and Marketing

There are many studies report that members derive benefits from co-operatively organised production and marketing activities such as discovering better farmgate prices, gaining higher profit and income. For example, studying a sample of apple growing co-operative members in China, Ma and Abdulai (2016) estimated a 4.66% increase on the household income of apple producers using propensity score matching method. Their study further asserts that the effect of co-operative membership for smallholders (5.73%) was greater than large landholders (3.81%). Estimating the impact of co-operatively provided transportation services, J. Lin, Zhang, Liu, and Rommel (2019) found an increase in farm income of Chinese tobacco growing co-operative members. According to their study, there has been a rise in annual farm income by 4,636 RMB (around 670 USD), including a sample of 318 Chinese watermelon producers. In their study of water melon producers, Ito et al. (2012) also observed a positive effect of co-operative membership on farm income. There has been a rise of income of 28.3–44.0 RMB (around 4-6 USD) per day for a producer. This study also applied propensity score matching method to estimate income effect and found significantly higher income for smallholder farmers. Verhofstadt and Maertens (2014) reported on a similar positive income effect on Rwandan cereal and horticulture farm households. As they report, the rise of member households' income has been 40-46%.

Similarly, Shumeta and D'Haese (2016) discovered a heterogeneous impact of co-operative membership on the income of Ethiopian coffee producers. At aggregation, co-operative members did not have a significantly different income to that of non-members. However, they found that income was heterogeneous among different socio-economic groups within the body of the co-operative membership following the application of propensity score matching model. Estimated results showed a significant positive impact of age, education, and farm size on income. A similar insignificant income effect was reported by Getnet and Anullo (2012) for Ethiopian crop farmers. Authors applied propensity score matching model to find the effect of co-operative membership on the total household income. Results demonstrated an insignificant treatment effect on total household income. Mojo et al. (2017) observed a positive impact of membership in Ethiopian coffee co-operatives on farm income using switching regression analysis. However, these results did not remain consistent with propensity score matching.

Using switching regression analysis, M. H. Ahmed and Mesfin (2017) analysed a sample of 250 farm producers in Ethiopia. They used consumption expenditure per adult as the outcome variable. The study indicated a rise of 17.6–26.5% of consumption expenditure. These findings were comparable to that of Verhofstadt and Maertens (2014) and Shumeta and D'Haese (2016).

In a study in Ethiopia, Chagwiza, Muradian, and Ruben (2016) estimated a large positive impact of approximately three litres per cow per day for members of Ethiopian dairy co-operatives attributed to the adoption of inputs and production technologies. Moreover, A. Kumar, Saroj, Joshi, and Takeshima (2018) show a positive and significant relationship between dairy co-operative membership and milk yield among a sample of Indian co-operative milk producers. Likewise, member farmers had higher net returns per litre and a high adoption of food safety methods.

Cechin, Bijman, Pascucci, Zylbersztajn, and Omta (2013) studied the quality of farm production with survey data from Brazilian broiler producers. They measured quality performance as a proportion of sales discounted for chicken feet callus, and nonparametric group comparisons were performed on the data. The analysis indicated a significant difference in the proportion of quality discounts for co-operative members and non-members. Authors conclude that products of members are of better quality which was attributable to various support services provided by the co-operatives.

Cai, Ma, and Su (2016) reached a similar conclusion in a study of 135 Chinese apple marketing co-operatives. The authors constructed a composite product quality measure applying principal

component analysis on survey data comprising size, shape, colour, hardness and other subjective measurements. The result of the study revealed a positive and significant correlation between product quality and membership size. However, this positive relationship was found to be discontinued when the membership became very large.

Looking at co-operative members marketing choices, Hao et al. (2018) in their study of Chinese apple farmers found a positive impact of co-operative membership on selling to wholesalers and a negative impact on selling to small dealers. However, there was no significant impact on selling to the co-operative itself. Yang, Vernooy, and Leeuwis (2018) showed that farmer co-operatives are capable of establishing or joining high-quality food networks. However, the same study concludes that the benefits are found to be often limited because of co-operatives' weak position or instability of the network.

Benefits in Supplying Inputs, Services, and Information

Some studies have overlooked aspects of input costs, input use, service and adoption of technology by co-operative members. In theory, co-operative membership should lower per-unit expenditure on inputs or higher adoption of total inputs per unit of land, or even both. The following section evaluates the empirical evidence on these claims.

In Ethiopia, involving 183 and 768 members and non-member farmers, respectively, Abebaw and Haile (2013) studied input adoption. Results demonstrated an increase in fertiliser use by the member farmers approximately by about 10%. While positive, the coefficients in relation to seed and pesticide adoption did not exhibit statistical significance. Besides, results from another regression analysis demonstrated a positive and significant impact of membership on pesticide adoption once the credit variable and consumer co-operatives were excluded from the regression. Similarly, in Rwanda, Verhofstadt and Maertens (2014) observed a significant difference in the probability of applying fertiliser, pesticide, and irrigation for members and non-members.

In regard to technology, Ma and Abdulai (2019) report on positive impacts of co-operative membership in technology adoption. The findings indicate that agricultural co-operatives have acted as a transmission route by proliferating the adoption and diffusion of integrated pest management (IPM) technologies. Over and above, increased IPM adoption also has contributed to improving the economic performance of farm households. Chagwiza et al. (2016) reported that co-operatives drive two types of technological innovations for its members in Ethiopian dairy industry.

They found that co-operative members own a higher proportion of crossbreeds (22–27%) and use more feed per year.

As well, in relation to co-operative membership among cassava producers in Nigeria, Wossen et al. (2017) observed a positive impact of approximately 13% on the adoption of new and improved varieties of cassava. In their study of Ethiopian coffee co-operatives, Shumeta and D'Haese (2018) demonstrate a significant and positive effect of co-operative membership on staple food production. The rise of food production found to be a result of technological transformation via increased utilisation of fertiliser and improved seeds.

Based on study of Chinese pig farmers, Ji, Jin, Wang, and Ye (2019) found a higher propensity among co-operative member farmers to adopt safe production practices. Moreover, adoption was found to be heterogeneous across co-operatives, farm and household attributes. Specifically, the members of co-operatives led by Investor-owned firms (IOFs) and with small farms, were more adoptive. Further, members who have a medium and high level of education, less than ten years of pig production experience, no off-farm job experience, and specialised in pig production were recognised as better adopters.

4.3.4 Performance of Co-operatives and Members

This section reviews the empirical literature that measures the performance of co-operatives in agriculture and its members. Recent literature in agricultural co-operatives has examined the performance of both co-operatives and their members. Performance has mainly been examined based on economic efficiency (technical, scale and allocative), financial indicators, and market-based indicators (sales volume, market share and new market entry). Also, performance has been examined with respect to some other dimensions or compared between different co-operatives and non-co-operative firms such as investor-owned firms, and members and non-members.

A considerable number of studies on co-operatives' performance was based on economic efficiency. Gezahegn, Van Passel, Berhanu, D'haese, and Maertens (2019) examined the initiator's effect on the performance in Ethiopian agricultural co-operatives. The results demonstrated low efficiency among co-operatives initiated either by NGOs and governments. Conversely, community-initiated co-operatives were relatively more efficient. Gezahegn, Van Passel, Berhanu, D'Haese, and Maertens (2019) thus compared the cost efficiency of large versus small co-operatives, including a sample of co-operatives from different crop and livestock sectors in Ethiopia. Findings

demonstrated a reduction in costs by 78% to 181% when the farmers joined relatively large co-operatives than small ones. The efficiency of marketing co-operatives and private farmers in the sugar, corn and coffee sectors were compared by Ahn, Brada, and Méndez (2012). According to their study results, marketing co-operatives were 45%, 60%, and 75% less efficient respectively in sugar, corn, and coffee sectors relative to the best-practice private farms. On the other hand, the mean private farm profit fell only 30% below the frontier for each crop.

Soboh, Oude Lansink, and Van Dijk (2012) conducted a comparative study of investor-owned firms (IOFs) and co-operatives in the west European dairy industry. They found that the average co-operative in the sample has many more assets than the average firm. However, the average co-operative had lower scale (−10%), technical (−50%), and allocative efficiency (−20%) compared to average firms. The study by Xaba, Marwa, and Mathur-Helm (2018) incorporates various South African crop, and livestock farmers demonstrated that technically efficient firms (including co-operatives) do not always translate to profitable firms. The authors highlighted the importance of management in investigating how best to allocate resources in order to remain relevant within the business context and competition.

Estimating the performance of co-operatives, Franken and Cook (2015) found two latent variables to explain overall performance. The first variable was financial performance, instrumented by return on assets, return on equity, and the extra-value index. The second variable was non-financial performance, instrumented by competitiveness, member satisfaction, and vision achievement. Authors used the structural equation model to explain survey responses from 460 board chairmen of US co-operatives. Results of their study demonstrated a strong complementarity between financial and non-financial as well as objective and subjective measurements of co-operative performance. Similarly, in a study of cocoa co-operatives in Peru, Donovan, Blare, and Poole (2017) examined the factors affecting on the performance of co-operatives and used the term “viability” to imply the performance. The authors used both financial (financial ratios) and non-financial (buyer relations for example) as performance indicators. Results revealed that co-operatives’ internal weaknesses and the challenges posed by the external environment have largely influenced on the performance. Mengistu (2017) assessed the performance of marketing co-operatives in Ethiopia. They used financial ratios to measure the performance. Result of the study revealed moderate level of financial performance in study co-operatives.

Instead of using objective financial data, Benos et al. (2016) examined the association of organisational attributes, cost/benefit allocation and strategic factors on organisational performance based on subjective measurements. Their study involved 114 and 25 agribusiness co-operatives respectively in two stages in the Netherlands. Accordingly, respondents' level of satisfaction with respect to sales volume, new market entry, and market share were used as the performance indicators. Results revealed that strategic attributes have a greater influence on organisational performance than organisational attributes.

Besides co-operatives, members' performance also has been examined mostly on the basis of economic and financial measures. Economic indicators such as technical and allocative efficiency and financial indicators such as income, farm profit also have been used to measure members' performance. For example, Abate, Francesconi, and Getnet (2014) studied the impact of co-operative membership on technical efficiency at the farm applying propensity score matching. With survey data on 1,038 Ethiopian households, Abate et al. (2014) found approximately five per cent reduction in technical efficiency at the mean. However, farms were found to be characterised with higher product quality performance.

Similarly, Gong, Battese, and Villano (2019) compared the efficiency of members and non-members of various crop and livestock co-operatives. Their study found that non-members were the least efficient. The authors infer that co-operative membership allows farmers to learn more advanced technology and take advantage of productivity-enhancing practices. Furthermore, in a study of a famer professional co-operative in China by Dong, Mu, and Abler (2019) found that members have improved returns to scale, marginal returns to land and labour, gained higher technical efficiency, and income. A study of apple farmers in China also confirmed a higher technical efficiency of members against non-members. In their study, Ma, Renwick, Yuan, and Ratna (2018) concluded that the average technical efficiency was consistently higher for co-operative members than their counterparts. Based on their results, Ma et al. (2018) concluded that co-operative membership promotes efficient usage of production inputs. Vandeplas et al. (2013) compared the performance of Indian milk producers linked to three different types of markets; informal channels, multinational companies, and co-operatives. Results revealed a growth of productivity per cow of smallholders who supplied milk to both co-operatives and multinationals compared to informal channels respectively by 21 and 23%.

There is a considerable number of studies that examine members performance based on financial indicators. For example, Chagwiza et al. (2016) measured the performance of members of dairy co-operatives in Ethiopia using several indicators, including the proportion of dairy income to total household income, total dairy income, proportion of crossbred cows to the total number of cows in the herd (an indicator of technological innovation), amount of feed bought (another indicator of technological innovation), milk production, milk productivity, commercialisation, the price per litre of milk, the price per kg of butter and the share of milk production that is processed at the household level. Authors employed propensity score matching technique to assess the performance. Results revealed a significant increase in those performance indicators among members except the price.

Ma and Abdulai (2019) examined IPM adoption and farm economic performance of apple growing co-operative members in China. Their study included a sample of 481 apple-growing households and employed the endogenous switching regression model to analyse data. Apple yields, net returns and agricultural income were used as performance indicators, and they IPM adoption was positively associated with those economic performance indicators. Zheng, Wang, and Song (2011) examined the factors that decide farmers' behaviours and performance in co-operatives in China. According to the result of their study, planting area, agricultural production costs, the variety of agricultural products and lack of agricultural insurance have determined the final performance achieved by the members. Both income and the level of perceived benefits were used to measure members' performance in their study.

This discussion of performance measurement in agricultural co-operatives and their members revealed that the performance had been examined in many different angles. This study, however, utilises financial performance to measure the performance. In the studies of business tradition, financial ratios have used frequently. This study also follows the same tradition and use conventional financial metrics. Financial indicators are used to examine the members' performance, as well. More importantly, cost of production, profit per kilogram of produce, and income of the members are considered following the previous studies discussed above.

4.4 Value Chain Research in Agriculture

This section reviews the value chain research in agriculture. Particular emphasis is given to empirical work that covers smallholder agriculture. Various aspects of value chain theory have been applied in agriculture. Common dimensions covered by the recent studies include governance, relationships and their impacts on chains' actors and chain upgrading. Thus, regional, national and international

level value chains have been examined in the past studies and organisations' value chain gained less attention.

4.4.1 Governance, Relationships and Impacts

Governance, relationships and their impacts on actors in the value chain have been a subject of recent value chain studies in agriculture. For example, Altenburg (2006) proposed a framework for the analysis of the developmental impacts of different forms of value chain governance patterns. Consequences for developing countries in terms of inclusion of poor producers, their income-earning opportunities, and allocation of risks and consumer prices are also discussed. Looking into recent developments in private food standards, Lee, Gereffi, and Beauvais (2012) have applied the global value chain approach to explain the relationship between value chain structure and agri-food safety and quality standards. They discussed the challenges and the opportunities that those relationships present for the upgrading of smallholders. Similarly, Swinnen and Vandeplas (2011) also examined the association between the distribution of rents and the aspect of quality in global value chains. They proposed certain conditions under which the introduction of quality standards in global value chains benefit smallholder farmers.

Looking at value chain governance, Ouma, Ochieng, Dione, and Pezo (2017) analysed smallholder pig value chains in Uganda. They found spot market governance, based on relationships and trust, was prominent at the pig production node. At the trader level, on the other hand, they found it to be more vertically integrated and that was influenced by the access to information, the value of investments in the value chain and assets, specifically in terms of slaughter premises.

Undertaking exploratory case studies, Trienekens and Willems (2007) explored governance and innovations in international value chains. Examining grape and pineapple chains originating from Africa, the authors concluded that western demands have led to innovations at the producer end. They also found changes in governance structures towards coordination and vertical integration. Similarly, using global value chain theory, Tran, Bailey, Wilson, and Phillips (2013) analysed the governance of the shrimp industry in Vietnam. The authors identified clear governance relations between importing countries and Vietnam and between importers and NGOs. These relationships, however, were found to be more fragmented at the producer and trader level, adversely affecting their access to lucrative markets. Integrating aspects of global value chains and sustainable livelihood, Challies and Murray (2011) analysed the local impact of agri-food globalisation in Chile using the raspberry export sector. Their study found that smallholder raspberry growers have been

able to comply with the required quality and safety standards due to institutional support. The authors also concluded that smallholders have gained and retained market access via the value chain.

Maertens, Minten, and Swinnen (2012) also applied the global value chain concept to analyses and compare the welfare effects of different horticulture export chains in sub-Saharan Africa. Their study revealed positive welfare effects of supermarket-driven, high-value export chains in Sub-Saharan Africa. According to the authors, the rise of welfare occurs through product or labor market effects or direct and indirect effects.

With an emphasis on global value chains, De Backer and Miroudot (2014) discuss the prevalence of global value chains at the aggregate level (country) instead of the product level. In this study, they provide more evidence to examine the position of countries within the international production network and developed indicators to accurately identify the position of countries.

Jespersen, Kelling, Ponte, and Kruijssen (2014) explained what determine the shape of food value chains analysing aquaculture industries in four Asian countries. They concluded that negative publicity and media campaigns have led to increased use of third-party certification and the adoption of public and private standards. Domestic institutions play a significant role in facilitating compliance with increasing foreign demands. The authors also concluded that sophisticated aquaculture operations found in value chains are led by retailers and branded processors.

4.4.2 Chain Upgrading

Lie, Rich, Kurwijila, and Jervell (2012) applied a value chain framework to identify the possibilities for upgrading and the determinants of competitiveness in value chains in which smallholder farmers can participate. In this study, the authors examined how smallholders, through co-operatives, establish and sustain value chains in Tanzania's dairy goat sector. Their study concluded that smallholders have benefitted from participating in value-adding co-operatives. Further, the authors report on several constraints that could impede scaling up in the future. Thiele et al. (2011) explored the role of stakeholder platforms in building trust among actors in the value chain. It is argued that the lack of trust among actors increases the transaction cost and discourages innovations. Studying the potato value chain in Bolivia, the authors found that stakeholder platforms have enabled development of new products, processes, norms and behaviours. These developments have delivered significant benefits to smallholder potato growers.

Demont and Ndour (2015) tested the competitiveness of domestic rice relative to imported rice in African urban markets. The aim was to recognise whether upgrading of domestic rice value chains is needed to compete for quality. Their study found that domestic rice can compete with imported rice in urban markets if quality attributes are better tailored to urban consumer preferences.

The above review of empirical research reveals important gaps in value chain applications in the agriculture sector. More importantly, studies have inclined towards analysing global value chains, their governance and associated impacts on smallholders in developing countries. National, regional and organisational value chains gained limited attention in recent scholarly works. Types of value chains studied mostly included high-value fruits, vegetables and other horticultural crops, milk, poultry, pig and aquaculture food. Food grain and other staple food value chains also have often been neglected in the recent literature. Thus, studies that focus on actors of the value chains are also limited. Available few studies that focus on actors of the value chain mostly include individual entrepreneurs and investor-owned firms that function at various activity levels. A substantial number of studies included producers in their analysis. However, analysis of situations in which the actor is a collective enterprise (such as co-operatives and other farmer organisations) was also rare in recent agricultural value chain studies.

4.5 Vertical Coordination in Agriculture: Empirical Evidence

Food and agricultural commodity chains have undergone tremendous changes during the past couple of decades, particularly in developing and transition countries (M. Ahmed et al., 2021; Pingali, 2007; Reardon, 2015; Swinnen, 2007). According to Reardon and Timmer (2014) there are five interlinked transformations in developing countries including Asia, Latin America and Africa which are being acted as fundamental drivers of overall structural transformations. They include (1) urbanization; (2) diet change; (3) agri-food system transformation; (4) rural factor market transformation; (5) intensification of farm technology (the agricultural transformation). These five transformations are interlinked in a mutually causal way and hence work as a system of transformation. These transformations in general can grouped into; 1) downstream, 2) mid-stream and 3) up-steam (factor market, farm technology and product composition).

Downstream transformation is characterized by urbanisation, diet change, and supermarket revolution. There has been a shift from public to private food standards, and the implementation of strict traceability requirements, in response to consumers' concerns about food safety (Qian et al., 2020). Rising income and growth of middle-income population have increased the demand for

differentiated and high-quality products (Brenes, Montoya, & Ciravegna, 2014; Ha, Shakur, & Do, 2019). The mid-stream transformation includes food system transformation that consists of rural-urban linkages, market liberalization, globalization and internationalisation of food and agricultural value chains. Upstream transformation includes changes in factor markets, advancement of farm technology and product composition (Reardon, 2020).

Recent transformations in the agricultural and food value chains created a greater need for vertical coordination to meet the quality and safety needs. It is argued that vertical coordination can reduce transaction costs associated with acquiring production inputs, adoption of productivity-enhancing innovations through increased access to private and public extension services, as well as easy access to credit (Abdul-Rahaman & Abdulai, 2018a). The concept of vertical coordination in the agriculture industry has been discussed by several scholars such as Barkema (1994); Galizzi and Venturini (1999); Henderson (1994); Martin et al. (1993); Sporleder (1992) and Swinnen and Maertens (2007). Recent resurgence of vertical coordination in agriculture and food value chains has been a result of transformation in the agriculture and food industry (Abdul-Rahaman & Abdulai, 2020; Ba, de Mey, Thoron, & Demont, 2019). Demand for high quality and safety food has grown in recent decades. As a result, the cost of spot market transactions rose in contemporary markets, and the altering of traditional market relationships to various forms of managed coordination emerged (Birthal, Jha, Tiongco, & Narrod, 2009; Hansman, Hjort, León-Ciliotta, & Teachout, 2020; Minten, Murshid, & Reardon, 2013).

Changes in agriculture and food marketing systems have impacted the welfare of smallholders. Smallholders have been constrained in integrating into developing value chains owing to their lack of access to profitable markets, capital, improved technology, quality inputs, and information and support services (Corsi et al., 2017; Fernando, Garnevska, Ramilan, & Shadbolt, 2021; A. Royer, Bijman, & Bitzer, 2016; Tray et al., 2021). Some scholars (Van Der Meer, 2006) have argued that some of the vertical coordination arrangements have been able to benefit smallholders while others have worsened their situation. Similarly, Rein (2005) claims that the effects of various vertical coordination arrangements on smallholders still remain inconclusive.

There has been many recent empirical research carried out on vertical coordination in agri-food value chains in different countries and regions, particularly those predominated by smallholders (Table 4-1). Despite theory identifies a range of vertical coordination options (such as specifications contract, relation-based alliance, equity-based alliance, vertical integration (H. C. Peterson et al.,

2001)), contracts predominate in the agriculture industry as shown in Table 4-1. Other options identified in theory, such as equity-based alliances were not found commonly in agriculture industries in developing countries. Majority of the contracts have been produced between smallholder farmers and private sector entities such as corporations and other investor-owned

Table 4-1: Vertical coordination in agriculture

Coordination option	Elements	Involved actor/s	Region /Country	Commodity sector	Reference
Contracts	Production	Farmers and private companies	Ghana	Rice	(Abdul-Rahaman & Abdulai, 2020)
Contracts	Production and marketing	Farmers, co-operatives and investor-owned firms	India, Brazil	Dairy, broiler, pork, vegetable	Birthal (2008); Birthal et al. (2009); Birthal et al. (2005); F. M. Martins, Trienekens, and Omta (2017)
Contracts	Production	Farmers and investor-owned firms	India, Indonesia	Poultry, oil palm	Ramaswami, Birthal, and Joshi (2006), Gatto, Wollni, Asnawi, and Qaim (2017)
Contracts	Production, inputs and marketing	Farmers, co-operatives and investor-owned firms	Indonesia, India	Crops and livestock	Patrick (2004), (Khan & Parashari, 2019)
Contracts	Production	Farmers and investor-owned firms	Asia	Fruits and vegetables, meat, eggs, dairy, and fish	Gulati et al. (2007)
Contracts	Production	Farmers, investor own companies and co-operatives	Asia, Africa, and Brazil	Tree crops (cocoa, rubber, palm oil, coffee and tea)	Baumann (2000), Oliveira, Zylbersztajn, and Saes (2019)
Contracts	Production	Farmers and corporation	India, Malavi	Oil seed (Sunflower), tobacco	S. Singh (2004), (Makoka et al., 2017)
Relation based alliance (franchising)	Production	Farmers and corporations	South Africa and India	Mussel, other agricultural products	Karaan (1999), S. Singh (2019)

Table 4-1: continued

Coordination option	Elements	Involved actor/s	Region /Country	Commodity sector	Reference
Relation based alliance	Production, marketing, services	Farmers and investor-owned firms	Canada, Tunisia and France	Wine, Dairy	(Telfer, 2001), Ben Arfi, Enstroem, Sahut, and Hikkerova (2019)
Relation based alliance (partnership)	Production, marketing	Farmers, public and co-operative enterprises	India	Horticulture crops	Roy and Thorat (2008)
Relation based alliance (partnership)	Production, Marketing	Co-operative and private company	America, Tanzania	Lamb	Boland, Bosse, and Brester (2007), Damon and McCarthy (2019)
Relation based (relationship)	Production, input, technical services, marketing	Farmers, co-operatives and private firms	China	Dairy	(Zhong et al., 2018)
Integration	Marketing, processing and services	Companies, large corporations and co-operatives	Poland	Dairy	Dries and Swinnen (2004), Nyokabi et al. (2018)
Integration	Production	Investor-owned processing companies	Vietnam	Fish	Trifković (2014)
Integration	Production and processing	Co-operatives	USA, Costa Rica	Agriculture, Coffee	Grashuis (2018), Macchiavello and Miquel-Florensa (2017)

Most often, production and marketing have been coordinated by the parties involved in the vertical coordination. Instances that coordinate all the activities of a value chain found limited. The actors involved in vertical coordination constituted farmers, investor-owned firms including large multinational corporation, co-operatives and state enterprises. As shown in Table 4-1, in the majority of the cases, investor-owned firms (such as processing firms and large-scale retailers) were coordinated upstream to take control of the production. On the other hand, the involvement of investor-owned firms in downstream coordination (producer takes control of processing for example), remains limited. Alternatively, co-operatives were mostly owned by producers and have involved mostly in downstream coordination taking the control of processing and retailing operations.

Table 4-1 also shows that vertical coordination studies have been carried out almost in all the developing regions and countries including Latin America, Africa and Asia, where agriculture plays a significant role in their economies. However, it is still a common phenomenon in the developed regions as well. Most developing regions where vertical coordination have been studied are predominant with smallholder farmers. Vertical coordination is mainly found in high-value and perishable commodity sectors such as fruits, vegetable, dairy and meat. Literature suggest that these commodities are characterized by high transaction cost (Swinnen, 2006) It has not been commonly found in food grain and tree crop sectors.

4.5.1 Vertical Integration in Agriculture

Vertical integration is the tightest vertical coordination option and relies upon one of the extremes in the vertical coordination continuum. The review of literature revealed a number of reasons for vertical integration from several perspectives. They include: transaction costs (Hennessy, 1996; Williamson, 1971), social network (Burt, 1997; Coleman & Coleman, 1994; Uzzi, 1997), supply chain management (Bowersox et al., 2002; M. C. Cooper et al., 1997; LeMay, Helms, Kimball, & McMahon, 2017), and strategic management (Harrigan, 1983, 1984, 1985a; H. C. Peterson et al., 2001). In agribusiness, it is mostly considered as a strategy for value creation in rural economies and the agri-food industry (Barney & Hesterly, 2011; Delgado, 1999), to protect firms themselves from opportunist behaviour (Gallick, 1984; Purcell, 1990; Read, 1983), to optimise production system (Felicetta Carillo, 2016), and increase competitiveness and profitability (Felicetta Carillo et al., 2016; G. Van Dijk, Kyriakopoulos, & Nilsson, 1997).

Both recent and past studies of vertical integration in the agri-food industry have been mostly on investor-owned enterprises such as corporations (den Ouden, Dijkhuizen, Huirne, & Zuurbier, 1996), large retailers (Dorsey & Boland, 2009; Hingley, 2005), processing firms (Delgado, 1999; Figueiredo & Franco, 2018; Hayer, Staduto, & Darr, 2019), and multinational companies (Dries & Swinnen, 2004). The majority of them looked at upstream integration that takes control of input supply and production by processors and retailers (Delgado, 1986, 1999; Swinnen & Maertens, 2007). On the other hand, downstream integration, where producers take control of processing and retailing, has not been examined substantially.

Furthermore, co-operatives' vertical integration has not been a subject of recent research and has gained less scholarly attention compared to the integration in other businesses. Most of the studies, on the other hand, have been conducted in the developed country context, but not in the context of developing countries. For example, Bergman (1997) found a declining welfare effect when a marketing co-operative integrated vertically. J. S. Royer and Bhuyan (1995) report on positive effects of vertical integration. They found that both producers and consumers benefitted as a co-operative integrates forward. Seen from the organisation's perspective, G. Van Dijk et al. (1997) claim that vertically expanding co-operatives have the ability to compete effectively against multinationals. Richard J Sexton (1986b), on the other hand, examined the incentive for co-operatives to integrate farm product marketing.

4.5.2 Co-operatives' Vertical Integration in Agriculture

There have been limited recent studies in co-operatives' vertical integration. It has mostly been a subject of studies conducted in the 1990s (see Table 4-2). In fact, those studies have been carried out in the context of developed countries with comparatively large farms. Yet, the context of available literature is far different from that of transforming and developing countries. In the meantime, P. C. Huang (2011) reported the emergence of vertically integrated co-operatives in agriculture sectors in countries predominant with smallholders such as China.

For example, applying simulation analysis, J. S. Royer (2007) analysed the market incentives for US agricultural co-operatives in oligopolistic markets for integrating forward into processing activities and their impacts on producers and consumers. The result of Royer's study suggests that co-operatives do not have incentives to integrate forward in competitive markets. A potential for vertical integration, however, was noted in co-operatives with some degree of market power to restrict its members' output.

Including a sample of Spanish agricultural co-operatives, Salazar and Gorriz (2011) investigated the determinants of differences in co-operatives' downstream vertical integration and efficiency implications. Their study found that actualisation mechanisms of social capital, high dedication to agricultural activity, and a high rate of capacity utilisation are more likely to lead to integrating with another stage of the production cycle within the co-operative.

Without a specific focus on co-operatives, Cadot (2015) included family-farms, investor-owned firms and co-operatives and compared agency costs of vertical integration in the French wine industry.

Cadot concluded that vertical integration is less rewarding for co-operatives while having lower operating expenses than family-farms and investor-owned firms.

4.5.3 Definitions of Co-operatives' Vertical Integration

Table 4-2 includes some definitions adopted, dimensions considered, and levels/degrees of vertical integration in past studies on co-operatives' vertical integration (including both theoretical and empirical research). As shown in Table 4-2, past studies of co-operatives' vertical integration have considered control of product and marketing or distribution channels or centralised control of commodity chains. Common elements included in all definitions are production and marketing/distribution of a commodity. Two important common dimensions are control and ownership. As shown from the information included in Table 4.2, past studies have referred to centralised control of product and marketing within a co-operative's ownership boundary as its vertical integration.

None of the past studies has defined co-operatives' vertical integration in terms of value chains. Vertical integration of commodity chains, on the other hand, is a less relevant and outdated concept amidst market transformation and globalisation as shown by Reardon and Barrett (2000); Reardon et al. (2009). In the current context where there is a greater concern for food quality and safety (Ponte & Gibbon, 2005; Swinnen & Vandeplas, 2011), value chains play a greater role in linking producers and consumers. It is more about creating and delivering value for customers rather than delivering a generic commodity as done in the past. Therefore, defining co-operatives' vertical integration in terms of value chains is timely and relevant.

Some researchers have introduced the idea of vertical integration in investor-owned firms' (including corporations) in terms of value chains (M. E. Porter, 1980, 1985; Sturgeon, 2001). Referring to value chains, Sturgeon (2001) considered an integrated firm as one that engages in an entire range of activities from product strategy, product definition, design, manufacturing, sub-assembly component manufacturing, marketing, sales and distribution.

Therefore, influenced by the works of several scholars who provided some insights into the concept of vertical integration (H. C. Peterson et al., 2001; J. S. Royer, 1995; J. S. Royer & Bhuyan, 1995; Sporleder, 1992) and value chains (M. E. Porter, 1989; Sturgeon, 2001) this study defined co-operatives' vertical integration in terms of value chains and described in the following theoretical framework.

Table 4-2: Definitions in co-operative's vertical integration and their levels/degrees

Scholar	Definition and key elements	Dimensions	Levels/degrees
(J. S. Royer, 2007; J. S. Royer & Bhuyan, 1995)	Control of three market stages (producer-assembler-processor)	Ownership and control	One level with partial integration
(Bergman, 1997)	Control of few to more market stages	Ownership and control	Low and high degree depending on the number of market stages
(J. S. Royer, 1995)	Coordination of marketing of agricultural commodities along the market channel from the farm level to the processed product level	Ownership and /or control	One level with partial integration
(Ollila & Nilsson, 1997)	Coordinating arrangement in which markets are replaced by contractual or ownership arrangements between successive stages in the production-distribution chain.	Ownership and /or control	One level with full integration
(Salazar & Gorriz, 2011)	Integration of other stages of the production cycle within the limits of the co-operative	Ownership and control	Low to high degree depending on the number of stages of the production cycle
(Cadot, 2015)	Internal organisation of vertical relationships involving suppliers of intermediate goods and services (“upstream”) and the purchasers of those goods and services (“downstream”)	Ownership and control	One level from production to sale of final product
(Koller, 1950)	Combination of business units, each at successive stages in a chain of productive operations for a commodity, into one firm and under one managerial control.	Ownership and control	One level from primary producer to consumer

4.6 Theoretical Framework

The underlying conceptual framework (Figure 4-1) asserts the effect of the level of vertical integration on the performance of co-operatives, members, and member benefits. Despite vertical integration being analysed from multiple perspectives (transaction cost, strategic management, supply chain management, and social network, discussed in section 3.10.2), in this study, vertical integration is considered a firm strategy that creates and captures more value, offering a competitive advantage. Accordingly, co-operatives' vertical integration is defined as the organisation of a few, or all successive activities in a value chain from input supply through to the retail to the final consumer. Decisions on whether to integrate partially or fully to create and capture more value depends on relative costs and benefits (Hansman et al., 2020; Harrigan, 1986).

As shown in the illustrative framework (Figure 4-1), partially integrated co-operatives centrally control some of the successive activities of a value chain while fully integrated co-operatives centrally control all the successive activities. Partially integrated co-operatives control the supply of inputs, services and information, production of primary products, and assembling and marketing of primary products. Fully integrated co-operatives centrally control all the successive activities of a value chain. They include the supply of inputs, provision of services and information, production of primary products, assembling and marketing of primary products, processing, wholesaling, and retailing.

By internally organising the supply of inputs, services, and information, co-operatives achieve some cost saving, competitiveness and performance at input and service supply stage of the value chain (F. Kaiser & Obermaier, 2020). Additionally, co-operatives benefit from discounts from bulk purchasing of inputs and services (Veselska, 2005). By integrating production, co-operatives gain better ability to differentiate products, ensure product quality, and reliability (timeliness and quantity), which are important sources of value-added (Swinnen, 2006). Using collective marketing of primary farm products, co-operatives enhance the bargaining power over private traders, gain economies of scale, ensure product reliability, and reduce market risk for raw materials (Ao et al., 2021; Bakucs, Fertő, & Szabó, 2012; Cotterill, 2019; Trifković, 2014).

Fully integrated co-operatives commit further value addition to their products and claim extra margins from additional processing, wholesaling and retailing activities integrated by them, when compared to partially integrated co-operatives (Östensson & Löf, 2017). Moreover, fully integrated co-operatives directly approach high-value consumer markets, reserve better opportunities to

tailor-make products to meet specific consumer needs, develop relationships with customers, and increased customer base loyalty to their products.

According to the above discussion, by integrating value adding activities, both partially and fully integrated co-operatives reduce coordination, search and information costs, reserve discounts, differentiate products, ensure product quality and reliability, gain economies of scale, and bargaining power, and reduce market risks. Additionally, fully integrated co-operatives add further value to their products, reach high value markets and build better customer relationships by directly connecting to the end customer. Thereby the firms are able to increase sales and market share by encouraging customers to purchase more or switch more of their business over to the firm (Hult, Ketchen Jr, & Slater, 2005).

The source of competitive advantage for co-operatives integrated into different levels relies on their ability to perform integrated activities and manage the linkages among them (M. E. Porter, 1985). Integration of activities within the organisation ensures information sharing among different stages of the co-operatives' value chain, reduce redundancy of tetrafunctional tasks, achieve rapid and effective internal decision-making and efficient implementation (Wong, Boon-Itt, & Wong, 2011). Internal organisation maximises the efficiency of a firm's activities and processes improving operational performance and controlling the organisation's economic environment on the other hand (Christopher, 1993; H. C. Peterson et al., 2001). Moreover, internal organisation of activities facilitates thorough market information sharing among departments, helps firms closely meet and respond to customer requirements, and promotes responsiveness through functionally coordinated actions among departments (Hult et al., 2005; Shapiro, 1989). Finally, all of the above influence a firm's financial returns through cost reduction and revenue expansion. Also, as several others suggest (Felicetta Carillo et al., 2016; Delgado, 1999; Harrigan, 1983), co-operatives as business enterprises create more value, perform better, earn more profit and become more competitive as they integrate all the activities of a given agri-food commodity value chain rather than integrating only some of them.

The above discussion leads to the hypothesis that fully integrated co-operatives perform better than partially integrated co-operatives. The performance of co-operatives is measured with several financial and non-financial indicators from which the former has been used often (F. S. Martins & Lucato, 2018; Parliament et al., 1990; Soboh, Lansink, Giesen, & Van Dijk, 2009). This study also adopted financial performance measures as performance indicators.

Theoretically, co-operatives work on user-owner, user-control, and user-benefit principles (Chaddad & Cook, 2004). As stated in the user-benefit principle, members derive various benefits from their co-operatives while investing in them. The distribution of benefits might also depend on how co-operatives are performing. Since co-operatives distribute benefits to members, it can be argued that the members get better benefits when their co-operatives perform better. The literature discusses a wide range of member benefits in co-operatives and other collective enterprises (discussed in section 3.6). They include both financial and non-financial benefits. Considering their nature, six groups of benefits are identified following an extensive review of co-operative literature that covers a wide range of financial and non-financial benefits. Accordingly, the members of co-operatives have: 1) production and marketing benefits, 2) benefits in supplying inputs, services and information, 3) ownership benefits, 4) community benefits, 5) social benefits, and 6) environmental benefits. These benefits were measured subjectively as pursued by the members. It is hypothesised earlier in this section that fully integrated co-operatives perform better than partially integrated co-operatives.

Production and marketing benefits of co-operative members are discussed in detail in section 3.6.1. Accordingly, members' production and marketing benefits from their co-operatives composed of better prices, improved income and farm profit, commercialisation of production, and enhanced product quality (Alho, 2015; Barton, 1989; Baviskar, 1990; Bernard, Taffesse, et al., 2008; M. Fulton & Ketilson, 1992; Shumeta & D'Haese, 2016; Wollni & Zeller, 2007). Further, members build their savings, properties and other farm assets from co-operatively performed production and marketing (Bacon et al., 2008; Fischer & Qaim, 2012a; Getnet & Anullo, 2012). Members also benefit from improved bargaining power against traders and economies of scale (Bonus, 1986; Hansmann, 1996; Schroeder, 1992). Since both partially and fully integrated co-operatives integrate production and marketing activities, it is reasonable to assume that most of the above benefits are attributable to their members. However, fully integrated co-operatives employ their primary products for further value addition (processing, for example) within the organisation. This enables retaining more of the value created within the organisation ultimately contributing to organisation's financial performance. Based on this, the following hypothesis is derived on production and marketing benefits.

H1: Members in fully integrated co-operatives receive better production and marketing benefits than the members of partially integrated co-operatives.

Both partially and fully integrated co-operatives integrate supply of inputs, services and information. When co-operatives supply inputs services and information, members benefit from reduced transaction and search costs, enhanced access to, and affordability to inputs, services, technology and information (Abebaw & Haile, 2013; Markelova et al., 2009; Tefera, Bijman, & Slingerland, 2017). This discussion suggests that members in both partially and fully integrated co-operatives are more likely to benefit from all of the above. However, fully integrated co-operatives can provide extended services, and information since they control all the activities of the value chain. Hence, fully integrated co-operatives effectively exchange a whole range of information and services required throughout the value chain to ensure safety and quality requirements of the final product to realise a better price. On these grounds, the following hypothesis is derived related to the benefit associated with integrated input, information and service supply activities.

H2: Members in fully integrated co-operatives receive better benefits from sourcing inputs, services, and information from their respective co-operatives.

As for ownership benefits, members hold the right to claim patronage refunds or rebates, dividends on their investment, and share financial risk of investments (Barton, 1989; Birchall, 2012; Hansmann, 1996). Moreover, members as the owners gain greater control and are involved in governance in their co-operatives and formulating business strategies (Birchall, 2012; Dunn, 1988; Österberg & Nilsson, 2009). This discussion suggests better ownership benefits for the members of fully integrated co-operatives; however, co-operative law sets limits on it. Both partially and fully integrated co-operatives are regulated by the Co-operative Societies Law, (1972) which sets common rules for paying dividends, rebates, and the board of directors of the co-operatives. Therefore, the following hypothesis is derived with respect to ownership benefit.

H3: Members in partially and fully integrated co-operatives have comparable ownership benefits.

Community benefits are those a particular community of members receive from their co-operatives. Members find co-operatives as common spaces to meet and develop interactions, and as community platforms to share experiences, (M. Fulton, 1999; Putnam, 2001; Tolbert et al., 2002; Wilkinson, 1991). Moreover, members benefit from community health services and medical services provided by the co-operatives (You & Kobayashi, 2009). Providing these services involves significant investment of operational capital. Financing this operational capital is possible for a co-operative only if they have satisfactory performance and it is demonstrated earlier in this section that the fully integrated co-operatives perform better than partially integrated co-operative. Based on this, the following hypothesis is formulated about community benefits.

> H4: Members in fully integrated co-operatives have better community benefits than the members in partially integrated co-operatives.

Social benefits are those benefits that diffuse to the wider society in the form of public goods and services which are mainly related to education and social empowerment. They include promotion of democratic principles, equality, and leadership (Fairbairn, 2004; Hoyt, 2004; Hussein, 2001; Merrett & Walzer, 2001; Nugussie, 2010). Providing social benefits also depends on the financial capacity of the co-operatives to invest in social services. Since fully integrated co-operatives are supposed to perform better financially, it can be argued that their ability to invest in social services is also high. Based on this, the following hypothesis is developed regarding social benefits.

> H5: Members in fully integrated co-operatives have better social benefits than the members in partially integrated co-operatives.

Members derive various environmental benefits from co-operatives. These benefits mostly reflect environmentally friendly practices of members to ensure product quality, safety, and sustainability. These benefits include efficient use of resources such as water and soil, wise use of agrochemicals, and practices that inhibit resource degradation (V. Kumar et al., 2015; Uphoff & Wijayaratna, 2000). One of the justifications for vertical integration is the rise of demand for product quality, and safety and sustainability concerns of consumers (P. C. Huang, 2011; Tran et al., 2013). Hence, promotion of environmentally friendly member operations is more relevant and important for fully integrated co-operatives to ensure ethical production practices since they are directly linked to the end customer. Therefore, it is supposed that fully integrated co-operatives invest more in

environmentally friendly practices. Based on this discussion, the following hypothesis is derived on environmental benefits of members.

> H6: Members in fully integrated co-operatives have better environmental benefits than the members in partially integrated co-operatives.

Members' financial performance is also commonly identified in the literature as a key member benefit (Chagwiza et al., 2016; Ma & Abdulai, 2017a). In this study, financial performance is considered explicitly and measured objectively. Cost of production per kilogram of produce, profit per kilogram of produce, and households' economic profit are used as the members' financial performance indicators (Chen, Babb, & Schrader, 1985; Lerman & Parliament, 1991; Mengistu, 2017; Parliament et al., 1990).

Fully integrated co-operatives integrate more value-adding activities over partially integrated co-operatives. Going further downstream along the value chain than partially integrated co-operatives, fully integrated co-operatives integrate processing, wholesaling and retailing activities. Thereby fully integrated co-operatives entail overall control of the whole value chain. Co-operatives create more value, perform better, earn more profit and become more competitive as they integrate all the activities of a value chain rather than integrating some of them. (Felicetta Carillo et al., 2016; Delgado, 1999; Harrigan, 1983). Accordingly, it is hypothesised that fully integrated co-operatives are better positioned to distribute a broad range of direct and indirect financial benefits to members such as better price for products, patronage refunds, dividends, subsidised inputs, services and information to members compared to partially integrated co-operatives. Delivering those direct and indirect financial benefits contributes to a decline in production costs, as well as, increased farm and household economic profit for members. This discussion leads to the following three (H7, H8 and H9) hypotheses related to members' financial performance:

H7 - Members in fully integrated co-operatives have a lower cost of production per kilogram of produce compared to partially integrated co-operatives

H8 - Members in fully integrated co-operatives have a higher profit per kilogram of produce compared to partially integrated co-operatives

H9 - Members in fully integrated co-operatives have higher economic profit compared to partially integrated co-operatives

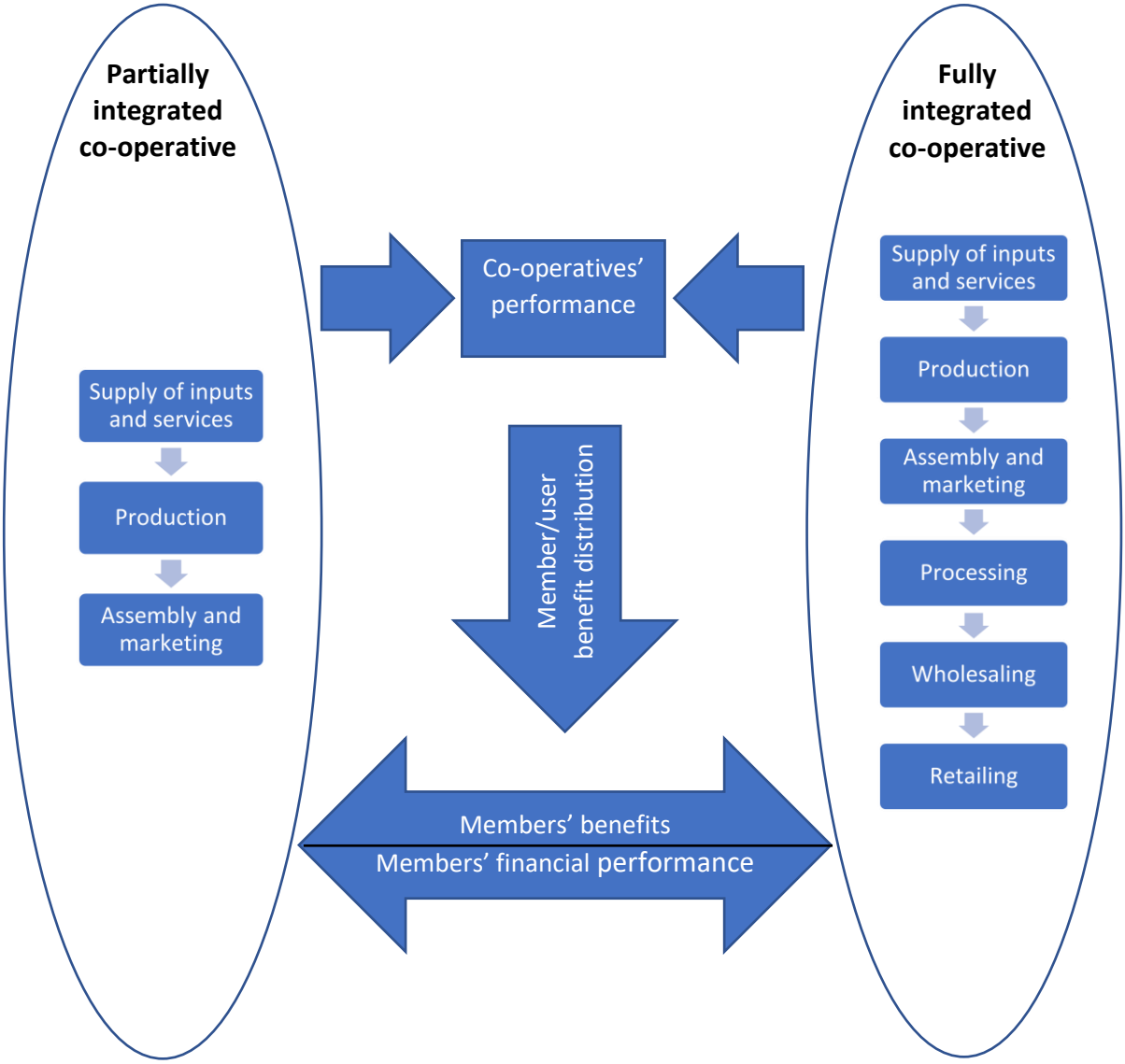

Figure 4-1: Theoretical framework

4.7 Summary

This chapter appraises the application of theoretical concepts relevant to the research problem and describes the theoretical framework. A review of empirical research unfolded important developments in applying those theories and gaps that prevail in empirical research. For instance, many scholars have conceptualised co-operatives in agriculture as a collective action assuming that co-operatives also embed the principles of collective action. However, this review informed that a formal evaluation of agricultural co-operatives against the principles of collective action has not been done up to the present time. Following those who conceptualised co-operatives in the collective action framework, this study also treated co-operatives as a form of collective action.

The role of co-operatives in linking smallholders to markets has been widely discussed in the context of agri-food industry transformation in developing countries. However, the vast majority of the empirical work has centered around high-value crops (fruits and vegetables), livestock and aquaculture product sub-sectors. Studies explicitly examine staple food crop sectors such as grain (e.g., maize and rice), and other starchy tuber crops, such as potato, have not gained considerable attention. This study fills this gap, including rice crop sector in a transforming economy predominant with smallholders, in Sri Lanka.

On the other hand, most recent empirical studies of co-operatives were inclined to compare members against non-members of co-operatives in terms of their benefits, impacts, and performance. None of those studies however, explicitly examined how prevailing heterogeneities among members (social, demographic, farm and contextual differences) affect their benefits, impacts and performance. This study contributes to that vacuum in the literature considering the body of co-operative members as a population of interest in this study.

More importantly, the literature often treats co-operatives as homogenous enterprises relying on user-owner, user-control and user-benefit principles and neglect possible differences or heterogeneities that could exist. There is a scant of studies that discuss differences among co-operatives and how any likely difference affect co-operatives themselves and their members. The present study intends to fill this gap of understanding by comparing two different types of co-operatives in terms of their vertical integration.

Past studies that examined co-operatives' vertical integration have considered integrating product market/distribution chains and viewed these from the perspective of the transaction cost. Contrary to that traditional view, this study defines co-operatives' vertical integration in terms of value chains from the strategic management perspective. It is timely and relevant in the current context of rising demand for high quality and safe agri-food commodities that pass along value chains. Thus, most of the past studies on co-operatives' vertical integration often identifies only one level. Further, this study divides vertical integration into two levels. Finally, a theoretical framework is developed and described to elaborate interconnections between co-operatives' vertical integration, members' benefits and performance of co-operatives and members.

5 RESEARCH METHODOLOGY

5.1 Introduction

In order to design a robust research methodology to reach the aims and objectives, first half of this chapter reviews research methodology literature covering research philosophy, paradigms, methods, designs, and sampling techniques. In the second half of the chapter the unique research process followed in this study is explained. Following the methodology, reliability and validity of the measures are discussed. The last section summarises the chapter.

5.2 Research Philosophy and Approach

Research philosophy relates to the development of knowledge and the nature of that knowledge (Saunders, 2011). Embarking on research means developing knowledge in a particular field. According to Bryman (2015), the philosophy adopted in research contains important assumptions about the way a researcher views the world. Hence the researcher's assumptions on how he/she sees the world will underpin the methods and strategies they choose to develop the knowledge. Two important considerations of research philosophy are ontology and epistemology.

The starting point of all research is ontology. One's epistemological and methodological positions logically follow after this. It is concerned with the nature of reality. Blaikie (2000, p. 8) defines ontology as "claims and assumptions that are made about the nature of social reality, claims about what exists, what it looks like, what units make it up and how these units interact with each other". Two aspects of ontology are objectivism and subjectivism (Saunders, Lewis, & Thornhill, 2012). The position of objectivism asserts that social phenomena and their meanings have an existence that is independent of social actors (Bryman, 2015). Subjectivism (Bryman (2015) referred to as constructionism) asserts that social phenomena are created from the perceptions and consequent actions of social actors (Bryman, 2015; Saunders et al., 2012). Epistemology concerns what is regarded as acceptable knowledge in a field of study and four epistemological paradigms include positivism, interpretivism, pragmatism and transformative. Induction and deduction are two different approaches to social investigation that views the nature of the relationship between theory and social research. Induction is a theory-building approach. It provides good answers to the research problems developing better designs and generating information from which to enable a sound understanding of the topic. Deduction is a theory-testing approach with a sequence of organisation. In this way, hypotheses are deduced from the theory, hypotheses are translated into operational terms to propose a relationship between constructs, data collection is specified,

hypotheses are tested, quantitative results are provided, and the outcome of the inquiry is examined to confirm the theory and then considers statistical generalisability (Bryman, 2015). Although it is useful to think of the relationship between theory and research in terms of being deductive and inductive, it is sometimes hard to clear-cut them. Therefore, it is better to treat them as tendencies rather than as separated by a hard-and-fast distinction (Bryman, 2015).

5.3 Research Paradigms

A number of authors defined the term "research paradigm". According to Bogdan and Biklen (1998, p. 22), it is "a loose collection of logically related assumptions, concepts, or propositions that orient thinking and research". Cohen, Manion, and Morrison (2002, p. 3) defined it as "the guiding principle for undertaking a research study". According to Mac Naughton, Rolfe, and Siraj-Blatchford (2010), it is a composite of three elements: a belief about the nature of knowledge, a methodology and criteria for validity. Saunders et al. (2012, p. 141) define research paradigm as "a way of examining phenomena from which particular understanding of these phenomena can be gained and explanations attempted". The commonality among all definitions is that the research paradigm influences the way knowledge is studied and interpreted. A number of research paradigms are discussed in the literature (Mackenzie & Knipe, 2006). It is sometimes complicate to explaining them due to the multiplicity of terminologies used in different texts and lack of agreement on how many paradigms there are. However, four commonly referred research paradigms can be identified in research texts. Table 5-1 provides an account of commonly associated terms to identify four research paradigms.

Table 5-1: Four research paradigms and associated common terms used to identify them

Positivism/post-positivism • Determination • Realism • Reductionism • Experimental • Correlational • Theory verifications	**Pragmatism** • Consequences of actions • Problem-centred • Real world practice-oriented • Mixed models
Transformative • Participatory • Advocacy • Political • Empowerment issue-oriented • Collaborative • Change-oriented	**Interpretivism/Constructivism** • Understanding • Multiple participant meanings • Social and historical construction • Theory generation

Source: (Creswell, 2008; Mackenzie & Knipe, 2006; Mertens, 2014)

The positivist/post-positivist paradigm is sometimes referred to as a scientific method or science research which is based on rationalistic and empiricist philosophy (Mertens, 2014). It reflects a deterministic philosophy in which, causes determine outcomes (Creswell, 2008). It is argued that the positivist/post-positivist paradigm can be applicable to the social world on the assumption that the social world can be studied in the same way as the natural world. Social studies backed by positivist/post-positivist philosophy are value-free and the nature of cause and effect can be explained (Mertens, 2014). Positivism aims at testing theories and describing experiences using observations and measurements (O'Leary, 2004).

The transformative paradigm, based on the argument that interpretivist/constructivist approach to research, did not adequately address issues of social justice and marginalised people (Creswell, 2008). This paradigm assumes that participants are useful resources to design questions, and to collect and analyse data. It also utilises qualitative and quantitative data collection and analysis methods (Somekh & Lewin, 2005). Researchers explore multiple subjective meanings of experiences and this leads them towards the view's complexity (Crotty, 1998). Research in this paradigm stresses the need for enquiry to be intertwined with politics and political agenda (Creswell, 2008).

The pragmatism paradigm is not committed to any one system of philosophy. Pragmatists argue that the truth about the real world cannot be accessed relaying social enquiry solely on a single scientific method (Mertens, 2014). Research in this paradigm emphasises commonness and "what" and "how" of the research question (Creswell, 2013). This paradigm considers the "research problem" as central and uses all approaches to understanding the problem (Creswell, 2008; Crotty, 1998). Pragmatism has no loyalty to a particular philosophy and methods are chosen placing the research question in the centre. Accordingly, this paradigm provides an underlying philosophical framework for mixed methods.

The constructivism/interpretivism paradigm grew out of the phenomenology philosophy and interpretive understanding called hermeneutics (Eisenhardt, 1989b; Eisenhardt & Graebner, 2007; Mertens, 2014). The constructivist/interpretivist approach to research seeks to understand the world of human experience and suggests that reality is socially constructed (Creswell, 2013; Mertens, 2014). Research in this paradigm relies on participants' views of the situation being studied (Creswell, 2013). Constructivists do not generally begin with a theory rather; they inductively develop a theory or patterns of meanings. Research in this paradigm relies, on qualitative

data/narrative data and may be supported by quantitative data to expand qualitative data and deepen the description (Creswell, 2008).

5.4 Research Methods

The research paradigms presented above influence the way knowledge is studied and investigated; the research methods. Table 5-2 summarises the link among research paradigms, methods and data collection tools. Accordingly, positivist paradigm predominately uses quantitative methods (Bryman, 2006; Creswell, 2013; Mackenzie & Knipe, 2006). Measurable and numerical data are gathered using various data collecting tools (Cohen et al., 2002; Saunders et al., 2012). Research stem from interpretivist/constructionist paradigm applies qualitative methods and rely on qualitative data collection tools (Creswell, 2013; Miles & Huberman, 1994; Saunders et al., 2012; Van Maanen, 1979). The pragmatic paradigm applies mixed-methods and use a combination of qualitative and quantitative data collection tools (Creswell, 2013; Neuman, 2002). Transformative paradigm predominantly applies qualitative methods, despite quantitative methods are used where necessary. Pragmatic paradigm applies mixed-methods and use a range of data collection tools (Mac Naughton et al., 2010).

Table 5-2: Research paradigm, method, and tools of data collection

Paradigm	Method	Data collection tool (Examples)
Positivist/ post-positivist	Primarily quantitative. (Qualitative methods can be used though quantitative methods tend to be predominate (Mertens, 2014))	Experiments, Quasi-experiments, Surveys, Tests and Scales
Interpretivist/ constructivist	Qualitative methods predominate although quantitative methods may also be utilised.	Interviews, Observations, Document reviews, Visual data analysis
Transformative	Qualitative methods with quantitative and mixed methods.	Diverse range of tools such as open-ended interviews and audio-visual data
Pragmatic	Qualitative and/or quantitative methods may be employed. Methods are matched to the specific questions and purpose of the research.	Multiple forms of both pre-determined and emerging tools including interviews, surveys, observations, testing and experiments.

Source: (Creswell, 2013; Mackenzie & Knipe, 2006)

Research methods have emerged from different paradigms and consist of their own distinct characteristics. Table 5-3 compares two contrasting research methods; qualitative and quantitative

(Bryman, 2015; Hair, 2007; R. B. Johnson & Onwuegbuzie, 2004; Neuman, 2002; Saunders et al., 2012). The mixed-methods blend the qualities of qualitative and quantitative methods.

Table 5-3: Comparison of research methods

Qualitative	Mixed	Quantitative
Paradigm is subjective		Paradigm is objective
Logic is inductive		Logic is deductive
Often uses non-causal theories		Often uses causal theories
Describes phenomena		Tests hypothesis
Uses themes and motifs		Uses distinct variables
Non-systematic measures		Systematic measures
Uses narrative data in the form of words and images		Uses quantitative numeric data
Builds and explains theories		Tests and validates theories
Procedures are non-replicable		Procedures are replicable
Proceeds by extracting themes		Proceeds by using numbers
Rarely uses statistical tools		Often applies statistical tools

Source: (Bryman, 2015; Hair, 2007; R. B. Johnson & Onwuegbuzie, 2004; Neuman, 2007)

5.4.1 Qualitative Research Methods

Qualitative research underpins from interpretivist approach. Emphasis is given to the meaning of words rather than quantities (numbers) in the collection and analysis of data (Bryman, 2015; R. B. Johnson & Onwuegbuzie, 2004). Fundamental purpose of qualitative research is to express reality and explain people in natural situations by the use of words (Bryman, 2015). According to Bryman (2015) qualitative research is a strategy that uses inductive approach, rejects the norms of natural scientific models, emphasises researcher's interpretations about the social phenomena, treat social phenomena as a subjective reality and rejects concept of objective social reality.

Qualitative research applies descriptive analysis to investigate social issues using small groups of people, focusses of individual's experiences and is context specific (Wiersma & Jurs, 2009). The method is exploratory and focusses on understanding the social phenomena rather than quantifying it (Saunders et al., 2012). Analysis of information considers individual's perceptions, values, needs, feelings, emotions and motivations and find the answers to "what meaning" (Saunders et al., 2012).

Commonly identified strengths of qualitative research include; awareness of complexity, study in-depth, provide foundation to a quantitative study, see through the eyes of individuals being researched, descriptive in nature, focus on context, emphasis of process by using unstructured interviews, flexibility and theory building from data (Bryman, 2015; Burns & Burns, 2008).

Compared to quantitative methods, qualitative method is more flexible using multiple methods, procedures and designs (Wiersma & Jurs, 2009).

Qualitative research method suffers from limitations as well. These methods are subjective because findings rely too much on the researcher's often unsystematic views about what is significant and researcher's personal relationships with the people studied. Difficulty of replicating qualitative research is the second limitation. Thirdly, findings of qualitative research have limited scope and cannot be generalised. Limited transparency is the fourth limitation. It is sometimes difficult to establish from qualitative research what the researcher actually did and how he or she arrived at the conclusions. Fifth limitation of qualitative research methods is that they require a lot of time in their execution (Bryman, 2015; Burns & Burns, 2008; Creswell & Creswell, 2017).

Methodologists suggest (Bryman, 2015; Creswell, 2013; Hair, 2007; Saunders et al., 2012) a number of qualitative methods such as ethnography or participant observations, qualitative interviewing, focus groups, content analysis (analysis of texts and documents), and language-based approaches (discourse analysis and conversation analysis).

5.4.2 Quantitative Research Methods

Quantitative research methods stem from the positivist approach. Quantitative research methods adopt deductive approach, norms of natural scientific model, and hold the view that social phenomena exist external to the social actors (objective reality). Four main features of quantitative research include measurement, causality, generalisation, and replication (Bryman, 2015; R. B. Johnson & Onwuegbuzie, 2004). This method involves collection and analysis of large set of data that can be tested statistically as it relies heavily on statistical results to make context free generalisation (theory testing) (Wiersma & Jurs, 2009). Quantitative research also involves experimental and non-experimental or quasi-experimental research designs in collecting data (Burns & Burns, 2008; Creswell, 2013; Neuman, 2007).

Quantitative methodology is being criticised on its epistemological and ontological foundations, and specific methods and research designs. These methods do not distinguish among people (can think) and the social institutions from 'the world of nature'. Thus, objectivism implies a static world that is independent of human's life. The measurement process possesses an artificial and spurious sense of precision and accuracy, and procedures hinders the connection between research and everyday life. The environment where quantitative methodology is applied in social science is more complex

than in natural science. Natural scientists have a greater control over the conditions in strict laboratory environment. (Bryman, 2015; Burns & Burns, 2008; Creswell, 2013).

5.4.3 Mixed-methods Research

Mixed methods research combines both qualitative and quantitative aspects. Mixed-method research emerged in response to the emphasis placed on strengths and weaknesses of qualitative and quantitative research. Consequently, integration of qualitative and quantitative approaches came into prominence (Bryman, 2006; Hair, 2007; Neuman, 2002). This method bases knowledge claims on pragmatic grounds and collects both numeric and narrative information. Mixed-methods strategy consists of sequential, concurrent and transformative processes (Creswell & Creswell, 2017).

Sequential process expands the research findings by using multiple research strategies. This starts with exploring the research problem using qualitative approaches followed by quantitative approaches or vice versa. Concurrent process uses both qualitative and quantitative research approaches at the same time. Transformative process employs theoretical lenses which provide a specific framework (Bryman, 2015; Creswell, 2013).

Mixed-methods also have its own strengths and weaknesses. The strengths of mixed-methods include; ability of adding meanings to numbers from narratives and vice versa, ability of giving both qualitative and quantitative strengths and overcome weaknesses of using one method, ability to generate and test a grounded theory, ability of answering broader and complete range of research questions, provide stronger evidence for a conclusion through convergence and corroboration of findings, increase the generalisability of results, and produce more complete knowledge necessary to inform theory and practice since two methods are used (Creswell, 2013; R. B. Johnson & Onwuegbuzie, 2004). Some of the weaknesses include; need of more resources and time, overwhelming of the researcher with learning many methods (Creswell, 2013; R. B. Johnson & Onwuegbuzie, 2004).

5.5 Research Designs

The research design is a framework for the generation of evidence that is chosen to answer the research question(s) in which the investigator is interested (Bryman, 2015). Research designs are associated with the above discussed research approaches/strategies. Some others (Hair, 2007) refer research designs to data collection methods. However, some methodologists (Creswell & Creswell, 2017; Kerlinger & Lee, 1999) refer research designs to the plan or proposal to conduct research. It

outlines the investigator's overall scheme of programme from the writing hypothesis, their operationalisation and to the final analysis of data. There is an ambiguity in the meaning of research design due to the variation in constituents of its definition by various authors.

The commonly found research designs in research texts associated with two contrasting research approaches are summarised in Table 5-4. Those five designs include experimental, cross-sectional, longitudinal, case study and comparative (Bryman, 2006). Thus, these research designs/data collection methods would be applied interchangeably in a mixed-methods approach based on the sequence of integrating two approaches (Bryman, 2006; Creswell & Creswell, 2017).

Table 5-4: Research designs applicable under different methods

Research design	**Research method**		
	Qualitative	**Mixed** ⟷	**Quantitative**
Experimental	Not applicable	Sequentially and/or concurrently use a combination of qualitative and quantitative methods (for example, case study followed by cross-sectional survey)	Employ experimental designs to generate quantitative data that enable quantitative comparisons between experimental and control groups.
Cross-sectional	Qualitative interviews or focus groups at a single point in time. Qualitative content analysis of a set of documents relating to a single period falls into this group.		Survey research or structured observations on a sample at a single point in time. Content analysis of sample documents also falls in to this type.
Longitudinal	Ethnographic research over a very long period, qualitative interviewing on more than one occasion, and qualitative content analysis of documents relating to different time periods.		Survey research on a sample on more than one occasion as in panel and cohort studies. Content analysis of documents relating to different time periods.
Case study	Intensive study by ethnography or qualitative interviewing of a single case, which may be an organisation, life, family or community.		Survey research on a single case with a view to revealing important features about its nature.
Comparative	Ethnographic or qualitative interview research on two or more cases.		Survey research in which there is a direct comparison between two or more cases, as in cross-cultural research.

Source: (Bryman, 2006, 2015; Hair, 2007)

5.6 Sampling Techniques

A selected sample can be seen as a subset of the population and are assumed to represent the properties of the population (De Vaus & de Vaus, 2013; Fowler Jr, 2013; Hair, 2007). There are two main sampling methods: probability and non-probability sampling.

5.6.1 Probability Sampling

Probability sampling is associated most commonly with survey research, particularly when inferences are to be drawn from the sample about the population to answer research question(s) (Fowler Jr, 2013). Probability sampling has been argued to compromise between accuracy of findings and the amount of time and money invested in collecting and analysing data. It remains a major limitation in probability sampling (Manjunath, Hegadi, & Archana, 2012).

Having a sampling frame (list of all the cases in the population from which the sample is drawn) is essential when using probability sampling. Sample size plays an important role in probability sampling. The larger the size of a sample, the closer its distribution will be to the normal distribution (Hair, 2007). Stutely (2003) advises that a minimum number of 30 as the smallest number in each category within the overall sample as a rule of thumb for statistical analysis. However, the decision on the size of the sample depends on a number of considerations such as time and cost, problem of non-response, heterogeneity of population and the kind of analysis to be performed (Bryman, 2015).

Another important aspect of a probability sample is that it represents the population. Once the sample size has been decided, it is very important to obtain high response rate in order to be able to reduce the risk of non-response bias and ensure the sample is representative (Groves & Peytcheva, 2008). Four reasons to non-response include refusal to respond, ineligibility to respond, inability to locate the respondent, and inability to contact despite the respondent were located (Saunders et al., 2012). Studies involving individuals or organisations' representatives, response rates of approximately 50 per cent and 35 – 40 per cent were respectively considered adequate (Baruch & Holtom, 2008).

Once the sampling frame has been decided and the sample size is established, the next important step of probability sampling is selecting the appropriate sampling technique to obtain a representative sample. According to Saunders et al. (2012) the five main probability sampling techniques are; 1) simple random, 2) systematic random, 3) stratified random, 4) one stage cluster,

and 5) multistage cluster. Advantages and disadvantages of these sampling methods are discussed in Table 5-5.

Table 5-5: Advantages and disadvantages of probability sampling techniques

Technique	Advantages	Disadvantages
Simple and systematic random	Highly representative	Not possible without compete list of population members Potentially uneconomical Disruptive to isolate members Time-scale may be too long Data/sample could change
Stratified random	Specific groups are represented by selecting individuals from strata list	More complex Requires greater effort than simple random sampling Strata must be carefully defined
One stage cluster	Possible to select randomly	Clusters in all level must be equivalent and some natural ones are not for essential characteristics
Multi stage cluster	Possible to select randomly	Complex

Source: (Black, 1999)

5.6.2 Non-probability Sampling

Non-probability sampling includes all forms of sampling techniques that are not conducted according to the principles of probability sampling. In here, the sampling frame cannot be decided. The majority of these techniques include an element of subjective judgement. These techniques are used to select samples when there is no sampling frame available, such as in market surveys, in exploratory stages of some research projects (pilot survey), and case study research. However, statistical inferences drawn about a population from a non-probability sample could be biased (Bryman, 2015; Saunders et al., 2012).

Unlike in probability sampling, the issue of sample size in non-probability sampling is ambiguous and there are no rules. Non-random samples serve the purpose of generalising to theory rather than to a population. Therefore, the sample is dependent on research question(s) and objectives. For instance, what is needed to be found out, what will be useful, what will have the credibility, and what can be done within available resources (Patton, 1990). Non-probability samples are mostly used to collect qualitative data using semi-structured or structured interviews. Therefore, the validity, understanding and insights gained from such data depends mostly on the researcher's data collection and analytical skills rather than sample size (Patton, 2002). Most research texts recommend to continue sampling until data saturation is reached, while several others suggest

varying the size of samples based on the study. For example, Guest, Bunce, and Johnson (2006) suggest 12 in-depth interviews to understand commonalities within a homogenous population. Creswell (2008) suggests 25-30 interviews for a general study.

Having decided the likely suitable sample size, the next stage of non-probability sampling is selecting the most appropriate technique. There is a range of non-probability sampling techniques, including 1) purposive 2) quota 3) snowball, 4) volunteer, and 5) convenience. Advantages and disadvantages of different probability and non-probability sampling techniques are summarised in Table 5-6.

Table 5-6: Advantages and disadvantages of non-probability sampling techniques

Technique	Advantages	Disadvantages
Purposive and Quota	Ensure balance of group size Focus on specific group Ensure adequate numbers' selection	Samples are not easily defendable Subjectivity nature
Snowball	Possible to include members of groups	Same as above
Volunteer and Convenient	Inexpensive way of ensuring sufficient number of a study	Highly unrepresentative

Source: (Black, 1999)

5.6.3 Qualitative Data Analysis

According to Yin (1994) and Miles and Huberman (1994) this research also include examining and interpretation of informants' words, behaviours and actions and such qualitative data are analysed according to the research objectives and the framework.

Using the transcripts, categorising key dimensions of associations and summarising are strategies to analyse qualitative data (Saunders et al., 2012). Moreover, "a thematic analysis can be aided by and presented as thematic networks that summarise the key themes constituting a piece of text" (Attride-Stirling, 2001, p. 386). The thematic analyses enhance the understanding of the phenomenon and promote interpretation of the data collected during the fieldwork, leading to explorations and explanations. Referring to theory building research, Eisenhardt (1989b) applies two key steps; within case analysis and within cross-case analysis in order to capture the novel findings which may exist in the data. Accordingly, this process allows examination of each case and provide replications across the cases. Eisenhardt (1989b, p. 541) says "within case analysis allows the unique patterns of each case to emerge and then gives the researcher a rich familiarity with

each case which, in turn, accelerate cross-case comparison". Cross-cases analysis follows selecting key themes suggested by the existing literature, seeing subtle similarities and differences between cases and dividing the data-by-data sources (Eisenhardt, 1989b). Yin (1994) on the other hand suggested four dominant analytical techniques used in case study research including pattern-matching, explanation-building, time series analysis and program logic models.

5.6.4 Quantitative Data Analysis

There are two broad statistical techniques to analyse quantitative data. They are descriptive and inferential techniques. Descriptive techniques are used to describe and summarise data while inferential statistical techniques are used to make inferences about large population by using small sample data (Rudolph, 2018; Saunders et al., 2012). Data is summarised and displayed in tabular, graphical or numerical forms in descriptive analysis to describe and show the relationships between variables in a data set (D. R. Anderson, Sweeney, & Williams, 2011). Frequency tables, cross-tabulation or contingency tables, quadrant analysis, bar charts, pie charts, histograms, dot plot, ogive, stem-and-leaf display, pareto diagrams, boxplots, scatter diagrams, correlation and mapping are the common tabular and graphical methods. Cross tabulation or contingency tables, correlation and scatter diagrams are frequently used to describe the relationship between two variables while all other methods are used to describe one variable (D. R. Anderson et al., 2011; D. R. Cooper, Schindler, & Sun, 2006; Saunders et al., 2012). Frequency distribution, measure of central tendency, variability and relative position, exploratory data analysis, weighted mean and measure of association are the common numerical descriptive methods (D. R. Cooper et al., 2006; Saunders et al., 2012).

In inferential statistics, inferences are made about large populations taking observations from representative sample of the study population. Inferential statistics are used to estimate population parameters from a random sample and to test statistically based hypothesis (Rudolph, 2018; Zikmund, Babin, Carr, & Griffin, 2013). Two types of population parameters are estimated from random samples; point estimate and interval estimate. A point estimate is a single value estimate that represent reasonable estimate of the corresponding population parameter. Interval estimate is an interval (confidence interval) which is defined on the scale of measurement that contains acceptable range (Wiersma & Jurs, 2009). Interval estimation is frequently used and preferred over point estimation (D. R. Cooper et al., 2006).

Hypothesis testing is the second major function of inferential statistics. Based on the number of variables, hypothesis testing can be univariate, bivariate and multivariate (Saunders et al., 2012). There are two types of statistical techniques for testing hypothesis based on the distribution of data; parametric and non-parametric (Zikmund et al., 2013). Parametric statistics are applied for numerical data, having known and continuous distribution (normal sampling distribution), interval or ratio scale data arise from large samples. Contrary, non-parametric statistics are employed for data without normal distribution (distribution free) (Rudolph, 2018; Saunders et al., 2012). Parametric tests include analysis of variance (ANOVA), analysis of covariance (ANCOVA), regression, factor analysis and structural equation modelling (SEM) while non-parametric tests include sign test, Mann-Whitney U, Kruskal-Wallis test, Wilcoxon matched-pair signed rank test, chi-square goodness-of-fit test, odds ratio and Fisher's exact test (Leedy & Ormrod, 2014).

Choosing between qualitative and quantitative analytical techniques is highly debated. Sinkovics, Penz, and Ghauri (2008) argue that the properties of a techniques being quantitative and producing numeric results should not be preferred over qualitative research. It is the research problem and its purpose that really matter in selecting suitable analytical techniques. Moreover, the suitability of a research method largely depends upon the credibility of research findings (Bryman, 2006; Saunders et al., 2012; Zikmund et al., 2013). Further, Bryman (2015) argues that reliability, replication and validity are the prominent tools for evaluating the credibility of a research method.

5.7 Methodology of this Study

General theory of research methodology has been discussed in the previous sections. Following sections describe the research methodology applied in this research.

5.7.1 Philosophy and Approach

Philosophy is used to clarify the research design type in this research. The nature of this research suggests both subjective and objective knowledge claims. The research problem is embedded with both qualitative and quantitative characteristics. Hence this research does not precisely align into one single ontological foundation. The research problem has its commitment to both subjectivist and objectivist ontological perspectives. Hence it is perceived here in this research that both subjective and objective knowledge claims are precise. Induction and deduction are the two approaches to social investigation as discussed earlier in this chapter. However, it is not easy to determine which epistemological perspective would be the right one to provide an account of the research 's nature (Bell, Bryman, & Harley, 2018).

5.7.2 Research Paradigms

According to the above discussed literature there are four research paradigms to examine a phenomenon; positivist/post-positivist, interpretivist/constructivist, transformative and pragmatic. From its nature, research problem in this study holds both qualitative and quantitative constituents. Hence, this study has its link to pragmatic paradigm and examined from both positivists/post-positivist and interpretivist/constructivist perspectives. To be precise, this research was examined from pragmatic paradigm and the research problem directed the choice of an appropriate methodology.

5.7.3 Mixed-methods Research

The research problem in this study demands a dynamic research approach that is firmly rooted in both qualitative and quantitative epistemology. Despite the previously discussed controversy remains on its ontological and epistemological foundations, this study employed mixed-methods approach and positioned on pragmatic paradigm following Saunders et al. (2012). In the following sections, the mixed-methods' research procedures followed in this study are explained.

This study consisted of two phases. First phase required building a comprehensive understanding about co-operatives' vertical integration and their levels. In particular, how co-operatives have organised various value adding activities and to what extent these co-operatives exercise control in their organisation's value chain was examined. This involves detail exploration about co-operatives' value adding activities, organisational, governance and managerial arrangements and financial performance. It suggests that such explorations emerge with qualitative data collected with methods such as content analysis, participant observation and unstructured interviews. Thus, the information generated in this phase was used in designing the second phase. Another motivation to use mixed-methods is to overcome the weaknesses of applying qualitative and quantitative method alone by combining the strengths of both methods (Mertens, 2014).

Application of mixed-methods in this study is further motivated by its use in business research in general and co-operative research in particular. For example, Sisay et al. (2017b) applied similar approach in their investigation of firm performance and members' livelihood in Ethiopian seed producer co-operatives. In their study of examining benefits and drawbacks for co-operatives involved in coffee certification, Snider, Gutiérrez, Sibelet, and Faure (2017) also used mixed methods with qualitative case study using interviews followed by a quantitative study based on a survey. Naziri et al. (2014) followed mixed-methods in their study of estimating the impact of small-scale

farmer collective action on food safety. In the sequential mixed-methods, the researchers interviewed organisational leaders and surveyed members to gather quantitative data. In comparing the success of marketing groups initiated by different projects and effect of these groups on marketing performance of farmer members, Schöll, Markemann, Megersa, Birner, and Zárate (2016) followed mixed-methods that included interviews and surveys as main methods of data collection.

5.7.4 Study Area

This research is carried out on the rice sector in Sri Lanka. Rice is the staple food crop and the involvement of co-operatives are evident in the sector (Korale Gedara et al., 2016). Considering its importance to the national rice production, North Central Province (NCP) was selected as the study area which consists of two districts; Anuradhapura and Polonnaruwa. It is the second largest rice producing province in the country. Co-operatives' involvement in rice business activities in this province was higher than other provinces (Department of Co-operative Development, 2015). Thus, over 90% of the rice farmers in this province belongs to one ethnic group and speak Sinhala as their language. This brought great cultural homogeneity and made convenient the implementation of data collection process. Also, it saved the time and resources required for translation and translators. Rice sector provides the livelihood for about 75% of the population in the province and over 90% of the rice farmers in the province are smallholders (Central Bank of Sri Lanka, 2017). More information about the province in terms of rice production and socio-economic situation is provided in the background chapter. Provincial map and respective locations of study co-operatives are shown in Figure 5-1.

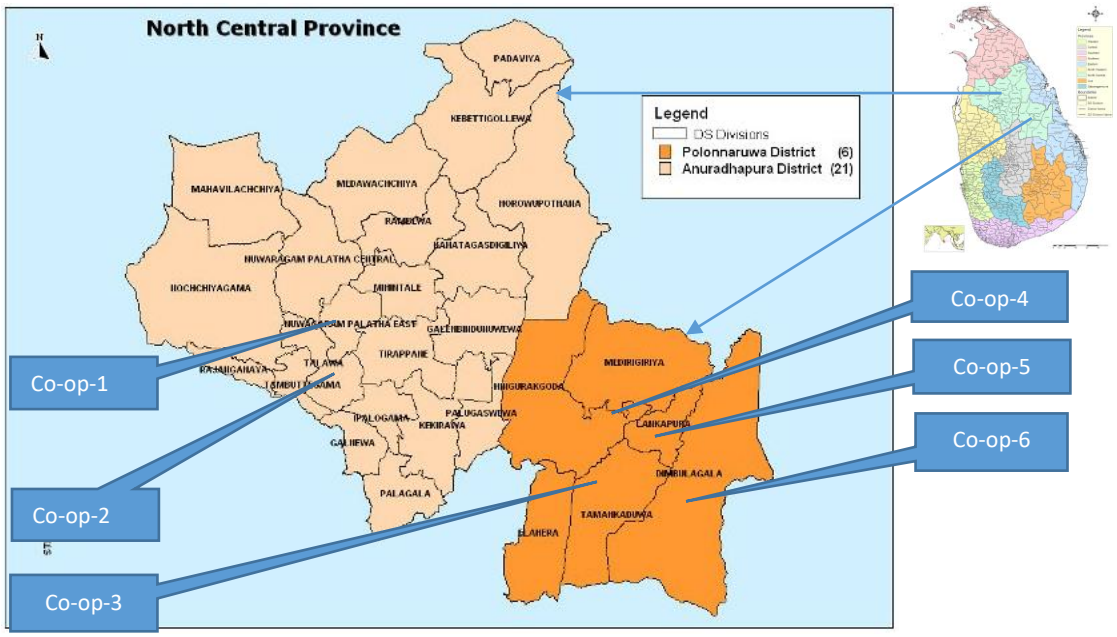

Figure 5-1: Map of the study province and location of study co-operatives

5.7.5 Research Process Followed in this Study

This section describes the overall research process followed in this study to approach the problem. As outlined in Figure 5-2, the research process began with defining the research problem. Then the research aims and the objectives were defined. Relevant literature was critically reviewed to develop a theoretical framework to explain the problem at the third step. Data collection was implemented at the fourth stage which comprised of a pilot study, collecting qualitative and quantitative data. The results of the pilot study suggested revising the research problem, redefining the research aim and objectives, revising the literature review and theoretical framework as illustrated in Figure 5-2. Fifth stage involves data analysis. Discussion of results and drawing conclusion were made respectively at sixth and seventh stage.

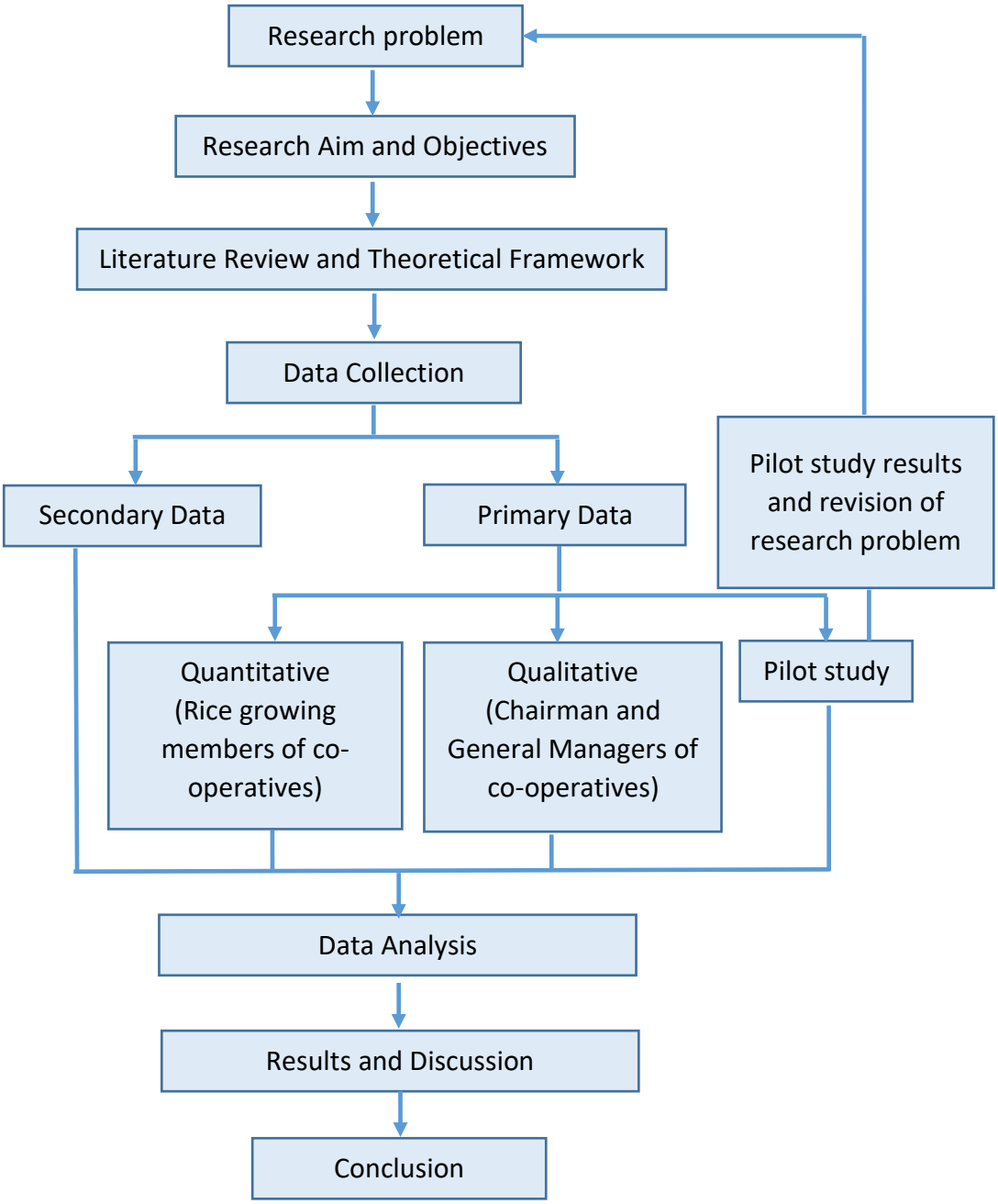

Figure 5-2: Research process followed in this study

5.7.6 Research Problem

As the first step in the process of research undertaking, the research problem was defined. It is presented in detail in section 1.3 in Chapter One.

5.7.7 Research Aim and Objectives

The main aim of this study is to analyse vertical integration in rural co-operatives in Sri Lankan rice sector. This analysis focuses on the performance and members' benefits of co-operatives and their performance. The study consisted of four research objectives as follows.

Objective 1: to develop a framework to analyse the benefits and performance of vertically integrated co-operatives

Objective 2: to analyse and compare the performance of partially and fully integrated co-operatives in Sri Lanka's rice sector

Objective 3: to analyse and compare the members' benefits of partially and fully integrated co-operatives in Sri Lanka's rice sector

Objective 4: to analyse and compare the members' financial performance of partially and fully integrated co-operatives in Sri Lanka's rice sector

5.7.8 Literature Review and Theoretical Framework

Four theoretical perspectives are deemed relevant and useful in examining the research problem of this study. They are; value chain theory, collective action theory, co-operative theory and vertical coordination theory. These theories and their applications in agriculture are reviewed comprehensively in Chapter Three and Four to explore important gaps in knowledge (in theory and application). The theorical framework is established towards the end of Chapter Four combining the four theoretical perspectives identified above.

5.7.9 Data Collection

The current study mainly used primary data complemented with secondary data. Data were collected from different sources at several stages and explained below.

Secondary data collection

Secondary data were collected from various sources available in studies of co-operatives and Department of Co-operative Development in Sri Lanka. Co-operative level data sources include financial reports, minutes of the annual general meetings, by-laws, and other published articles such as internal circulars. Archival records available at the Department of Co-operative Development were used to gather information about the number of co-operatives in the rice sector, their geographical locations, co-operative legislation and by-laws.

Primary data collection

Primary data were collected at three stages. In the first stage a pilot study was carried out to fill the gaps in secondary data and to pre-test the data collection instruments. As shown in Figure 5-2, a

qualitative and a quantitative study were conducted, respectively, at the second and the third stages of primary data collection. Those procedures of data collection are described below.

5.7.10 Pilot Study and Lessons Learned

Pilot study was carried out in January, 2017. The aim of the pilot study was to test the feasibility of operationalising the initial theoretical framework and to evaluate data collection instruments. The initial theoretical framework aimed to compare vertical integration in co-operatives and farmers companies. Following the development of initial theoretical framework, it was applied on Sri Lanka's rice sector at pilot scale. Two cases, each from successful co-operatives and farmer companies that have vertically integrated to include the activities of the general rice value chain were included in the pilot study. A total of 28 interviews were conducted to collect qualitative data supported with an interview protocol. Respondents who have the access to required information and are knowledgeable to provide reliable information were selected purposively. They included the chairman (01), general manager (01) and members/shareholders (05) from each case. Secondary sources of data used include organisational constitutions, annual reports, and published articles.

Results revealed that farmer companies devised relatively better institutional attributes to overcome some of the institutional problems that discourage investment in value-adding activities compared to co-operatives. However, neither co-operatives nor farmer companies have devised institutional attributes appropriate to attract adequate equity capital to establish and sustain value-adding activities. Regardless of the form of collective enterprise, both have integrated value-adding activities with either full or partial financial support from the government and debt capital.

Pilot study successfully validated the initial theoretical framework and evaluated the data collection instruments of the initial study. However, it was found during the pilot study that the farmer companies that have integrated rice value chain activities were liquidating in the study area and in Sri Lanka. This liquidation of companies constrained the operationalisation of initial framework. Finding appropriate number of comparable farmer companies to the vertically integrated co-operatives in the study region. There was no reliable evidence on the availability of comparable farmer companies at least in other comparable geographical locations. As a result of this learning, initial research problem was revised as shown in Figure 5-2 and refined to examine co-operatives' vertical integration and divide them into two groups as partially and fully integrated co-operatives. The results of the pilot study were published in the Journal of Co-operative Organisation and Management (Appendix A).

5.7.11 Qualitative Study

This section describes the procedure followed in the qualitative study. The qualitative study aimed to achieve the second objective of this study; to analyse and compare the performance of partially and fully integrated co-operatives in Sri Lanka's rice sector.

Selection of Co-operatives

According to the records available at the DCD in north central province (study area) in Sri Lanka, there were 26 registered co-operatives that have integrated various rice value chain activities. Activities of the typical rice value chain include supply of inputs, production, assembling and marketing, processing, wholesaling, and retailing. It was found during the interviews with DCD's officers that all 26 co-operatives have involved in assembling and marketing of paddy rice. Eleven co-operatives have integrated supply of inputs, production, and assembling and marketing activities. Remaining 15 co-operatives have integrated various combinations of input supply, production and marketing activities. On the other hand, the co-operatives that have integrated paddy rice processing (the subsequent next stage of the rice value chain after marketing) continues their value chain until retailing of consumer rice. There were three such co-operatives in this group. These three co-operatives integrated upstream assembling and marketing, production, and input supply activities as well. Looking into the structure of the value chain activities of 26 co-operatives, only two levels of vertical integration could be identified with sequence value adding activities. A range of vertical integration with sequence value adding activities could have not been able to identify due to two reasons. First, all the co-operatives have integrated assembling and marketing activities. Second, those co-operatives that have integrated processing continue their value chain by integrating subsequent wholesaling and retailing activities.

Since this study intended to analyse vertically integrated co-operatives, it was paramount important to identify the levels or range of vertical integration. According to the information presented earlier, a clear division of levels were identified at the assembling and marketing stage. Three of the co-operatives have integrated the whole rice value chain including supply of inputs, production, assembling and marketing, processing, wholesaling and retailing activities. Eleven co-operatives have integrated all subsequent activities from input supply through assembling and marketing. They also found to satisfy the study's definitions of partially and fully integrated co-operatives. Accordingly, the co-operatives available in the study area were divided into two clusters as partially integrated co-operatives and fully integrated co-operatives. Partially integrated co-operatives incorporated supply of inputs, production, and assembling and marketing of paddy rice. Fully

integrated co-operatives integrated whole of the value chain activities including input supply, production, assembling and marketing, processing, wholesaling and retailing. Therefore, from the partially integrated cluster, three co-operatives were selected randomly to include in the sample. In the fully integrated cluster, there were three co-operatives. All three fully integrated co-operatives were included in the sample. Figure 5-1 identifies the geographical location of six co-operatives. The Co-op-1, Co-op-2, and Co-op-3 are partially integrated co-operatives whereas Co-op-4, Co-op-5, and Co-op-6 are fully integrated co-operatives.

Selection of Respondents

Each co-operative possessed its own sources of primary data including directors, hired managers, employees, and members. The data sought to collect are related to the co-operatives' governance, management, business strategies, co-operatives' value chain and financial performance. Therefore, it was a requirement for any selected respondent to have knowledge on those aspects, access to such information, and authority to declare them. Saunders et al. (2012) contend that directors and managers are more likely to agree to be interviewed. Therefore, suitable informants were selected from the governance and management pillars. Following Barbour (2013), respondents were purposefully selected to obtain valuable data.

In order to identify potential research participants among directors and managers, pre-interview telephone conversations were held initially with the chairman of selected co-operatives. From six chairmen contacted, five offered to be interviewed themselves while all of them provided their consent to interview managerial level personnel. One of the chairmen nominated a director to be interviewed on behalf because of the chairman's busy schedule. Following chairman's approval, general managers were also contacted over the phone to get their consent for the interview. All general managers of six co-operatives were offered to be interviewed. Accordingly, five chairmen, one director and six general managers were interviewed.

Data Collection and Method

Primary qualitative data were collected between January and April, 2018 from the respondents. The data were collected from both selected partially and fully integrated co-operatives to understand the phenomena of vertical integration in co-operative enterprises and associated performance. Interview protocol was prepared based on the objectives of this study. Yin (2013) describes protocol as a set of substantive questions that will reflect the line of enquiry. Preparation of protocols has a

couple of advantages. It acts as a format to gather targeted data and guide data collection along a scheduled path. Protocol has several features. The question in it needs to be posed by the investigator. The protocol contains the instrument, the procedures and the general rules to be followed within it. It is essentially used in case studies and improve the research reliability. According to Yin (2013) a protocol consists of an overview, fieldwork procedures, case study questions and a report guide.

Primary qualitative data were complemented with co-operatives' financial data gathered from secondary sources such as available financial statements. These data were also collected in parallel to the interviews. Those financial data covered at least past three years from the year of collecting data for this study (2018). Financial data such as profit, total sales, current liabilities, current assets, total liabilities, total assets, and total equity were gathered from available financial records. Co-operatives studied however are multipurpose co-operatives and hence these financial figures were not only pertaining to rice business activities. Disaggregating those figures to give a better representation to rice business activities was time consuming, costly and cumbersome due to the complexity of account keeping in the co-operative's studies. Hence, aggregate figures were used for the financial analysis. Financial data were used to calculate financial ratios to measure the performance of co-operatives. Conventional financial rations used to measure the performance of businesses such as leverage, solvency, liquidity, profit margin, and efficiency were calculated with financial data.

Interview Protocol

The interview protocol consisted six sections. Each section included multiple questions linked to empirical enquiries and theoretical constructs. Following Perry (1998), the protocol in this study was used as a guide by the researcher to collect the data. The initial protocol was pre-tested with 2 participants (Appendix B - protocol before pre-test). Several amendments were made to the original protocol following the pre-test. Sections of the protocol and some of the questions within each section were re-organized to ensure a smooth flow of the interviews and to maintain the consistency.

Final version of the interview protocol consisted 36 questions/prompts (Appendix C – protocol after pre-test). Using this protocol, the participants respond to specific questions in each section about

themselves, their co-operative enterprise (their development, business departments and operations, and financial performance), co-operatives' rice value chain activities, other services provided, governance and management of co-operatives, and general comments around the topic. Sections of the final protocol and aims of the questions included in each section is summarised in Table 5-7.

Table 5-7: Organization of the protocol content and aims

Section of the protocol		Aim	Questions
01	Respondent's information	To collect data about the interviewees to understand their qualifications, competence, and experiences related to the co-operative businesses	1 - 5
02	General information and business operations	To evaluate the development, business scope, membership, and financial performance. Secondary data available in financial reports were converted into this section that are important in calculating financial ratios	6 - 14
03	Governance and management	To explore the governance and management conduct of co-operatives since they are linked to the vertical expansion and performance	15 - 18
04	Co-operatives' rice value chain	To explore specific value chain activities that have been integrated by these co-operatives and their operational performances	19 – 28
05	Other services and benefits of co-operatives	To examine community, social and environmental types of services offered by the co-operatives	29 – 32
06	General comments	To collect general explanations and comments across the cases about future goals and strategies of the co-operatives	33 – 36

This research developed interview protocol in English and translated into Sinhala. The data were collected in Sinhala and specific steps were followed in translating the data into English to ensure the texts 'validity and the correct meanings of the responses. In particular, transcriptions and expert consultations during the translation steps and pilot studies were followed for all the interviews.

Interviews

Evaluating its common advantages and disadvantages, this research used face-to-face interviews to gather qualitative (narrative) data. More specifically, semi-structured interviews were conducted, as opposed to unstructured interviews (Saunders et al., 2012). In choosing semi-structured interviews, particular emphasis was also given to the purpose (mainly to explore rather than testing hypothesis), respondents to be interviewed (directors and managers), types of data intended to

collect (organisational level) and the time. The purpose of the qualitative study in this research was to explore various elements of co-operative enterprises that could have impacted on their vertical expansion and the performance. Semi-structured interviews allow to investigate and explore the details about a particular area of interest. It is also useful in keeping the focus along a line of inquiry. Building in depth understanding of key concepts under enquiry such as value chain, level of vertical integration, governance, management, and business strategy of study co-operatives were required in this study. Generating such information was important to support the subsequent quantitative study as well. Semi-structured interviews are used to explore such concepts seeking new insights and explain the interrelationships between factors in depth (Saunders et al., 2012). Moreover, interviews provide direct information on above key concepts through the views of interviewees. Historical development of study of co-operatives were considered important and relevant for the analysis. Interviews are highly recommended to obtain historical information through interviewees (Bryman, 2015; Creswell & Creswell, 2017; Hair, Wolfinbarger, Money, Samouel, & Page, 2015).

In total, 12 semi-structured interviews were conducted including two interviews from each case. Interview protocol consisted of open-ended questions and was used to obtain information from the respondents. Face-to-face interviews were administered to collect primary qualitative data from the respondents. The face-to-face interviews allowed to make notes where necessary and digitally record the interviews. Additionally, being able to gather other secondary data to supplement the narrative data was another advantage of having face-to-face interviews. Compared to the other methods such as emails and telephone interviews, face-to-face interviews ensured getting high-quality information, high response rate and real time observations of the researcher.

Each interview lasted about one hour (up to three hours per case) and was digitally recorded while making notes on the points emphasised by the respondents. Tape recording enabled collecting and analysing narrative data more accurately. It was a limitation that due to the time constraint, there have not had a chance to show the transcripts to the interviewees to ensure their accuracy in terms of both the content and language.

The literature suggests various qualitative data analysis methods. Meantime, those suggested methods bring certain level of confusion around what method to choose, how to combine them and how to use them logically to generate reliable and valid findings. However, the method suggested

by Eisenhardt (1989b) is more applicable in analysing qualitative data in this research. This research basically aims to compare two types of co-operatives that supposed to be theoretically different in their level of value chain integration. Selection of two types of co-operatives hence align with the theoretical sampling proposed by Eisenhardt (1989b) and Perry (1998). Examination and comparison of organisational level attributes of the two types of co-operatives and how those attributes influence co-operatives' performance was the aim of the qualitative study. Therefore, this study relied on within case analysis and cross-case analysis for analysing data. Accordingly, analysis of qualitative data in this study included within and cross co-operative analysis.

Within Co-operative Analysis

Interviews were conducted in Sinhala, which is the language spoken by all the interviewees. Later on, the same day, the digitally recorded interviews were transcribed in English and combined with field notes made during the interviews. Following Yin (2003, pp. 109-111), the qualitative analysis involved in examining, categorising, tabulating and re-combining narrative data. Accordingly, each case study was described with emphasis given to their location, development, governance and management, business scope, membership, value adding activities involved, services and information provided, and financial performances. These narrative data were then grouped in a way to represent the constructs of the theoretical framework proposed in Chapter Four. This grouping of narrative data allowed qualitative comparisons between the partially and fully integrated co-operatives.

Cross Co-operative Analysis

Having established the relevant data, theoretical propositions were checked by a process of "pattern matching" as proposed by (Yin, 2003, pp. 116-119). Accordingly, partially and fully integrated co-operatives were compared. This was to match propositions and relationships across the co-operatives. Moreover, differences among the co-operatives were identified when comparing coding between the two types of co-operatives. This entailed comparison of attributes observed in fully and partially integrated co-operatives and attributes predicted by the theory. Yin (2009) argued that cross-case analyses by matching patterns in multiple case study design improve the robustness of results.

Dey (2003) proposed explanatory metrices to compare between cases. Accordingly, partially and fully integrated co-operatives were compared using metrices. The metrices helped to create themes that share common meanings. This comparison entailed seeing evidence and replication across all

the cases to explore the attributes of partially and fully integrated co-operatives and examine how they are associated with level of vertical integration and financial performance.

Five financial ratios were used to compare financial performance following Parliament et al. (1990). They are leverage, solvency, liquidity, profit margin and efficiency. Leverage dictates the level of debt incurred by a business entity. It was calculated as the ratio of total liabilities to total assets in the co-operative's capital structure. Solvency determine what percentage of a company's assets are owned by investors and not leveraged. It was calculated as total equity to total assets ratio. When this ratio is high, there is little likelihood of defaulting on debt service payments and the prospect of bankrupt or bankruptcy is remote. Liquidity measures the adequacy of current assets to meet current obligations. The simplest and least strict measure of liquidity is the current ratio, which is the ratio of co-operative's current assets to current liabilities. Profit margin was calculated as profit before tax to total sales to gauge the profitability of co-operatives. Capital efficiency was measured by the ratio of sales to total assets. It indicates how efficiently the organisation employs its assets to generate sales (Chen et al., 1985; Lerman & Parliament, 1990).

5.7.12 Quantitative Study

Following section describes the cross-sectional survey research design followed in the quantitative study.

Aim of the Quantitative Study

The quantitative study aimed to achieve the third and fourth research objectives of the study. Those are to analyse and compare the members' benefits, and financial performance of partially and fully integrated co-operatives in Sri Lanka's rice sector.

Cross-sectional Survey Design

This study conducted a cross-sectional survey during the period from January to April, 2018 to collect quantitative data. Cross-sectional designs administer surveys, qualitative interviews, focus groups at a single point in time, and qualitative content analysis of a set of documents relating to a single period to collect data (Bryman, 2015; J. Powell, Inglis, Ronnie, & Large, 2011). Considering its ability to get observations on elements and the time taken to complete the survey, this study administered its survey in two communication modes; structured interviews and self-administered (Bryman, 2015; D. R. Cooper et al., 2006). The survey questionnaire was developed in two parts allowing to use two communication modes. Part one of the questionnaire was used by the researcher to conduct structured interviews. In quantitative studies, structured interviews are often

used as an appropriate communication method to collect quantitative data and it is also known as quantitative research interviews (Bryman, 2015). The answers to the questions in part one was taken down by the researcher himself in the gaps provided under each question in the questionnaire. Face-to-face structured interviews provided an opportunity for the researcher to make important observations and some degree of data triangulation. It also allowed in-depth data collection and a comprehensive understanding of the respondents' context. Face-to-face interviews thus helped to have high commitment of respondents towards participating in the survey.

Part two was self-administered by the respondents and was collected by the researcher on the same day or later by post. Part two of the survey questionnaire was self-administered to give more freedom to respondents on their responses to perceive benefit statements and minimise the researcher's influence on the responses. Self-administering of a part of the questionnaire also helped to save the time taken to complete the survey.

Selection of Respondents

Methodological literature discussed earlier in this chapter suggests a number of probability and non-probability sampling methods, their advantages and limitations. Having this is mind, two stage cluster sampling was used in this study. Study population (co-operative members) was divided into two clusters (members in partially and fully integrated co-operatives). These clusters were identified based on the probability list of co-operatives, that are involved in rice business activities, provided by the Department of Co-operative Development (Bryman, 2015). Of the list of partially and fully integrated co-operatives, there were three co-operatives that satisfy the definition of fully integrated co-operatives. They all were included in the sample. Out of seven partially integrated co-operatives, three were selected randomly. A list of rice-growing members in each of the selected partially and fully integrated co-operatives were used as the sampling frame in this study. Lists of rice growing members were prepared from member registries available at the co-operatives included in the study. Respectively, from each partially and fully integrated co-operatives 152 and 157 smallholder member rice farmers were selected randomly to include in the sample.

Questionnaire Design

The procedure suggested by the methodologists (Churchill & Iacobucci, 2006; Denscombe, 2007; Oppenheim, 2000) was followed in developing the questionnaire in this study. As the first step, a comprehensive literature review was performed to identify the constructs. The two key constructs of the quantitative study are member benefits and financial performance. An account of various

benefits derived by the members/patrons of various forms of collective enterprises (for example, co-operatives, farmer companies, farmer associations, producer groups, and so forth) identified in the literature is provided in the Chapter Three.

Various dimensions of members' performance were also identified in the Chapter Three including both financial and non-financial. However, scope of this study limited to include only financial performance. Moreover, review of quantitative data analysis informed about measurement scales and their properties. Steps were taken to make sure variables have the properties of measurement scales.

Table 5-8: Link of questionnaire content to the research's framework

Type of information	**Aim**	**Link to research framework**	**Questions**
Respondent's demographic information	To understand demographic and socio-economic situation of the respondents and their participation in co-operatives	1. Describe and distinguish members of partially and fully integrated co-operatives 2. Serve as explanatory variables in comparing and analysing benefits and financial performance	1-8, 12, 13
Characteristics of rice farms	To evaluate the scale of farming, tenure conditions, farm operations, conditions of infrastructure and farm assets	1. Describe and distinguish members based on farm characteristics 2. Serve as explanatory variables in comparing and analysing benefits and financial performance 3. Input variables in estimating farm financial performance	9-13
Production and marketing	To explore rice production, post-harvest and marketing activities.	1. Compare production, post-harvest and marketing performance among members of partial and fully integrated co-operatives 2. Inputs to estimate farm financial performance	14-17
Input use and cost of production	To explore and evaluate input use and cost of production	1. to distinguish members in partially and fully integrated co-operatives in using production inputs and cost of production 2. Inputs to estimate farm financial performance	18

Questionnaire consisted of two parts; Part one of the questionnaire primarily aimed at gathering data required to measure financial performance and included 21 questions. Majority of the questions included in part one is close ended questions. More of the close-ended questions aimed to get direct, structured, and numerical answers as much as possible. Types of information collected, their aims and links to the research's framework are summarised in Table 5-8 along with reference to respective questions.

Only seven open ended questions were included in part one. Open-ended questions were asked to have respondents' opinions and/ or reasons on particular event and/or observation. For example, question number eight (what are the three main reasons for you to join the co-operative?) was aimed at recalling the main reasons affected on respondents to get the co-operative membership. Question number 15 to 17 directing the respondents to provide reasons for important production, and marketing decisions made by them. Question number 19 and 20 stimulate future prospects on continuing co-operative membership and rice farming. Question 21 asks to elaborate on respondent's thought around key words of the research.

Part two of the questionnaire was designed to gather member benefit data. The benefits derived by the members/patrons of collective enterprises were identified and are presented in Chapter Three. Those benefits were transformed into 61 perceived benefit statements and organised under six groups. They are; 1) production and marketing, 2) supplying inputs, services and information, 3) ownership and control, 4) community, 5) social, and 6) environmental.

The level of agreement or disagreement on each of the statements was recorded on a 5-point scale ranging from "strongly disagree" (1) to "strongly agree" (5) with middle scales of "disagree" (2), "moderately agree" (3), and "agree" (4). There is a debate on the degree of discrimination between respondents and data characteristics of scale categories such as 5-point, 7-point, and 10-point. However, Dawes (2008) demonstrated that data obtained from using 5-point and 7-point have quite comparable characteristics, while a 10-point scale produced a lower mean score than the 5- or 7-point formats. However, negative skewness of score was often identified as one of the limitations of such scales (Dawes, 2002; R. A. Peterson & Wilson, 1992). The present study used a 5-point scale to measure the perceived benefits. Since this section was self-administered by the respondent, the scale needed be easily understandable and manageable. Johns (2010) argues that a 5-point scale offers enough choice and makes things manageable for the respondents. Moreover, the 5-point scales have often been used in agribusiness research to measure perceptions of respondents on

important constructs (Benos et al., 2016; Brenes et al., 2014; Heyder & Theuvsen, 2012; Kader, Mohamad, & Ibrahim, 2009). Following the development of the questionnaire, it was pre-tested on six members in study co-operatives. The questionnaire used for pre-testing is given in Appendix D. During the pre-test, several necessary changes to the questionnaire were identified. The order, organisation and wording of questions were slightly changed to ensure a smooth flow and clear meaning. Additionally, few new questions were also included. Final version of the questionnaire is given in Appendix E.

Quantitative Data Analysis

Following sections describe the methods and tools used in analysing the quantitative data. There are various descriptive and inferential data analysing techniques used in social science research (Ary, Jacobs, Irvine, & Walker, 2018; Saunders, 2011). This section discusses data analysing techniques applicable to this quantitative study. The R statistical software (R Core Team, 2015) was used to analyse data in this study motivated by its computational efficiency, ability to data manipulation, calculation and visualisation in the same environment (Ihaka & Gentleman, 1996). However, lack of easy way to maintain functions has been a challenge when using the software.

Checking for Data Characteristics and Accuracy

Data gathered from the survey were entered into an Excel spreadsheet. Spreadsheet was visually checked to ensure whether the data have accurately been entered and are free from missing data. Based on the recommendations of the analysts (Oja, 1983; Tabachnick & Fidell, 2007) data also were checked for normality to identify outliers using median, box, whisker and normal probability plots. Since its multivariate nature of the research problem, the identified outliers were imputed with mode rather than removing from the analysis. Quantitative data were summarised and described using tables, percentages, frequencies, and means. Summaries of quantitative data are presented in Chapter Seven. Descriptive analysis of data provided very important insights for subsequent analysis as shown by evolutionists (Finlay & Agresti, 1986; Keppel, 1991).

Non-Parametric Methods

The benefits were measured with a five-point Likert type of scale ranging from 1 (strongly disagree) to 5 (strongly agree) in this study. These benefit measures were in the form of non-parametric data and do not fit into a known distribution. Conventional parametric tests such as Student's t-tests are inapplicable to compare such ordinal data. Hence, as recommended by researchers (Mann & Whitney, 1947; Wilcoxon, 1945), Mann-Whitney U test was applied to compare perceived benefits by the respondents of partially and fully integrated co-operatives. To apply Mann-Whitney U test,

the sample must satisfy three assumptions. First, samples must be randomly drawn from the target population. Second, each measurement or observation must correspond to a different participant. Third, the data measurement scale is of an ordinal or continuous type (Nachar, 2008). Benefit data in this study satisfied above three conditions. The survey respondents in this study were selected applying cluster sampling method and satisfy the first assumption of randomness. Each measurement also corresponds to a different participant since each respondent ranked its level of agreement or disagreement to the perceived benefit statements and satisfy the second assumption. The measurement scale was also ordinal and satisfy the third assumption. Accordingly, the data fulfilled the conditions necessary to apply Mann-Whitney U test. The results of comparing benefits with Mann-Whitney U test are discussed in section 8.2 in Chapter Eight.

Data Reduction Methods

One of the analytical challenges faced in this study was interpretation of benefit data. Study used 61 statements to measure perceived benefits. Interpretation of such a large number of dimensions is cumbersome. Moreover, use of such a large number of variables in subsequent analysis also found to be challenging. Aiming to overcome these challenges in data analysis and interpretation, Exploratory Factor Analysis (EFA) was applied on benefit data. Literature suggests three data reduction methods; EFA, Principal Component Analysis, and Confirmatory Factor Analysis (Fabrigar, Wegener, MacCallum, & Strahan, 1999). Properties of three data reduction methods, advantages and limitations are summarised in Appendix F.

In principle, all three methods are used in reducing a large amount of data represented by different variables to a small and manageable amount, represented by a small number of factors. However, use of EFA in this study was stimulated by a number of reasons. Main purpose of data reduction in this study was to identify the nature of constructs that underlie responses given in perceived benefit statements and to generate factor scores to use in subsequent analysis. For such purposes, EFA works well (DeCoster, 1998). Apart from that, as identified in Appendix F, EFA takes advantage of all the information in the interrelationships between variables. Thus, EFA discovers common/underlying factors maximising the common variance instead of total variance like in PCA. Hence, EFA allow statements sharing a common variance to group together to evolve common factors. It was also assumed here that the perceived benefits reflect a few latent variables, but their structure is not known.

EFA however suffers from the weakness in using ratio data similar to PCA and CFA. They are strongly recommended for data in the form of interval and ratio scale (Gorsuch, 2015) or at least a "Quasi-Interval" level measurement (Floyd & Widaman, 1995). Variables measured on a nominal or ordinal scale, with three or more categories, are argued to not satisfy the assumption that "factors exert linear effects on measured variables" (Fabrigar & Wegener, 2012, p. 94). However, evidence from various fields of study, including agribusiness and other related social science disciplines (Appendix F), have applied EFA on data measured on the Likert types of scales such as in this study. Williams, Onsman, and Brown (2010) outline a five-step protocol in Exploratory Factor Analysis and it is provided in Appendix G.

As the first step of applying EFA, data were checked for their suitability to perform EFA. A number of preliminary checks were made for this purpose before beginning the application of EFA. Sample to Variable Ratio (*N:p* ratio) was one of the important pre-checks. The study sample included 309 respondents in total. A total of 61 statements/items were used to measure various dimensions of benefits as informed by the literature. Accordingly, the *N:p* ratio was estimated at 5:1 and it was in the recommended range proposed by Everitt and Dunn (2001); Gorsuch (2015); Hair, Black, Babin, and Anderson (2014) to reliably implement EFA.

Apart from *N:P* ratio, absolute sample size was also comparable to the recommended sample sizes. The sample size in this study qualifies the size suggested by Tabachnick and Fidell (2007), Hair et al. (2014), and Comrey and Lee (2013) fall within the "good" range. Correlation analysis were carried out including all 61 statements/items as another pre-check following several authors (R. K. Henson & Roberts, 2006; Tabachnick & Fidell, 2007). Majority of the resulted correlation coefficients were in the recommended range of +/- 0.4 and +/-0.5 (Hair et al., 2014).

From the total of 61 statements/items, 14 had low correlations below +/- 0.3, even though they had KMO values greater than 0.7. It is a principal requirement to have considerably higher correlations at least over 0.3 among items to apply EFA reliably. Therefore, following Tabachnick and Fidell (2007), those 14 statements/items were eliminated from the analysis at the initial stage before proceeding for any iterations of EFA. A total of 47 statements/items remained to proceed with EFA following the elimination of low correlated statements/items.

In addition to the examination of correlation coefficients, two standard tests were also used to assess the factorability of data following the directions of Bartlett (1950), H. F. Kaiser (1970), and

Tabachnick and Fidell (2007). Accordingly, the KMO test of sample adequacy (MSA) and Bartlett's Test of Sphericity were also performed on remaining 47 statements/items.

Following above initial assessments, many iterations of EFA were carried out on data represented by 47 statements/items until a simple, interpretable and meaningful latent benefit structure was discovered.

According to the literature, there are seven-factor extraction methods, of which, PCA and PAF (principal axis factoring) are popularly used. Relying on its frequent use in various subject disciplines, this study used the PAF method to extract factors. However, Thompson (2004) states that the practical difference between PCA and PFA is insignificant when variables have a high reliability.

Subsequent rounds of preliminary iterations of EFA also suggested further removal of several other statements/items from the analysis. It was found that some of the statements/items had low loadings on factors. Those statements/items with low loadings below the cut-offs (since the sample is 309 in this study, the cut-off was set to 0.35 following Hair (2007)) also eliminated in subsequent iterations.

Several other statements/items have loaded in more than one factor but were seemingly irrelevant to the underlying constructs. Those statements/items were also removed from the analysis. A few statements/items have loaded on factors without sharing a common meaning with other statements/items loaded on the particular factor. Those items were also eliminated. Further, the total variance explained remained low in some of the iterations. Consequent to those outcomes with repeated iterations, another 12 statements/items were eliminated from the analysis leaving only 35 statements/items in the final iteration of EFA.

In the final iteration of EFA, five factor solution was identified based on four criterions (Cumulative percentage of variance, 1< Eigenvalue or Kaiser's criteria, Scree test, Parallel analysis). These four criteria were considered simultaneously in determining the number of factors. Literature suggests that simultaneous consideration of all criteria is the best way to identify the number of factors. Despite this, parallel analysis has been recognised to have merits over other methods and Thompson (2004) admits that it is among the best. Except for the percentage of variance, all other three criteria suggested five factors. As far as the total variance is concerned, the inclusion of an extra factor beyond five did not contribute substantially to the total explained variance.

Consequently, the resulted five factor solution was identified as the final solution. The result of preliminary analysis, scree plot and final EFA result with five factors are described in detail in section 8.3 in Chapter Eight.

Treatment Effect Models

This study compares members' farm financial performance of partially and fully integrated co-operatives. However, application of simple mean comparison could have produced biased results if there had been pre-existing differences between the members in partially and fully integrated co-operatives. It was evident from the qualitative study that the members of the study co-operatives had not been able to select between partially and fully integrated co-operatives at the time of getting the membership. By law, residents of a given area are allowed to get the membership only in the co-operative that serves the area. It is prohibited by the law to get the membership of co-operatives outside of someone's area of residence. That means the assignment of membership into partially and fully integrated co-operatives have not been random and suggest pre-existing differences among members of partially and fully integrated co-operatives. Evaluation literature suggests treatment effect models to handle similar selection problems (Heckman, Ichimura, & Todd, 1998; Rosenbaum & Rubin, 1985). The theoretical foundation that guides the estimation of treatment effects and related assumptions adopted in observational studies are discussed in Appendix H.

A number of models have evolved to estimate treatment effects in observational studies. Those models are designed to correct sample selection bias in observational studies for which there is no counterfactual in most cases. An account of models evolved, and their features are provided in Table 5-9. Almost all the models are extensions of Heckman (1979); Heckman et al. (1998) and Maddala (1986).

Considering its advantages and extensive use in agribusiness research, this study applied PSM model (No. 2 in Table 5-9). The PSM measures the treatment effect by creating the conditions of a randomised experiment that allows comparisons between the outcomes of treated and non-treated groups. The PSM has an advantage in that it does not rely on strong assumptions of linear functional form and the correlation of error terms (Dehejia & Wahba, 2002; Rosenbaum & Rubin, 1983). However, there are some criticisms of PSM. It was criticised for its inability to account for unobservable heterogeneities. That is, it does not account for unobservable characteristics such as

differences in entrepreneurship, motivation, skills, and effects of any side-selling (Mujawamariya, D'Haese, & Speelman, 2013; Shiferaw, Kassie, Jaleta, & Yirga, 2014).

Table 5-9: Models of estimating treatment effects in observational studies

	Methods	Model features
01	Heckman's sample selection model and its versions (endogenous switching regression) (Heckman, 1979; Maddala, 1986)	1. Explicitly models the selection structure 2. A switching regression technique that assigns participants to treated and non-treated regimes based on exogenous factors 3. Use the conditional probability of receiving treatment in estimating the effect
02	Propensity scores matching model (PSM) (Rosenbaum, 2002; Rosenbaum & Rubin, 1983)	1. Match non-treated participants to treated ones on probabilities of receiving treatment (propensity score) 2. Permit application to multiple treatment situations 3. Address the reduction of sample size 4. Employ multi-level modelling procedures in estimating propensity scores and modelling outcomes.
03	Propensity scores sub-classification model (Rosenbaum & Rubin, 1983, 1984)	1. Sub classifies propensity score 2. Estimate counterfactual for each subclass 3. Allows use of structural equation modelling in conjunction with sub-classification
04	Propensity score weighting model (Hirano & Imbens, 2001; Hirano, Imbens, & Ridder, 2003; McCaffrey, Ridgeway, & Morral, 2004)	1. Use estimated propensity scores as sampling weights to perform weighted outcome analysis. 2. Counterfactuals are estimated through a regression 3. Selection biased is controlled through weighting instead of using covariates in a regression model
05	Matching estimators' model (Abadie & Imbens, 2002; Abadie & Imbens, 2006)	1. Directly impute counterfactuals for treated and non-treated participants 2. Allows estimation of various types of treatment effects (sample average treatment effect, sample average treatment effect for the treated, for the controls, and equivalent effect for the population)
06	Propensity score analysis with non-parametric regression model (Heckman et al., 1998)	1. Comparison between treated and non-treated individuals are performed based on distance between propensity scores 2. Non-parametric regression is used to estimate treatment effect 3. Applicable to estimate average treatment effects using data at two time points (difference in differences)
07	Propensity score analysis of categorical or continues treatments' model (Hirano & Imbens, 2004; Imbens, 2000; Joffe & Rosenbaum, 1999)	1. Allows propensity analysis to multiple treatment levels 2. Counterfactuals are estimated through a single scalar generalised propensity score

Source: (Guo & Fraser, 2014)

The model's recent noteworthy applications in studies of co-operatives and collective enterprises include; evaluation of the impact of collective action on banana growers (Fischer & Qaim, 2012a), assessment of heterogeneous impact on coffee farmers (Shumeta & D'Haese, 2016), assessing the benefits of vertical coordination (Felicetta Carillo et al., 2017), assessing smallholders' performance in agricultural co-operatives (Verhofstadt & Maertens, 2014). Similarly, using cross-sectional data, Abebaw and Haile (2013) investigated the impact of co-operatives on the adoption of agricultural technologies. Francesconi and Ruben (2012) evaluated the impact of co-operative membership on milk production, productivity, quality and safety in the Ethiopian dairy sector. All these studies employed PSM model to control for pre-existing systematic differences in the study samples.

Implementation of Propensity Score Matching Model (PSM)

To estimate causal treatment effect corrected for possible selection bias, PSM was used in this study. The PSM modelling begins with estimation of the conditional probability (propensity scores) of receiving treatment. When the treatment has two levels, discrete choice models are suggested to estimate propensity scores (Dehejia & Wahba, 2002; H. L. Smith, 1997). Researchers (Becker & Ichino, 2002; Guo & Fraser, 2014; Rosenbaum & Rubin, 1983) often advice on using discrete choice models to estimate propensity scores. Accordingly, probit model was used in this study. Logit and probit models argued to have the possibility of overcome the shortcomings of the linear probability models.

Identification of the key variables is as an important consideration in implementing PSM (Bryson, Dorsett, & Purdon, 2002). A number of precautions were taken in selecting the variables in this study. Variables were selected in a way to minimise the influence of the treatment to satisfy the conditional independence assumption as suggested by Caliendo and Kopeinig (2008) and Dehejia & Wahba, (1999).

Following Caliendo and Kopeinig (2008), a number of empirical works were referred (given in Chapter Four) in evaluating theoretical underpinnings of selecting variables and their use in similar studies. Moreover, statistical techniques such as hit or miss method, stepwise argumentation, and leave-one-out were also followed in selecting variables (Dehejia & Wahba, 1999).

There is a number of suggested matching algorithms. Researchers (Caliendo & Kopeinig, 2008; Guo & Fraser, 2014) contend that each method has trade-offs between bias and efficiency, and advised to choose a matching method depending on factors such as the sample size, available number of treated/control observations, and the distribution of the estimated propensity score. Considering those recommendations and frequent applications in similar studies, Nearest Neighbour matching method was used.

In theory, treatment effects are estimated strictly within the common support region (Dehejia & Wahba, 1999; Heckman, Ichimura, & Todd, 1997). Lechner (2001) suggests a visual analysis of the distribution of propensity scores to identify common support. Following Lechner (2001) limits for propensity scores were set between 0.07 and 0.89.

Matching quality was assessed following the implementation of matching. Assessing matching quality involved checking whether the matching procedure has been able to balance the distribution of the relevant variables in both treatment and control groups. Rosenbaum and Rubin (1985) recommended assessing the distance in marginal distributions of covariates and use of two-sample t-test to check if there are significant differences in covariate means. Accordingly, two-sample t-test was performed to assess the balancing property. After checking for balancing properties, treatment effects were calculated.

Researchers (Gerfin & Lechner, 2002; J. A. Smith & Todd, 2005) recommended to draw samples of participants and non-participants from same economic environment and same individual lifecycle positions. This was ensured initially at the time of selecting samples and samples were taken from a similar socio-economic setting. Statistical significance of the treatment effects was tested and standard errors were computed (Heckman et al., 1998).

Multiple Regression Analysis

Part of the fourth objective of this study includes analysing members' farm financial performance in partially and fully integrated co-operatives. This analysis particularly examined the factors that affect members' financial performances. This involved checking for a causal relationship between a dependent and a set of independent variables. More precisely, the causal relationship between financial performance indicators and a set of explanatory variables were tested. The literature

suggests various applicable multivariate statistical techniques to handle such analytical problems such as multiple regression analysis (MRA), factor analysis (FA) and structural equation modeling (SEM) (T. W. Anderson, 1984; Mark & Goldberg, 1988). For this analysis, MRA was used, motivated by several reasons.

The MRA allows the simultaneous use of several variables to predict the behavior of a response variable and attempts to account for the variation of the independent variables in the dependent variable synchronically. It allows testing of hypothesised relationships with magnitudes and signs of the coefficients estimated (Meyers, Gamst, & Guarino, 2016; Tabachnick & Fidell, 2007). Moreover, MRA have widely been used in other agribusiness researches (Meyers et al., 2016; Montgomery, Peck, & Vining, 1982; Tabachnick & Fidell, 2007).

The multiple regression analysis model is formulated as follows:

$$y = \beta_0 + \beta_1 x_1 + \ldots + \beta_n x_n + \varepsilon$$

Where

$y = dependent\ variable$

$x_i = an\ independent\ variable$

$\beta_0 = intercept$

$\beta_i = parameter$

$n = the\ number\ of\ variables\ included\ in\ the\ equation$

$\varepsilon = error$

In most cases, such an equation is estimated using ordinary least squares. This technique involved choosing coefficients to minimise the sum of squared errors of prediction (Olive, 2003). Further, these estimations also rely on a number of assumptions (Mark & Goldberg, 1988; Tabachnick & Fidell, 2007). The MRA assumes linearity, that is, MRA models the linear (straight-line) relationships between the dependent and independent variables. The variance of the εs is assumed to be constant for all values of x_i's. Similarly, εs is assumed to be normally distributed. Thus, εs is assumed to be uncorrelated with one another. The last assumption is lack of multicollinearity, that is, there should not be near-linear relationships among the set of independent variables.

Statisticians have identified several steps to follow in MRA (Mark & Goldberg, 1988; Montgomery et al., 1982; Tabachnick & Fidell, 2007).

Accordingly, application of MRA in this study was started with scanning of data for anomalies, keypunch errors, and typos to ensure data accuracy. Patterns in missing values were checked for their randomness. Along with variance analysis, tests for normality, outliers, and multicollinearity were also carried out to see whether the data satisfy the important assumptions following Hair et al. (2014). As suggested by the scholars (Hair et al., 2014; Hutcheson & Sofroniou, 1999), linearity was checked with y versus x plots. Visual inspection of the normal probability plot and conducting goodness of fit tests were used to test for normality. Possible correlations between variables were assessed using correlation matrix as suggested by Tabachnick and Fidell (2007).

Variables were selected following the preliminary checks of data quality. Following appropriate selection of variables, regression was run. Three financial performance indicators (cost of production of per kilogram of paddy rice, profit per kilogram of paddy rice, and economic profit from rice) were regressed against the same set of selected independent variables. Number of methods such as subset selection, stepwise regression, all possible regressions, or multivariate variable selection are suggested by the experts (Hutcheson & Sofroniou, 1999; Tabachnick & Fidell, 2007). Each method has been criticised for their own advantages and disadvantages. However, stepwise regression method was used in this study considering its wide use compared to other methods. Checking for predictability is another important consideration following the estimation of the regression model. As Tabachnick and Fidell (2007) suggested, higher the R^2 value, greater the predictability and vice versa. Accordingly, R^2 value was used as an indicator of models' predictability. However, the aim of this analysis was to estimate associations rather than prediction.

A series of linear multiple regression analyses were performed to examine the factors, if any, have influenced respondents' farm financial performance in addition to co-operatives' level of vertical integration. The same three financial performance indicators were regressed with a set of covariates that were supposed to have determined the financial performance. Many iterations of linear regressions were performed with different model specifications, including the above-identified three financial performance indicators as dependent variables.

However, regressions that included the cost of production and profit as dependent variables failed to explain the variance in those two performance indicators substantially, even with various specifications. The reported R^2 values were very low when those two performance indicators were included. However, households' economic profit from rice was associated with a number of other factors apart from the co-operatives' level of vertical integration. The household's economic profit from rice was included in its log form as the dependent variable as the amount of variance explained by the covariates have increased. Five regression models were performed alternatively including a set of covariates. All the covariates used in the PSM model were also included in the regression. Instead of the farm size when joined the co-operative, the current farm size was included in this series of regressions because the conditional independence assumption applied in PSM has no relevance in multiple linear regression analysis.

Along with the covariates used in the PSM, several other covariates were also included alternatively in this series of regression analysis. The first regression (Reg. 1) in the series included a dummy variable along with the covariates used in PSM to represent the co-operatives' level of vertical integration. It was expected to re-confirm the effect of the level of vertical integration on financial performance by including a dummy variable. The second regression (Reg. 2) included the covariates used in PSM and key areas of benefits uncovered from EFA. The aim of the inclusion of key benefits was to see whether they have any effect on financial performance. The third regression (Reg. 3) included the covariates used in PSM, dummy variable to represent the level of vertical integration and, key areas of benefits came from EFA. The third regression expected to test the complementarity between the level of vertical integration and key areas of benefits. Forth regression (Reg. 4) included those covariates used in PSM along with four perceived benefit statements with highest mean scores. It was expected thereby to see if there is any effect of highly perceived benefits on financial performance. Finally, the fifth regression (Reg. 5) included the covariates used in PSM, dummy variable to represent the level of vertical integration, and the four perceived benefit statements with highest mean scores. This was aimed to see the complementarity between level of vertical integration and the highest perceived benefits. Result of regression analysis are discussed in section 8.5 in Chapter Eight.

5.8 Research Quality – Validity and Reliability

Validity and reliability evaluate the quality of social science research (Bryman, 2015; Eisenhardt & Graebner, 2007). Aspects of reliability and validity sheds lights on the trustworthiness of the research conclusions drawn. Different tests are used to ensure the quality of empirical research. Reliability assesses the degree to which measures are free from errors and concerned with issues of consistency of measures (Zikmund et al., 2013). Reliability comprises of three aspects; stability, equivalence, and internal reliability (Burns & Burns, 2008; D. R. Cooper et al., 2006; Neuman, 2007). Validity refers to "the ability of a scale to measure what is intended to be measured" (Zikmund et al., 2013, p. 331). It is more about whether the research findings are, in reality, consistent with the research objectives and measures exactly what a researcher wants to measure (Saunders et al., 2012; Zikmund et al., 2013). It is a crucial requirement to validate the underlying constructs. According to Neuman (2007), frameworks become superior if the validity is high. Bryman (2015) identified two types of validity such as internal and external validity, whereas Saunders et al. (2012) refer external validity as generalisability that implies the ability of generalising the research results from one situation to other. Internal validity further divides into content validity, concurrent validity, predictive validity, and construct validity (D. R. Cooper et al., 2006). A summary of internal validity estimation methods is given in Table 5-10.

Table 5-10: Summary of internal validity estimation methods

Types	What measured	Estimation method
Content/Face validity	Whether or not a study or a test measure what it is supposed to measure or the ability of the instrument to measure or evaluate all aspects of the construct it intends to assess	Judgemental Panel evaluation with content validity ratio
Concurrent validity	Refers to the ability of a test to predict an event in the present	Correlation
Predictive Validity	Prediction of the future; criterion data are measured after the passage of time	Correlation
Construct validity	Answer the question, "what account for the variance in the measure"? Attempts to identify the underlying constructs being measured and determine how well the test represent it.	Judgemental Correlation of proposed test with established one Convergent-discriminant technique Factor analysis Multitrait-multimethod analysis
Convergent validity	Convergent validity refers to the degree to which scores on a test correlate with (or are	Correlation

	related to) scores on other tests that are designed to assess the same construct.

Source: (Bryman, 2015; D. R. Cooper et al., 2006)

To ensure high validity and reliability in this research, various controls were employed throughout the research process. As much aspects as possible of validity and reliability were taken into consideration in decision making. Face validity was ensured through a thorough review of the relevant literature to identify key elements before developing measurement tools. Interview protocol and questionnaire were prepared including prompts and questions drawing from the contents of applicable literature; collective action, co-operatives, value chain and vertical coordination.

To ensure construct validity, this research generated its constructs following a rigorous review of both theoretical and empirical literature. This included a review of relevant theories applicable to the concept of vertical integration of co-operatives. The review informed the construct to be identified. To ensure convergent validity, this study applied multiple methods of data analysis. For instance, apart from comparing perceived benefit statements with Mann Whitney U-test, factor scores of key benefits were also compared between partially and fully integrated co-operatives with Two-Sample t-test. In the same way, members' farm financial performance also was compared with Two-Sample t-test and PSM. Results remained consistent between different analytical methods.

Few steps were taken to assure external validity of this research. External validity refers to the extent to which the results of a study can be generalised across persons, stings, and times (Grafton, Lillis, Ihantola, & Kihn, 2011). To ensure higher external validity, a quantitative study was carried out on a population that can be clearly distinguished from their affiliation to partially and fully integrated co-operatives. Moreover, variables under examination exist in the population and it was confirmed during the pilot study before beginning the main study. More importantly, study applied random sampling (cluster sampling) and hence selected study samples were representative. In particular, quantitative study included over three hundred randomly selected individuals which were large enough to reflect properties of the population. This justifies the generalisability of the findings to members of other co-operatives. Similarly, selected co-operatives represent co-operatives operate in the rice industry. This should strengthen the possibility to generalise some of the findings to other co-operatives in the rice industry. With regard to vertical integration, there are

similarities between this research context and other agri-food commodity sectors (fruit and milk for example) demonstrating the ability if the findings of this study to other sectors are generalised.

Several checks were made to achieve reliability in this study nevertheless it was not explicitly assessed with standard tests such as split-half method, alternate-form method, or Cronbach's alpha method (Crocker & Algina, 1986). One of the checks practiced was triangulation as suggested by Saunders et al. (2012) and Yin (2013). Theoretical triangulation was achieved in this study by evaluating the concept of vertical integration from different theoretical perspectives in building the framework. Data were triangulated using multiple sources (interviews, survey and published records). Triangulation of analytical methods was done using multiple data analysis methods to check the consistency of the findings. For example, members' financial performance was compared with mean comparison and PSM. Reliability of financial performance was ensured by using alternative analytical tools such as student t test, PSM and regression.

5.9 Summary

This chapter discusses methodological principles, theories, and values that underpin the particular methodology followed in this research. Ontological and epistemological considerations, general methodological principles and concepts were evaluated in the first half of the chapter. It covered general research paradigms, three general research methods, research designs, and probability and non-probability sampling techniques. The second half of the chapter focused on the research design and methodology that underpin this study. Accordingly, the research process followed in this study was explained from the point of identifying the research problem until drawing the conclusions of this study. Detailed information regarding the mixed methods design applied in this study, its origins, its relevance to this study and its general characteristics, were explored. Accordingly, qualitative and quantitative research methods followed in this study were explained in detail including designing of interview protocol, questionnaire, methods of collecting data including pilot study, interviews and survey, methods of selecting study samples, qualitative and quantitative data analysing techniques. Strategies adopted to ensure validity and reliability are discussed towards the end of the chapter.

6 RESULTS OF QUALITATIVE STUDY AND DISCUSSION

6.1 Introduction

This chapter analyses the partially and fully integrated co-operatives included in this study. Sections Two to Seven analyses each of the three partially (Co-op-1, Co-op-2, and Co-op-3) and fully (Co-op-4, Co-op-5, and Co-op-6) integrated co-operatives. Section Eight compares the result of six co-operatives. Lastly, section Nine discusses the results.

6.2 Co-op-1

6.2.1 Background and Development

Co-op-1 is located 15 km south of the district's capital city, Anuradhapura (see Figure 5-1 in Chapter 5). The area has fairly developed infrastructure facilities and fast access to the districts' capital city. Communities which are in its service area include original inhabitants and new settlers. According to the cooperative officers, rice is the main livelihood of over 70% of the population living in the area. A large reservoir supplies irrigation water for rice cultivation through a network of distribution canals in the area. Co-op-1 was also established in response to the Government's restructuring programme in 1971. As a result of the Government's MPCS restructuring programme, six different co-operative societies which operated in the area (credit, grocery store, and agricultural marketing) were merged to form Co-op-1. Later, during 1980's co-operative created a new business department entering to passenger transport services. Its membership has grown over the past and there are 6,780 members at present.

6.2.2 Governance and Management

Co-op-1 has three appointed directors in the board to provide the direction and control. There are three sub committees each consisted of three directors to provide directions for department level operations. Same three directors were serving the three committees at the time of the study. General manger coordinates the activities of five departments and three department managers oversees department level businesses. Co-op-1 has four business departments namely; accounts and human resources, transport, marketing, banking and grocery retail.

Table 6-1 summarises important aspects of Co-op-1's governance and management conduct. As shown in Table 6-1, number of active village level divisions have declined over time and it suggests that there have been some governance problems in Co-op-1. There were no elected village-level steering committees, and general assembly.

Current board of directors have been appointed by the commissioner of co-operatives. Member participation reported to be low. Moreover, Co-op-1 has failed to conduct regular annual general meetings. These results reflect Co-op-1's poor governance. "We have a large membership, but their participation and commitment are low. General manager says "*we have not been able to elect our steering committees yet. The participation of general assembly members also was not satisfactory. In some years we had just the house majority*". Even though Co-op-1 maintained up-to-date financial statements, they have not been audited over the last three years, reflecting low level of financial transparency. However, Co-op-1 have produced annual development plans, conducted regular board meetings and staff meetings where necessary. These observations suggest some degree of satisfactory management of the Co-op-1.

Table 6-1: Conduct of Co-op-1's governance and management

Aspects of Governance	***Performance description***
Membership	Grew up to 6,780 at present from around 1000 in the 1970s
Active village-level divisions	Declined from 6 to 3
Election of divisional level steering committees	Not elected since 2017
Conduct of divisional steering committee meetings	Not convened since 2017
Member participation in village-level divisional meetings	Very low (20-25%)
Conduct of annual general assembly	Not convened since 2017
Auditing of accounts	Not audited since 2017
Board of directors and their appointment	Three directors appointed by the commissioner
Annual development plan	Annually prepared
Conduct of board meetings	Board meets fortnightly on a regular basis.
Subcommittee meetings	Not regular
Staff meetings	As necessary, but not regular

6.2.3 Business Departments and Organisation of the Rice Value Chain

Business operations performed by each department are summarised in Table 6-2. Rice value chain activities of Co-op-1 have organised in marketing, grocery retail, transport, and banking department whereas accounts and human resource departments provided the supporting services for the functioning of department level activities. Various other business operations performed by Co-op-1 are summarised in Table 6-2.

Table 6-2: Business departments and operations

Departments	Core business operations
Banking	Providing financial services such as accepting deposits, providing credit (for agriculture and other), and mortgage services.
Marketing	Purchasing of paddy rice, other grains (maize), pulses (black and green gram), distribution of seed, and fertiliser.
Grocery retail	Retailing of grocery items/consumer goods including rice, and agricultural inputs (fertiliser and seed).
Transport	Supply of passenger transport services
Accounts and human Resources	Administration of human and financial resources and other logistic functions.

Figure 6-1 illustrates Co-op-1's rice value chain. It is a partially integrated co-operative according to this study's definition and its operations are limited to supplying of inputs, service, information and marketing of paddy rice. Co-op-1 primarily supplied seeds and fertiliser to members at a subsidised price and it buys fertiliser in bulk from state fertiliser corporation.

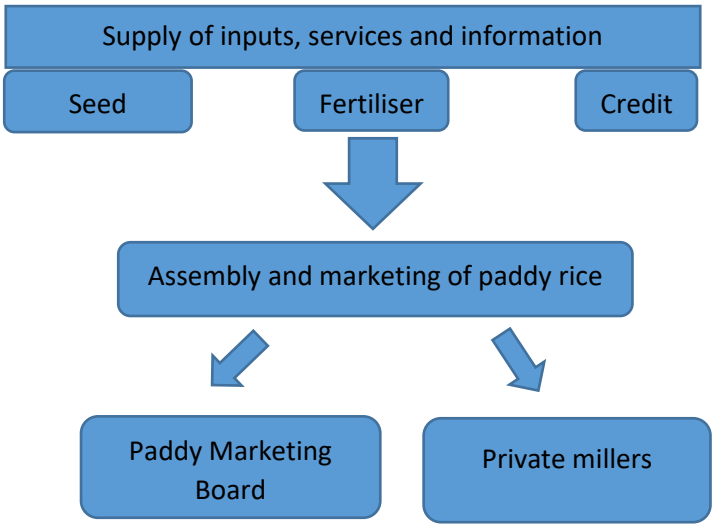

Figure 6-1: Co-op-1's rice value chain

Seed is mostly bought either from other co-operatives, or from private certified seed producers, and sold to farmers. Co-op-1 also provides various financial services such as cultivation loans to rice growing members. Co-op-1 purchases paddy rice from members and non-members and trade at a higher price after holding in stock until market price is increased.

6.2.4 Operational Performance of the Rice Value Chain Activities

Table 6-3 summarises the operational performance of the Co-op-1's value chain activities. Information presented in Table 6.3 highlights that Co-op-1's seed and fertiliser supply functions

have not been regular. Moreover, it has supplied only a limited verities of rice seeds and basic N, P, K fertiliser. Co-op-1 however has provided credits and other financial services to farmers more regularly. Paddy rice marketing activities of the co-operative was affected adversely in the last couple of years. *"We didn't get enough supply of paddy rice during the last two years due to the decline of rice production in our region as a result of prolonged drought. On the other hand, private traders bought moist paddy rice from the farms at a higher price. But we don't have transport facilities to collect paddy rice from farms and drying facilities to dry them in our warehouses. As a consequence, we have not been able to buy much paddy rice"* (General manager, 2018).

Table 6-3: Value chain activities and performance

Activities controlled	Description of performance
Paddy rice production	
	Production of paddy rice was independently performed by the member rice farmers
Supply of inputs and services	
Seed	Co-op-1 buys seeds in bulk from certified private seed producers, other co-operatives, and/or Government seed farms. Seeds were distributed to farmers at a lower than market price. During the last two years, the co-operative has not been able to cater to its total seed demand consequent to the drop of national seed supply.
Fertiliser	Regularly supply basic N, P, K fertiliser to member farmers since 2015.
Credit and finance	The banking department offers several financial services to farmers. It accepts deposits, provides agricultural credits, mortgage properties, and crop advances in some seasons.
Assembly and marketing of paddy rice	
Purchasing and stocking of paddy rice	Co-op-1 buys any variety of short and long grain paddy rice for its own trading and on behalf of PMB. Their three warehouses are owned by Co-op-1 in its service area. It pays the Government's certified price for paddy rice. Farmers themselves need to transport their paddy rice to the nearest warehouse.
Control of paddy rice quality	It monitors a number of quality parameters in purchasing the farmers' paddy rice (moisture content 14% or low and lower than 5% chaff grains and impurities, and bags weigh 50.5kg. Use moisture meters and weighing scales at the purchasing point to measure moisture and weight.
Reselling of paddy rice	Own stocks of paddy rice for resale to private millers either in the same region or other parts in the country. Bids are called from millers and sold to those who offer highest price.

Co-op-1 checked quality of the paddy rice they bought at the purchasing point. Apart from the quality requirements, it has applied other criteria in buying paddy rice as indicated in the Table 6-3.

Quality monitoring and other logistic requirements imposed by the Co-op-1 might have created entry barriers for the members who are willing to sell their paddy rice to Co-op-1. The co-operative has been able to bargain for a higher price for their paddy rice. Alternatively, it has generated some revenue by providing services to PMB.

6.2.5 Financial Performance

Co-op-1's financial performance indicators are presented in Table 6-4. It has recorded a growth in profit in 2014 and 2016 but it was declined in 2015 indicating a loss of profit. The loss was mainly attributed to the drop-in paddy rice marketing activities in 2015. In general, there was a growth in total assets and some of the equity was invested in assets as reflected in declined equity over the period. Factors such as the inability to quickly adjust to market changes in competitive markets, the Government's ad-hoc rice price control policies and the drop of rice production due to unpredictable weather, have also impacted Co-op-1's financial position. *"It's a challenge for a co-operative to do business in this competitive market. We can't face the private sector competition adopting to dynamic markets. On top of that, it is very difficult to plan our business activities due to government's inconsistent intervention on market price of rice. Also, we experienced a prolonged drought which caused a significant drop in rice production resulting a drop in rise business operations"* (Chairman, 2018).

Table 6-4: Financial performance of Co-op-1

Aspects of Finance	***Description of performance***			
Patronage refund to members	No refunded patronage since 2000. Offer scholarships to members' children, sponsor social activities			
Third-party/Government financial assistance	Not received since 1970s			
Year	**2014**	**2015**	**2016**	**2017**
Profit (LKR million)	0.29	0.35	-0.15	NA
Total sales (LKR million)	1.37	2.21	1.45	NA
Current liabilities (LKR million)	46.50	53.10	62.49	NA
Current assets (LKR million)	43.27	48.64	50.72	NA
Total liabilities (LKR million)	54.89	72.25	83.52	NA
Total assets (LKR million)	59.95	73.48	86.12	NA
Total equity (LKR million)	5.00	1.20	2.6	NA
Leverage (T. liabilities /T. assets)	0.92	0.98	0.97	NA
Solvency (T. equity/T. assets)	0.08	0.02	0.03	
Liquidity (C. assets/C. liability)	0.93	0.92	0.81	NA
Profit margin (Profit before tax/T. sales)	0.21	0.16	-0.10	NA
Efficiency (T. sales/Total assets)	0.02	0.03	0.02	NA

6.3 Co-op-2

6.3.1 Background and Development

Co-op-2 is situated in the Eppawala township about 40 km south of the district's capital city, Anuradhapura. Its service area covers Thalawa DSD. Infrastructure facilities in the area were greatly improved by the Mahaweli Accelerated Development Programme in the 1980s. Farm families settled in the region during 1950 and 1980. At the beginning, in the 1950s, first-generation settlers received 5ac (2.2ha) of rice lands and 1ac (0.4ha) of uplands (Chairman, 2018). The establishment of Co-op-2 was a result of the Government's MPCS restructuring programme. In 1979, 13 village-level MPCSs were merged to form Co-op-2. Consequent to this change, the society's business portfolio, service area, and the membership were expanded. There were 9,524 members at the time of this study.

6.3.2 Governance and Management

There are nine directors in the board to provide direction and control Co-op-2 and most of them have been serving for several consecutive terms in the board. The chairman has held his position for more than 20 years. "*Our present chairman has consistently been elected from the general assemblies conducted in the past for the chairmanship. Some of the directors were also elected to the board on several consecutive occasions,"* (General Manager, 2018).

There are five board committees to oversee the activities of five departments. All committees, except the project subcommittee, have four members. There is a general manager for overall coordination of Co-op-2's activities. Each department has a manager and subordinate staff to carry out department-level business operations. There is an accounts and human resources department to manage financial and human resources.

Information presented in Table 6-5 reflects some of historical governance challenges faced by the Co-op-2. Decline of village-level divisions over the past, low member participation in some of the village level divisions and delays in convening annual general assembly indicate some degree of governance issues. *"Participation of steering committee representatives in about three divisions have been low. However, we had to inform those representatives several times to get them in the general meeting. It has been a challenge in some years in appointing the general assembly as well. Delays in appointing village level steering committees owing to low member participation mean delaying the appointment of general assembly as well, because the general assembly should consist of representatives from all divisions. In the past, after consulting the DCD, we dissolved three*

divisions in which we could not gather at least the house majority consistently for many years," (General manager, 2018).

Table 6-5: Governance performance

Aspects of Governance	***Performance description***
Membership	Grew to 9,524 at present from around 1700 in the 1970s
Active village-level divisions	Reduced to 10 from 13 existed in the 1970s
Election of divisional level steering committees	Regularly elected
Conduct of divisional steering committee meetings	Regularly convened
Member participation in village-level divisional meetings	On average 45-60% member participation in meetings in level divisions. Three divisions have low member participation.
Conduct of annual general assembly	The last annual general assembly was held in 2017. There have been delays in conducting the general assembly in some years due to low appreciation of members.
Auditing of accounts	Regularly on annual basis
Board of directors and their appointment	Nine elected directors
Annual development plan	Prepared annually
Conduct of board meetings	Regularly on fortnightly
Subcommittee meetings	Regularly on fortnightly
Staff meetings	At least once in three months

Regular auditing of accounts, signals good financial transparency. Preparation of annual development plans, regular meetings of the board, and sub-committee meetings demonstrate satisfactory level of management. However, it was revealed from the interviews that retaining qualified people in the top managerial positions has been difficult due to non-competitive renumerations stipulated by the co-operative legislation. Chairmen says "*it has been a challenge for us to recruit and retain competent and qualified managers since our salaries are not competitive. We still have to adopt to the DCD's salary schedules which have not been revised for a long time*"

6.3.3 Business Departments and Organisation of The Rice Value Chain

There are five departments in Co-op-2 including trading and retailing, banking, marketing, projects, and accounts and human resources. Business operations performed by each department are summarised in Table 6-6. Co-op-2's business activities are mainly organised in four departments while management of financial and human resources are performed by the accounts and human

resources department. Rice value chain activities of Co-op-2 are performed by trading and retailing, marketing, project and banking departments.

Table 6-6: Business departments and operations

Departments	Core business operations
Grocery retail and trading	Retail of grocery items/consumer goods including rice, agricultural inputs (agrochemical, fertiliser, and seed), pharmaceuticals, stationery, processing and wholesaling of spices, distribution of confectioneries, communication and information technology services
Banking	Supply financial services such as accepting deposits, providing loans (for agriculture and other), mortgaging services and crop advances
Marketing	Purchasing of paddy rice and wholesale of seeds
Projects	Production and processing of seeds
Accounts and human resources	Management of financial and human resources, logistics and transports

Co-op-2 is a partially integrated co-operative and it includes functions such as supplying of inputs and marketing of paddy rice. The organisation's rice value chain is illustrated in Figure 6-2. Co-op-2 supply only a set of few inputs such as seed and fertiliser. Additionally, Co-op-2 provided credit and various other financial services to members. Members of Co-op-2 produce paddy rice with least involvement of the co-operative.

Co-op-2 produced its own seed with a group of contracted rice-growing members. Those farmers have been trained by Co-op-2 for seed production through the DOA. Co-op-2 provided fertiliser, inputs, and foundation seeds to farmers on either credit or cash. Agriculture Inspectors (AI) of the DOA monitored seed farms of registered farmers. Co-op-2 coordinated between registered farmers and the DOA obtaining services such as seed certification, foundation seeds, and monitoring production and seed processing. Seeds are produced by registered farmers, then cleaned, packed in 20kg weighing polyethylene bags, and labeled in the seed processing plant.

Co-op-2 purchases paddy rice from members and non-members. Paddy rice is bought at market price through the network of its warehouses located across the service area. The paddy rice purchased by the Co-op-2 is re-sold to private millers who offer the highest price.

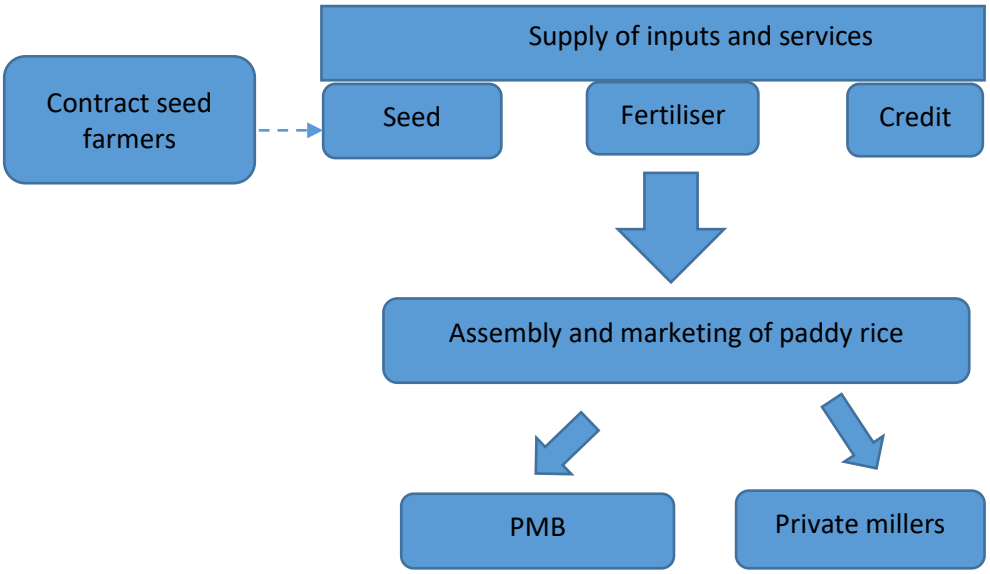

Figure 6-2: Co-op-2's rice value chain

6.3.4 Operational Performance of the Rice Value Chain Activities

Table 6-7 summarises Co-op-2's value chain activities and their performance. As indicated in Table 6-7, Co-op-2 produced rice seeds of few popular verities to distribute among members and supplied a limited range of fertiliser products. Compared to other inputs, Co-op-2 supplied relatively a wide range of financial services. Members of Co-op-2 produced paddy rice with co-operative's least involvement.

Co-op-2 assembled and marketed paddy rice. Paddy rice was bought at market price through the network of Co-op-2's warehouses located across its service area. Co-op-2 apply strict quality control methods and check for several quality parameters at the point of purchase. Farmers have to transport their paddy rice to the warehouse. Paddy rice assembled by Co-op-2 was sold either to regional or outside private millers at competitive prices following a bidding process. Thereby Co-op-2 has been able to bargain for higher prices. Alternatively, Co-op-2 received service fees from the PMB for providing marketing services for them. This includes handling and storage charges.

Table 6-7: Value chain activities and their performance

Activities controlled	Description of performance
Paddy rice production	
	Members grow paddy rice and Co-op-2's involvement remain low. Seed production by registered farmers is strictly monitored.
Supply of inputs and services	
Seed	Produce seeds through contracted farmers and provide certified seeds to rice farmers
Fertiliser	Re-started selling basic N, P, K fertiliser since 2017.
Credit and financial services	Various financial services are available to rice farmers from the banking division. They include cultivation loans, mortgaging services, and crop advances.
Assembly and marketing of paddy rice	
Purchasing and stocking of paddy rice	Buys any variety of short and long grain rice with storable moisture content (14% of moisture or below) at six warehouses. The market price is paid for paddy rice. The price paid is higher for paddy rice seed.
Control of paddy rice quality	Strictly monitors the moisture content, impurities and germination percentage when purchasing rice for seed. When purchasing paddy rice, moisture content, less than 5% chaff grains and impurities are monitored.
Re-selling of paddy rice	Paddy rice re-sold to private millers either from the same region or other parts in the country. Bids are called from millers and sell to those who offer highest price. PMB pays service fees to Co-op-2 for the paddy rice purchased for them.

6.3.5 Financial Performance

Financial performance measures Co-op-2's is presented in Table 6-8. Co-op-2 has not paid patronage refund to its members, instead, has spent some of its profits to sponsor social activities of the members. An honorarium, however, was paid to general assembly members for attending. *"Although we are unable to make payments to individual members, we spend some of our money to provide scholarships, sponsorships to social events happening in the area, and to help diseased people, etc.,"* (Chairman, 2018)

Co-op-2 has received financial support from both Government and NGO for its growth. "*We got financial help from both government and NGOs in early 1990s to build our assets. Current President of the country also promised in his recent visit to our office to provide some help for our development,*" (General Manager, 2018). There was a growth of share capital but its value of assets has declined following the major destruction from fire that destroyed some of the good's stocks and properties. *"We have been progressing well compared to other co-operatives in the district. The fire*

took place in our mega store destroyed some of our properties worth a million and putting us at hard situation" (General Manager, 2018).

Table 6-8: Financial performance

Aspects of Finance	***Description of performance***			
Patronage refund to members	Not paid patronage to members for the last ten years. An honorarium is paid to general assembly representatives for attending the annual assembly. They also provide education scholarships to members' children who passed the grade 5 scholarship exam.			
Third-party/Government financial assistance	Received LKR 4 (million from the Government in 2016 to restore the mega retail outlet destroyed from the fire. In 2000, an NGO granted its seed processing plant.			
Year	**2014**	**2015**	**2016**	**2017**
Profit (LKR million)	2.54	2.89	3.96	NA
Total sales (LKR million)	9.24	8.82	14.83	NA
Current liabilities (LKR million)	198.12	166.37	156.43	NA
Current assets (LKR million)	154.2	169.17	101.45	NA
Total liabilities (LKR million)	207.54	222.29	159.36	NA
Total assets (LKR million)	226.49	226.49	163.12	NA
Total equity (LKR million)	18.95	4.20	3.76	NA
Leverage (T. liabilities /T. assets)	0.92	0.98	0.98	NA
Solvency (T. equity/T. assets)	0.08	0.02	0.02	
Liquidity (C. assets/C. liability)	0.78	1.02	0.65	NA
Profit margin (Profit before tax/T. sales)	0.27	0.33	0.27	NA
Efficiency (T. sales/Total assets)	0.04	0.04	0.09	NA

6.4 Co-op-3

6.4.1 Background and Development

Co-op-3 is located in Polonnaruwa city, the capital of Polonnaruwa district. The service area of Co-op-3 includes Polonnaruwa city and suburbs. Rice still plays a significant role and it provides direct and indirect livelihoods to a majority of the people who live in Co-op-3's service area (Chairman, 2018). Rice is grown under the irrigation water supplied by Parakrama Samudraya reservoir. Co-op-3 started in the 1970s following the Governments MPCSs restructuring programme. To form Co-op-3, 17 village-level MPCSs scattered around Polonnaruwa DSD were merged.

6.4.2 Governance and Management

Co-op-3's has a seven-member director board elected to provide direction and control. There were seven sub committees each consisting of three board members to monitor seven departments. The general manager coordinated the processes and operations across the co-operative. There are

seven department managers to coordinate department level activities under the general manager. Co-op-3 has six business departments and two non-business departments. Retail and banking divisions have branch managers and each of these departments respectively have eight and six branches.

Important elements of Co-op-3's governance and management are summarised in Table 6-9. Information presented in Table 6-9 demonstrate satisfactory level of governance in Co-op-3. Some of the board members have served several terms in their positions. "*Most of the directors on my board have served at least a single term as a director including me. I was first elected as a steering committee member in 2002 and represented the general assembly as well until 2006. I left the general assembly in 2007 to contest in the local Government election and I became a member of the local Government. In 2017 I again contested for the divisional committee and elected to the general assembly*" (Chairman, 2017).

Table 6-9: Conduct of co-operative's governance and management

Aspects of Governance	***Performance description***
Membership	Grew to 7,560 at present from around 1500 members in 1970s
Active village-level divisions	All 17 divisions are active since the 1970s
Election of divisional level steering committees	All 17 steering committees have been elected
Conduct of divisional steering committee meetings	Regularly convened
Member participation in village-level divisional meetings	On average, 50-60% member participation in village level divisions.
Conduct of annual general assembly	Held in mid-2017 following a court order.
Auditing of accounts	Accounts have not been audited for the last ten years.
Board of directors and their appointment	Consist seven members. Elected regularly.
The composition of subcommittees	There are seven subcommittees to supervise the functions of seven business departments.
Annual development plan	Introduced annual development plans during last five years on a regular basis with development goals.
Conduct of board meetings	Convened monthly on regular basis
Subcommittee meetings	Convened fortnightly on regular basis
Staff meetings	As necessary, but not regular

Going before the court to resolve internal conflicts however reflects presence of different interest groups within the body of membership. This suggests existence of influence problems in Co-op-3.

"The outgoing chairman wanted to postpone the general assembly meeting that was supposed to elect a new board in early 2017. However, a majority of steering committee representatives (56) gathered to the main office and held an informal general assembly without representation from DCD officials amidst postponed general assembly by the then chairman. We elected to the board from that general assembly, but, the co-operative commissioner declined our appointments. We went before court and the court ordered us to carry out our duties until giving a verdict considering the right of general assembly members to elect a board. In late 2017, the court ordered to re-convene a formal general assembly to appoint a fresh board after hearing our consent to avoid delays for a decision. We re-elected from that general assembly as well," (Chairman, 2018).

Failure to audit Co-op-3's financial records for last ten years indicates poor financial transparency. However, Co-op-3 conducted its board meetings, committee meetings and staff meetings at regular intervals and reflected satisfactory level of management. Preparation of annual reports and development plans have been regular and suggest satisfactory planning in Co-op-3.

6.4.3 Business Departments and Organisation of the Rice Value Chain

Co-op-3's department level activities are summarised in Table 6-10. Business activities of Co-op-3 were organised in retail, banking, fuel, marketing, transport, and pharmaceutical departments. Administration of financial and human resources organised under accounts and human resources departments. As shown in Table 6-10, Co-op-3's rice value chain activities were organised under banking, fuel, marketing, transport, and retail departments.

Table 6-10: Business departments and operations

Departments	Core business operations
Banking	Supply financial services such as accepting deposits, providing loans (for agriculture and other) and mortgaging services
Fuel	Retail of fuel (gasoline and diesel)
Marketing	Purchasing of paddy rice, distribution of agrochemicals, seed, and fertiliser
Grocery retail	Retail of grocery items/consumer goods, mobile grocery stores, and agricultural inputs (agrochemical, fertiliser, and seed).
Transport	Responsible for managing transport services
Pharmaceutical	Retail of pharmaceutical products
Accounts	Administration of financial resources, planning, organising and auditing of accounts
Human Resources	Administration of human resources, recruiting and training employees

Co-op-3 is a partially integrated co-operative and its rice value chain is illustrated in Figure 6-3. Co-op-3 traded inputs used in growing rice such as fertiliser, herbicide, pesticide, fuel use in agricultural machines, seed, and provides a wide range of financial services such as agricultural credits, crop advances, and mortgage services to farmers. It purchased inputs in bulk from private and state-owned input suppliers and retailed to farmers at a lower price than in the market. Co-op-3 purchased paddy rice and stored to re-sell later after storing some time.

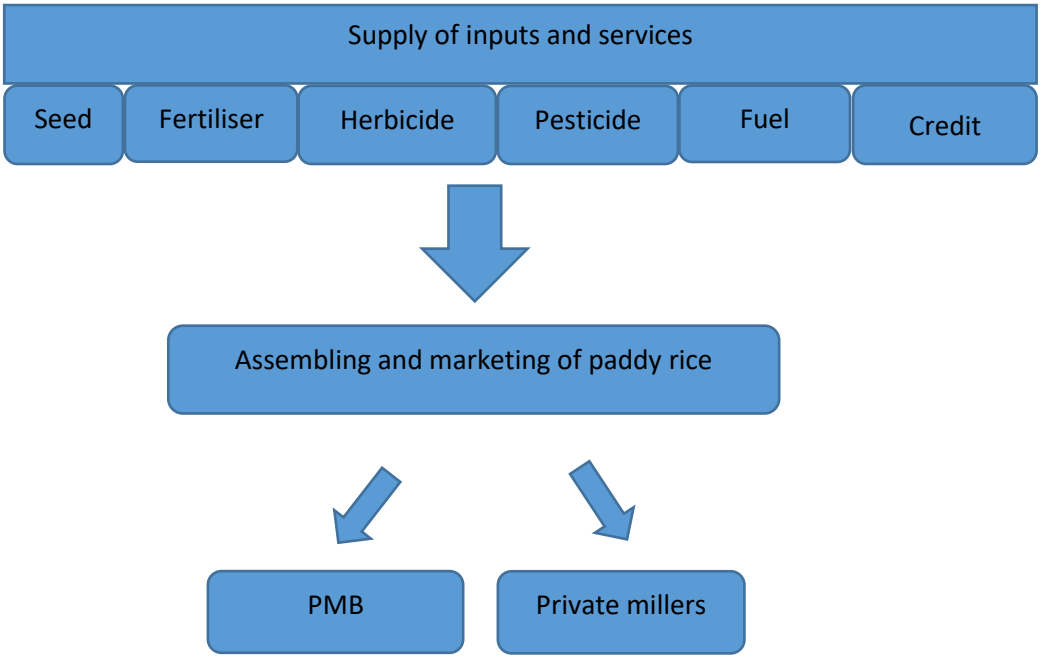

Figure 6-3: Co-op-3's rice value chain

6.4.4 Operational Performance of the Rice Value Chain Activities

Co-op-3's rice value chain activities and their performance are summarised in Table 6-11. As shown in Table 6-11 it was found that the Co-op-3 also had least control in the production of paddy rice. Co-op-3 supplied a wide range of inputs and services to rice growing member farmers on a regular basis. In particular, it has provided various financial and credit services to the rice growing members. Compared to the other inputs, credit and other financial services have been supplied more regularly through a simple process which is quickly accessible to the members. Co-operative has assembled and marketed paddy rice regularly and checked various quality parameters of paddy rice to ensure the quality. Information provided in Table 6-11 shows that the co-operative has obtained a higher price for their paddy rice through a competitive bidding process and it reflects the bargaining position of Co-op-3 in reselling their paddy rice.

Table 6-11: Value chain activities and their performance

Activities controlled	Description of performance
Paddy rice production	
	Paddy rice is independently produced by the member rice farmers Co-op-3 has a least influence on this stage.
Supply of inputs and services	
Seed	Supply seed to rice farmers purchased in bulk either from certified private seed producers or Government seed farms. Seeds distributed to farmers at a lower price than the market price. Co-op-3 did not supply seed in the last three seasons due to low availability of seed.
Fertiliser	Regularly supply basic N, P, K fertiliser since 2015 following the change of Government's fertiliser subsidy policy
Herbicide	Supply a wide range of weedicides on cash or in-kind credits on the condition of recovering them after harvesting.
Pesticide	Supply a wide range of pesticides on cash or in-kind credits on the basis of recovering them after harvesting.
Fuel	Supply a wide range of petroleum products used in farm machines and automobiles
Credit and finance	Co-op-3 provides a number of financial services to rice farmers. They include cultivation loans, mortgage services, crop advances, farm machinery loans, farm machinery mortgage, land mortgage recovery and in-kind credit (Supply inputs directly to the farmers instead of cash credit).
Assembly and marketing of paddy rice	
Purchasing and stocking of paddy rice	Buy any variety of short and long grain paddy rice for trading and for PMB. There were 12 warehouses and most of them have drying floors. The market price is paid for the paddy rice purchased.
Control of paddy rice quality	Monitors several quality criteria (moisture content 14% or low, lower than 5% chaff grains and impurities, and bags weigh to 50.5kg). Use moisture meters at the purchasing point to determine the moisture level of paddy.
Re-selling of paddy rice	Paddy rice was re-sold to private millers either in the same region or other parts in the country at a higher price after a bidding process.

6.4.5 Financial Performance

Co-op-3's financial performance indicators are given in Table 6-12. It contains a limited number of financial figures because Co-op-3's officials denied releasing complete financial records to the researcher claiming that they have not been audited for last ten years. Since lack of data, it is difficult to conclude about Co-op-3's performance. However, Co-op-3 paid honorarium to the members of general assembly and did not refund any patronage to its general members for the last 20 years. *"After we allocate our net profits to compulsory reserves given in the by-laws, we do not have much remaining to distribute among our large membership. Our retail and pharmaceuticals are also not profitable. However, we spend some of our profits on providing sponsorships, education*

scholarships to children of members' conduct education seminars, organise annual excursions to members and staff, provide staff training and uniforms, and so forth" (General manager, 2018).

Co-op-3 received grants from the Government on several occasions which could be worth several million of LKR to recover losses it made and to invest in new development projects. *"On several occasions, Government has helped financially to recover from losses and to invest in new projects during the last 20 years, as I know. The total could exceed several million but I cannot give the exact figure since I am new to the position and still studying those,"* (Chairman, 2018).

Table 6-12: Financial performance

Aspects of Finance	***Description of performance***			
Dividends paid/patronage refund to members	Has not paid patronage refunds to members for the last 20 years. An honorarium is paid to general assembly representatives for attending the annual assembly.			
Third-party/Government financial assistance	Received several blocks of grants worth several million LKR from the Government on a number of occasions to recover from losses we incurred in the past.			
Year	**2014**	**2015**	**2016**	**2017**
Profit (LKR million)	NA	NA	NA	NA
Total sales (LKR million)	NA	NA	NA	NA
Current liabilities (LKR million)	NA	NA	NA	NA
Current assets (LKR million)	NA	NA	NA	NA
Total liabilities (LKR million)	NA	NA	NA	NA
Total assets (LKR million)	NA	NA	NA	NA
Total equity (LKR million)	NA	NA	NA	NA
Leverage (T. liabilities /T. assets)	NA	NA	NA	NA
Solvency (T. equity/T. assets)	NA	NA	NA	NA
Liquidity (C. assets/C. liability)	NA	NA	NA	NA
Profit margin (Profit before tax/T. sales)	NA	NA	NA	NA
Efficiency (T. sales/Total assets)	NA	NA	NA	NA

6.5 Co-op-4

6.5.1 Background and Development

Co-op-4 is situated about 40 km north of the district's capital city, Polonnaruwa. Its service area includes parts of Hingurakgoda, Medirigiriya and Lankapura DSDs. Co-op-4's officers revealed that rice is the main livelihood of the settlers and they own small farms ranging from about 0.8 ha to 1.21 ha. Rice is grown under the irrigation water supplied from Minneriya reservoir. Co-op-4 was also established in 1971 following the Government's multi-purpose co-operative restructuring programme merging 12 village-level MPCSs.

6.5.2 Governance and Management

Co-op-4's director board consists of seven members to provide direction and control. There are six board committees; each consisted of three board members to supervise department-level activities. Co-op-4 has a general manager and three department managers to manage the activities of six departments. Retail and banking divisions have branch managers to oversee the activities of the branches.

Aspects of Co-op-3's governance and management are summarised in Table 6-13. Data presented in Table 6-13 shows some degree of historical governance problems as reflected by the declined villa-level divisions and member participation. *"Our society has not been able to convene village-level steering committee meetings and general assembly in regular intervals before 2013. Even though DCD's officials urged previous management to held general assembly and present the annual budget, they failed to do so,"* (Chairman and General Manager, 2018). However, resent improvement in governance is reflected from conducting division-level elections, divisional steering committee meetings, and the general assembly on a regular basis.

Table 6-13: Conduct of co-operative's governance and management

Aspects of Governance	***Performance description***
Membership	Grew to 1,256 at present from around 300 in the 1970s
Active village-level divisions	Declined to 9 at present from 12 existed in the 1970s
Election of division-level steering committees	All nine steering committees were elected regularly
Conduct of divisional steering committee meetings	Village-level steering committee meetings have convened regularly only in five divisions.
Member participation in village-level divisional meetings	There were 35-45% member participation. Member participation in village-level divisions was low. Some of the divisions have failed to get at least their house majority.
Conduct of annual general assembly	Conducted annually on a regular basis since for five years
Auditing of accounts	Accounts have not been audited regularly, however, have maintained up-to-date financial records since 2014
Board of directors and their appointment	The current director board consists of seven elected members. They have been in office for a second consecutive term since 2013.
Annual development plan	Introduced annual development proposals during last five years on a regular basis with development goals.
Conduct of board meetings	Meetings have been conducted monthly in most cases during last couple of years.
Subcommittee meetings	Subcommittee meetings were not regular
Staff meetings	For the last three years, there have been only four staff meetings.

Non-regular auditing of accounts reflects less transparent financial management. The co-operative prepared annual development plans and conducted board meetings regularly and those observations suggest satisfactory level of management at strategic level. *"We organise our board meeting during evening hours since it is more convenient for all members to attend. Generally, we have high participation of members in board meetings"* (General manager, (2017). However, lack of regular subcommittee and staff meetings, lack of permanent managers in some divisions, changing the general manager position trice during the last four years suggest serious management problems encountered by the co-operative at operational level.

6.5.3 Business Departments and Organisation of the Rice Value Chain

There are six departments in Co-op-4 such as banking, retail, marketing, fuel, rice mill, and administration. Business operations performed by each department are summarised in Table 6-14.

Table 6-14: Business departments and operations

Departments	Core business operations
Banking	Supply financial services such as accepting deposits, providing loans (for agriculture and other) and mortgaging services
Fuel	Retail of diesel.
Grocery retail	Retail of grocery items/consumer goods including rice and agricultural inputs (agrochemical, fertiliser, and seed)
Marketing	Purchasing of paddy rice, distribution of agrochemicals, and fertiliser.
Rice milling	Processing and wholesaling of rice
Administration	Dealing with matters involved in human resources, recruiting and training employees, administration of financial resources, planning, organising and auditing of accounts, and managing logistics

Co-op-4 is a fully integrated co-operative and controls both upstream and downstream activities in the rice value chain. Organization of the co-operative's rice value chain is illustrated in Figure 6-4. Co-op-4's rice value chain business activities were organised in banking, retail, marketing, fuel, and rice milling departments.

Co-op-4 trades inputs' use in rice production such as fertiliser, pesticide, insecticide, fuel use in agricultural machines, seed and provides financial services such as agricultural credits to farmers. It purchases inputs in bulk from other co-operatives, private and state-owned input suppliers and distribute to farmers at a subsidised price.

Co-op-4 processed rice purchased for its own processing in its rice processing plant. The processed rice is packed in different size bags. Rice bags were sold in wholesale to other co-operatives and regional private traders when there is a surplus of production. Most of the rice proceeds have retailed in its own retail shops.

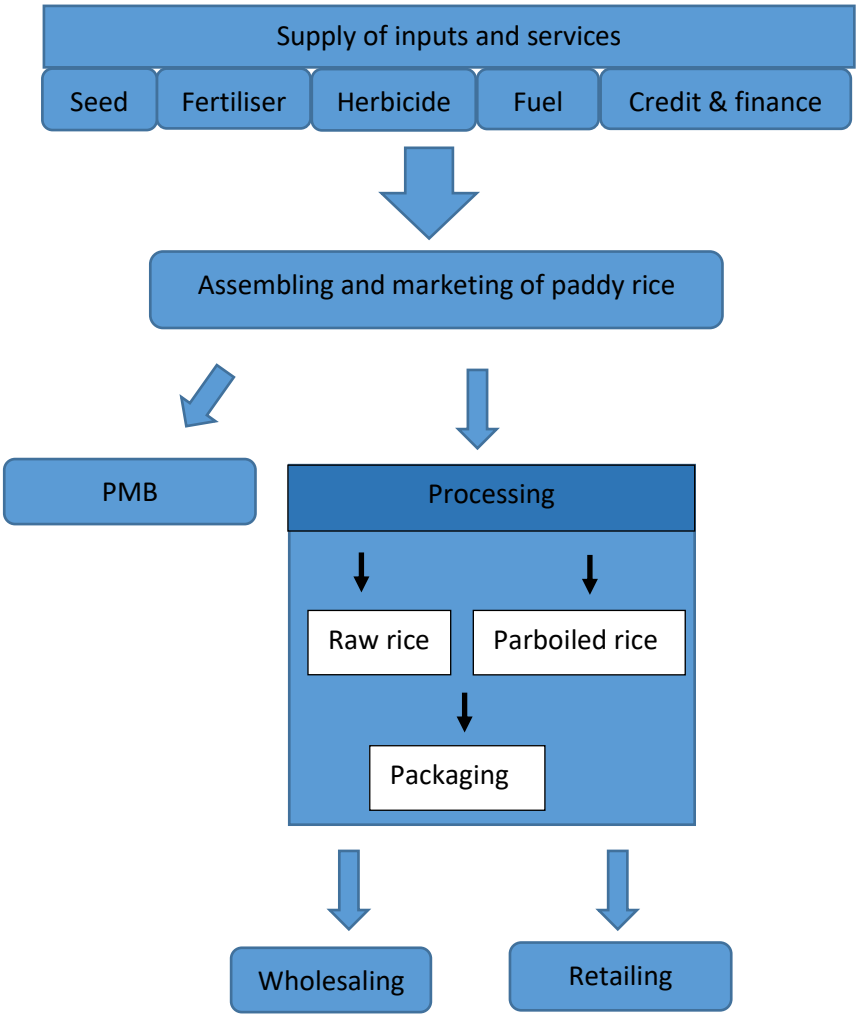

Figure 6-4: Co-op-4's rice value chain

6.5.4 Operational Performance of the Rice Value Chain Activities

The performance of co-operative-4's rice value chain activities are summarised in Table 6-15. According to Table 6-15, Co-op-4 has least intervened in the production of rice. There has been no proper exchange of information between members and the co-operative regarding production activities. Co-op-4 supplied seeds, fertiliser, herbicide, fuel, credit and financial services to rice growing member. It was noticed that input supply has been irregular. Co-operative has supplied cultivation loans and provided mortgage services. The range of financial services provided however was limited.

Table 6-15: Co-operative's rice value chain activities and operational performance

Activities controlled	Operational performance
Paddy rice production	
	Production of paddy rice was done by the member rice farmers under a least intervention by Co-op-4
Supply of inputs and services	
Seed	Supply seed in some seasons to rice farmers. Co-op-4 buys certified seed from private producers as well as from other co-operatives and distributes to rice farmers at a lower price than in the market. Co-op-4 stopped supplying seed during the last two seasons owing to lack of availability in the market.
Fertiliser	Regularly supply basic N, P, K fertiliser and a couple of liquid fertiliser mixtures are used in rice farming
Herbicide	Supply only a limited range of popular weedicides. However, maintaining limited stocks and supply is not regular in some seasons.
Supply of pesticide	Do not sell pesticide
Fuel	Supply only one petroleum product use in farm machines and automobiles
Credit and finance	There are a number of financial services supplied by Co-op-4. They include cultivation loans, mortgage services, crop advances, farm machinery loans, farm machinery mortgage services, and land mortgage recovering loans.
Assembly and marketing of paddy rice	
Purchasing and stocking of paddy rice	Purchase any variety of rice with storable moisture content (14% of moisture or below) for own processing as well as for PMB. There are 16 warehouses and most of them have drying floors. The farmer brought their paddy rice in polypropylene woven bags weighed to 50.5kg and stack in the warehouse. Stocks of paddy rice purchased for PMB held in warehouses until they get cleared by PMB. Due to the decline in rice production in the area, PMB did not get Co-op-4 involved in rice purchasing in 2015 and 2016.
Control of paddy rice quality	Strictly monitored at rice purchasing (moisture content 14% or low and lower than 5% chaff grains and impurities). Use moisture meters at the purchasing point to determine the moisture.
Processing	
Processing form	Process parboiled and raw rice, either long or short grain type.
Rice quality	Low to moderate quality. Rice contains black, half-filled and broken grains and parboiled rice produces unpleasant odor due to traditional methods used in fermenting and parboiling.
Grain size	Limited to short grain and long grain rice.
Packaging and labelling	Limited to four sizes (50kg, 20kg, 10kg, and 2kg) in polypropylene woven sacks and plastic bags printed with the co-operative logo.
Wholesaling	
Wholesale to other co-operatives and seldom to private traders; only when there is an excess production.	
Retailing	
Retail formats	Retail in own retail stores located across Co-op-4's service area at Rs. 5-7 lower than the market price. Some of the rice is distributed on food rations.
Retail markets	Mostly rural and occasionally semi-urban

Co-op-4 purchased paddy rice from members and non-members. Farmers themselves have transported their paddy rice to nearest warehouse and co-operative has not provided transport facilities. Co-op-4 processed both raw and parboiled rice in its central processing facility. The quality of the rice products was low to moderate. Rice contained black grains which produced an unpleasant aroma. The range of rice product was limited and produced only short and long grain rice.

Processed rice was bagged in large, medium and small size polypropylene woven sacks (50kg, 20kg, 10kg) printed with the Co-op-4's logo. In addition to these three bag sizes, there are also small 2kg plastic packs. Rice was wholesaled mainly to other co-operatives in non-producing areas of rice and to the private traders when there was an excess production. Wholesale operation was not practiced regularly. Rice was retailed in their own retail shops or distributed to the consumers on rations. Retail outlets of Co-op-4 are located in rural areas or small townships hence products were sold mainly to rural and semi-urban consumers.

6.5.5 Financial Performance

Co-op-4's financial performance is given in Table 6-16. Co-op-4 refunded patronage in some seasons to rice growing members before 2013. During the last five years, the patronage refund was not made owing to declining profits. "*Our society have been distributed part of the profit we made annually among members based on their patronage. However, we stopped it as we incur losses. But we still refund part of the interest we charge to the recipient of loans from our bank",* (General manager, 2018). Co-op-4 incurred losses in some of its business departments such as marketing, rice flour processing and retailing. "*We experienced decline in profits particularly in marketing and rice flour processing departments in recent years. With Government's rice pricing policy, it is difficult to run our rice businesses. We cannot produce rice profitably purchasing paddy rice at government's price. The Government did not get us involved in its rice purchasing programme in the last couple of years since the Government rice purchasing program launched through the PMB. This situation caused to decline our profits*", (General Manager, 2018). However, Co-op-4 recorded a growth in value of its assets and share capital in the recent years.

Co-op-4 received financial support from the Government and such grants have contributed to its development. "*We got Government financial support under several projects by consecutive*

Governments over the past. Most funds came to upgrade warehouses and the rice mill. But they were not enough for a complete upgrading of warehouses and the mill. We used most of the recent grants we got in 2014 to install a paddy rice dryer in our rice processing plant" (Chairman, 2018).

Table 6-16: Financial performance

Aspects of Finance	***Description of performance***				
Dividends paid/patronage refund to members	Patronage has not refunded to members for more than 6 years. A parcel of grocery items was distributed to general assembly representatives for attending the annual general assembly.				
Third-party/Government financial assistance	From time to time, over the last 20 years, Co-op-4 has obtained a number of grants worth LKR 6 million from the Government to invest in development projects. The largest sum of those grants was used to renovate warehouses and upgrade rice-processing facilities.				
Borrowed capital from other financial organisations	No borrowed capital from other financial organisations for the last six years.				
Year	**2013**	**2014**	**2015**	**2016**	**2017**
Profit (LKR million)	NA	-0.08	-0.75	-0.06	0.01
Total sales (LKR million)	NA	2.72	3.75	4.62	3.69
Current liabilities (LKR million)	NA	104.77	144.35	116.11	123.44
Current assets (LKR million)	NA	84.55	131.97	114.51	62.46
Total liabilities (LKR million)	NA	108.24	147.82	117.99	127.25
Total assets (LKR million)	NA	113.22	152.86	120.51	131.26
Total equity (LKR million)	NA	4.98	5.04	2.52	4.01
Leverage (T. liabilities /T. assets)	NA	0.96	0.97	0.98	0.97
Solvency (T. equity/T. assets)	NA	0.04	0.03	0.02	0.03
Liquidity (C. assets/C. liability)	NA	0.81	0.91	0.99	0.51
Profit margin (Profit before tax/T. sales)	NA	-0.03	-0.20	-0.01	0.00
Efficiency (T. sales/Total assets)	NA	0.02	0.02	0.04	0.03

6.6 Co-op-5

6.6.1 Background and Development

Co-op-5 is situated about 15 km northeast of the district's capital city, Polonnaruwa. Its service area covers almost all the area of Lankapura Divisional Secretariat Division. Early settlers were given 2 ha of rice land in this settlement. According to Co-op-5's officials rice is the main livelihood of the majority of the inhabitants and it is grown under irrigation. Other crops grown in the area include coconut, mango, and banana. There was a number of private medium and large-scale rice millers in this area, including two of the country's largest private rice-processing plants. Co-op-5 was

established by merging 18 village level MPCS in response to the governments MPCS restricting programme in 1971.

6.6.2 Governance and Management

Co-op-5 has seven members in the board and most of the members have been re-elected in several consecutive terms. Members of the board are from different professions. "*People on my board are professionals. We have a veterinary surgeon, retired school principals, teachers, farmers, local politicians, and social activists*" (Chairman, 2017).

There were three-member board committees to provide directives to the general manager and the department managers. There were Eight department managers to manage the eight business departments, an account and a human resources department. Retail and banking departments respectively have 12 and 14 branches. As reflected from the number of business departments and their branches, the Co-op-5 has a wider business scope. Important elements of Co-op-5's current governance and management conduct is summarised in Table 6-17.

Table 6-17: Conduct of co-operative's governance and management

Aspects of Governance	***Performance description***
Growth of membership	Increased from 650 in 1971 to 7,860 at present
Active village-level divisions	declined to 14 at present from the 18 divisions existed during the 1970s.
Election of division-level steering committees	All 14 steering committees have been elected for the term starting from 2016.
Conduct of divisional steering committee meetings	Village-level steering committee meetings have been convened regularly in all 14 divisions.
Member participation in village-level divisional meetings	A 45-60% of the members in a division. Four divisions have been reported with low member participation compared to other divisions.
Conduct of annual general assembly	Regular convened during last five years.
Auditing of accounts	Accounts have been audited annually by the DCD and maintained up-to-date financial records.
Board of directors and their appointment	The current director board consists of seven elected members
Annual development plan	Introduced annual development proposals during the last five years on a regular basis with development goals.
Conduct of board meetings	Board meetings have been convened thrice a month regularly
Subcommittee meetings	Convened fortnightly on a regular basis
Staff meetings	Once in two months

Decline of village-level divisions indicate previous governance problems faced by the co-operative. At present, Co-op-5's governance seems to be satisfactory as reflected in regular steering committee meetings, satisfactory member participation, and growth of membership. Auditing of accounts has been regular and maintained up-to-date records implying satisfactory financial transparency. Co-op-5 also has prepared annual development plan, conducted sub-committee meetings, board meetings, and staff meetings on regular basis. These regularities indicate satisfactory level of monitoring and follow-up of decisions leading to satisfactory management.

6.6.3 Business Departments and Organisation of the Rice Value Chain

The co-operative has ten departments and all business activities are performed by eight departments while other two respectively manage financial and human resources of the co-operative. Business departments include; retail, fuel, banking, marketing, rice flour processing, spice processing, kindergarten, and transport. The operations of each department are summarised in Table 6-18. Rice value chain business activities have been organised under several business departments such as retail, fuel, banking, marketing, transport and rice flour processing. Accounts and human resources departments provided supporting services for the functioning of value chain activities.

Table 6-18: Business departments and operations

Department	Core business operations
Banking	Supply financial services such as accepting deposits, providing loans (for agriculture and other) and mortgaging services
Marketing	Purchasing of paddy rice, distribution of agrochemicals, and fertiliser.
Grocery retail	Retail of grocery items/consumer goods including rice and agricultural inputs (agrochemical, fertiliser, and seed)
Rice flour processing	Processing and wholesaling of rice flour
Fuel	Retail of fuel use farm machinery and automobile
Spice processing	Processing and wholesaling of spice products (chili, curry powder, and turmeric)
Kindergarten	Early childhood education and daycare services
Transport	Responsible for managing transport services and facilities
Accounts	Administration of financial resources, planning, organising and auditing of accounts
Human Resources	Dealing with matters related to human resources, recruiting and training employees

Co-op-5 is a fully integrated co-operative and its rice value chain is illustrated in Figure 6-5. It supplied inputs used in rice production such as fertiliser, pesticide, herbicide, fuel use in agricultural machines, seed, financial services such as agricultural credits to rice growing members. Co-op-5 purchased paddy rice from member rice farmers for its own processing through its network of 16 warehouses located across its service area. The processing plant has been designed to process only raw rice required for producing flour. The rice flour packed in large, medium and small size (25kg, 10kg, 1kg) plastic bags offered to the market under “Golden” brand. It does both wholesaling and retailing.

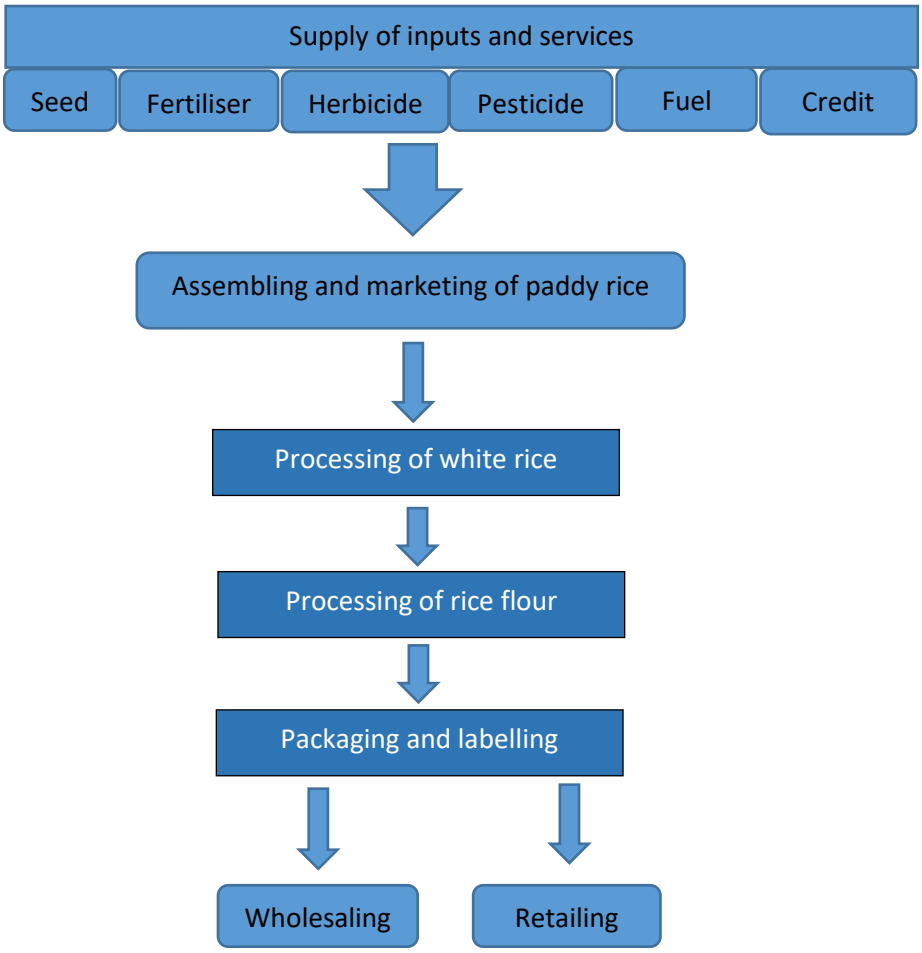

Figure 6-5: Co-op-5's rice value chain

Figure 6-6: A rice flour product of Co-op-5

6.6.4 Operational Performance of the Rice Value Chain Activities

The operational performance of the rice value chain activities integrated by Co-op-5 is summarised in Table 6-19. Co-op-5 has least intervened in production stage of rice and it was performed by the rice farming members. However, there has been some communication between the co-operative and the farmers about rice varieties that the co-operative intends to buy.

Table 6-19: Co-operative's rice value chain activities and operational performance

Activities controlled	Performance
Paddy rice production	
Production	Member farmers under minimum intervention of Co-op-5
Supply of inputs and services	
Seed	Regularly supplied a limited range of seed varieties
Fertiliser	Re-started selling N, P, K fertiliser in 2015 subsequent to the change of the Government's fertiliser subsidy policy. Holds the dealership of state's fertiliser corporation for selling basic N, P, K fertiliser.
Herbicide	Regularly supplies a couple of popular weedicides among rice farmers.
Pesticide	Supplies a limited range (2-3) of pesticides on an irregular basis
Fuel	Regularly supply fuel used in farm machinery
Credit and finance	Provides a wide range of financial services on a regular basis (cultivations loans, mortgage services, crop advances, construction loans, farm machinery loans, and loans to clear land mortgages).
Assembly and marketing of paddy rice	
Purchasing and stocking of paddy rice	Purchase only two rice varieties (BG 300, BG 352) dried to storable moisture. Either farmer themselves or co-operative-5 transport paddy rice to the nearest warehouse.
Control of paddy rice quality	Strictly monitored at purchasing (moisture content 14% or low and lower than 5% chaff grains and impurities). Use moisture meters at the purchasing point to determine the moisture.
Processing	
Processing form	White raw rice
Rice quality	Moderate to high
Grain size	Only medium to long grain rice
Processing of rice flour	
Flour quality	High quality
Product range	Limited to few products
Packaging and branding	Three sizes (25kg, 10kg, 1kg) in polypropylene woven sacks and plastic bags printed with the brand logo.
Wholesaling	
Wholesale of rice flour	Wholesale to private traders, fast food retailers, hotels, restaurants, and supermarkets
Retailing	
Retail formats	Retails in own retail stores located across co-operative-5's service area at a higher price than the similar products available in the market.
Retail markets	Mostly semi-urban and urban markets

Most of the production inputs have been supplied by the co-operative to their member rice growers. However, the product range of inputs was limited. Co-operative provided a wide range of financial services including cultivation loans and various other mortgage services.

Co-op-5 purchased only two varieties of rice which are suitable for making rice flour. "BG 300 and BG 352 *rice are most suitable to make rice flour. The texture and feel, colour and cooking quality of rice flour produced from these two varieties are much better compared to other varieties*" (General Manager, 2018). Paddy rice was checked for their quality at the point of purchasing to ensure the quality criteria which is important to produce rice flour. Co-op-5 processed only raw rice that is used as an input in producing rice flour. Product range of rice flour was limited but the quality was high. Rice flour was packed in different size packages that suit to commercial food retailers and households. Co-op-5 wholesaled rice flour to private traders, restaurants, hotels and other supermarkets. Rice flour was retailed in semi-urban and urban markets in their own retail shops as well. This information shows that the Co-op-5's rice flour products have reached their high value markets both in wholesale and retail.

6.6.5 Financial Performance

Some of Co-op-5's financial performance indicators are given in Table 6-20. As indicted in the table, Co-op-5's development has influenced by the Government financial assistance and burrowed capital. "*We have about LKR 60 million reserves. By the constitution, it is compulsory to maintain them and we have no authority to use those reserves without the DCD's approval. We do not have enough equity capital as well to spend on new projects. Therefore, we decided to borrow"* (Chairman, 2018). Coop-5 had refund patronage in some years for rice-growing members prior to 2013. During the last five years, the patronage refund has not been made due to the investment on assets.

Co-op-5 incurred losses in some of its business departments such as marketing, rice flour processing and retailing. "*We experienced decline in profits, particularly in marketing and rice flour processing departments, in recent years. With Government's rice pricing policy, it is difficult to run our rice businesses. Our cost of production has increased. The Government did not get us involved in its rice-purchasing programme in the last couple of years since the Government rice-purchasing programme was launched through the PMB. This situation caused our profits to decline compared to the profit we made some years ago."* (General Manager, 2018). However, Co-op-5 recorded profits, a growth

in value of its assets and share capital. Co-op-5's profit, according to the respondents has mainly come from retail and banking operations.

Table 6-20: Financial performance

Aspects of Finance	***Description of performance***			
Dividends paid/patronage refund and other forms of transfers to members and non-members	Paid to members who sold rice to Co-op-5 for some reason in 2013 and earlier. An honorarium paid to general assembly representatives for attending the annual assembly.			
Third-party/Government financial assistance	LKR 3 million grant received from the Government to start a rice flour milling plant			
Year	**2013**	**2014**	**2015**	**2016**
Profit (LKR million)	NA	4.24	5.57	5.88
Total sales (LKR million)	NA	21.5	19.24	25.41
Current liabilities (LKR million)	NA	272.52	303.25	332.42
Current assets (LKR million)	NA	346.48	329.45	384.57
Total liabilities (LKR million)	NA	410.42	433.23	459.54
Total assets (LKR million)	NA	460.23	537.37	586.25
Total equity (LKR million)	NA	49.81	104.14	126.71
Leverage (T. liabilities /T. assets)	NA	0.89	0.81	0.78
Solvency (T. equity/T. assets)		0.11	0.19	0.22
Liquidity (C. assets/C. liability)	NA	1.27	1.09	1.16
Profit margin (Profit before tax/T. sales)	NA	0.20	0.29	0.23
Efficiency (T. sales/Total assets)	NA	0.05	0.04	0.04

6.7 Co-op-6

6.7.1 Background and Development

Co-op-6 is situated in the Manampitiya township in Dimbulagala DSD in Polonnaruwa district about 15km southeast of the district's main city, Polonnaruwa. Its service area includes most of the new settlements which were developed under the Mahaweli Accelerated Development Programme during the 1980s. Officers of the co-operative revealed that rice is the main crop grown in the area under irrigation and it provides the livelihood for about 90% of the inhabitants. The majority of the rice farms are uniform and small (1ha). Moreover, this area had been affected by the civil war until 2009. Chairman of the Co-op-6 says "*some of the farmers had abandoned their rice lands and migrated to other safer areas in the country during the war time*". Co-op-6 was established following the Government's MPCS restructuring programme in 1971 by merging 17 village-MPCSs.

6.7.2 Governance and Management

Co-op-6 has a director board consisting of three appointed members at the time of study. There were seven subcommittees to provide direction to department-level activities. The same three

directors represented all seven sub-committees. General manager coordinated Co-op-6's overall business and administrative activities. There were seven department managers to manage department level businesses.

Table 6-21 summarise the important aspects of Co-op-6's governance and management conduct. Decline of village-level divisions indicate that Co-op-6 have encountered significant governance problems in the past. The information provided in Table 6-21 revealed that the Co-op-6 has encountered some recent governance issues. For instance, two of the existing divisions have not been convened their village-level divisional meetings to elect steering committees. That has delayed calling the general assembly, as well as the election of the board of directors leading to some degree of control issues.

Table 6-21: Conduct of co-operative's governance and management

Governance dimensions	**Conduct**
Membership	Grew to 20,195 at present from 821 in the 1970s
Active village-level divisions	Declined to 17 at present from the 24 divisions existed during the reorganisation in the 1970s.
Election of divisional level steering committees	There were 15 elected committees. Two committees were unelected due to lack of house majority.
Conduct of divisional steering committee meetings	Meetings were convened regularly in 15 divisions except remaining two
Member participation in village-level divisional meetings	About 35%-50% of total members of a division
Conduct of annual general assembly	Conduct annually on a regular basis
Auditing of accounts	Accounts have been audited annually by the DCD
Board of directors and their appointment	The current board of directors consists of three appointed members by the commissioner. The co-operative has not been able to convene 2016's general assembly because two steering committees have not been elected.
Annual development plan	Introduced annual development proposals during the last five years on a regular basis with development goals.
Conduct of board meetings	Conducted fortnightly on a regular basis except for a few occasions
Subcommittee meetings	Occurred delays in subcommittee meetings since all committees consist of the same three board members.
Staff meetings	Once every 3 to 4 months

"*There is a problem of getting house majority in two of our village-level divisions. Member participation in those two divisions is poor. We had to postpone the general assembly a couple of times being unable to have the steering committee representatives from those two divisions.*

Therefore, provincial commissioner of co-operatives appointed me as the chairman and two other former directors to look after the functions of our co-operative until elect a new board" (Chairman, 2018).

However, regular auditing of accounts reflects good financial transparent. Preparation of annual development plan, and conduct of regular board meetings imply satisfactory management. The general manager stated "*I have been working there for more than 15 years and started as a general clerk. I held a number of managerial positions in various departments before I became the general manager. I have very good experience in running a co-operative business*"

6.7.3 Business Departments and Organisation of the Rice Value Chain

Co-op-6 consisted seven departments including retail, banking, marketing, fuel, rice milling, finance, and human resources. Activities of the seven departments are summarised in Table 6-22. Co-op-6's rice value chain has been mainly organised in banking, retail, fuel, marketing, and rice milling departments. Finance and human resources departments oversee planning and managing of general financial and human resources respectively and provide supporting services for rice business operations.

Table 6-22: Business departments and operations

Department	Core business operations
Banking	Supply financial services such as accepting deposits, providing credit, and mortgage services (for agriculture and other)
Marketing	Seed production, processing and distribution, rice purchasing, purchase and distribution of agrochemicals, and fertiliser.
Grocery retail	Retail of grocery items/consumer goods including rice, spice processing and packaging, and retail of agricultural inputs (agrochemical, fertiliser, and seed)
Fuel	Retail of fuel (gasoline, kerosene, diesel, household gas, lubricants)
Rice milling	Processing and wholesaling of rice
Finance	Administration of financial resources, planning, organizing and auditing of accounts
Human resources	Dealing with matters involved in human resources, recruiting and training employees

Co-op-6 integrated both upstream and downstream activities in the rice value chain as illustrated in Figure 6-7 and satisfied this study's definition of a fully integrated co-operative. The co-operative supply inputs used in rice production such as fertiliser, pesticide, herbicide, fuel use in agricultural machines, seed and financial services such as agricultural credits to farmers. The co-operative

purchases paddy rice from both member and non-member rice farmers for its own processing and on behalf of the Paddy Marketing Board (PMB). There are 12 warehouses located in its service area to stock paddy rice. Co-op-6 processes rice in its own rice-processing plant. The processing plant designed to process both parboiled and raw rice. The co-operative incorporated rice wholesaling and retailing as well.

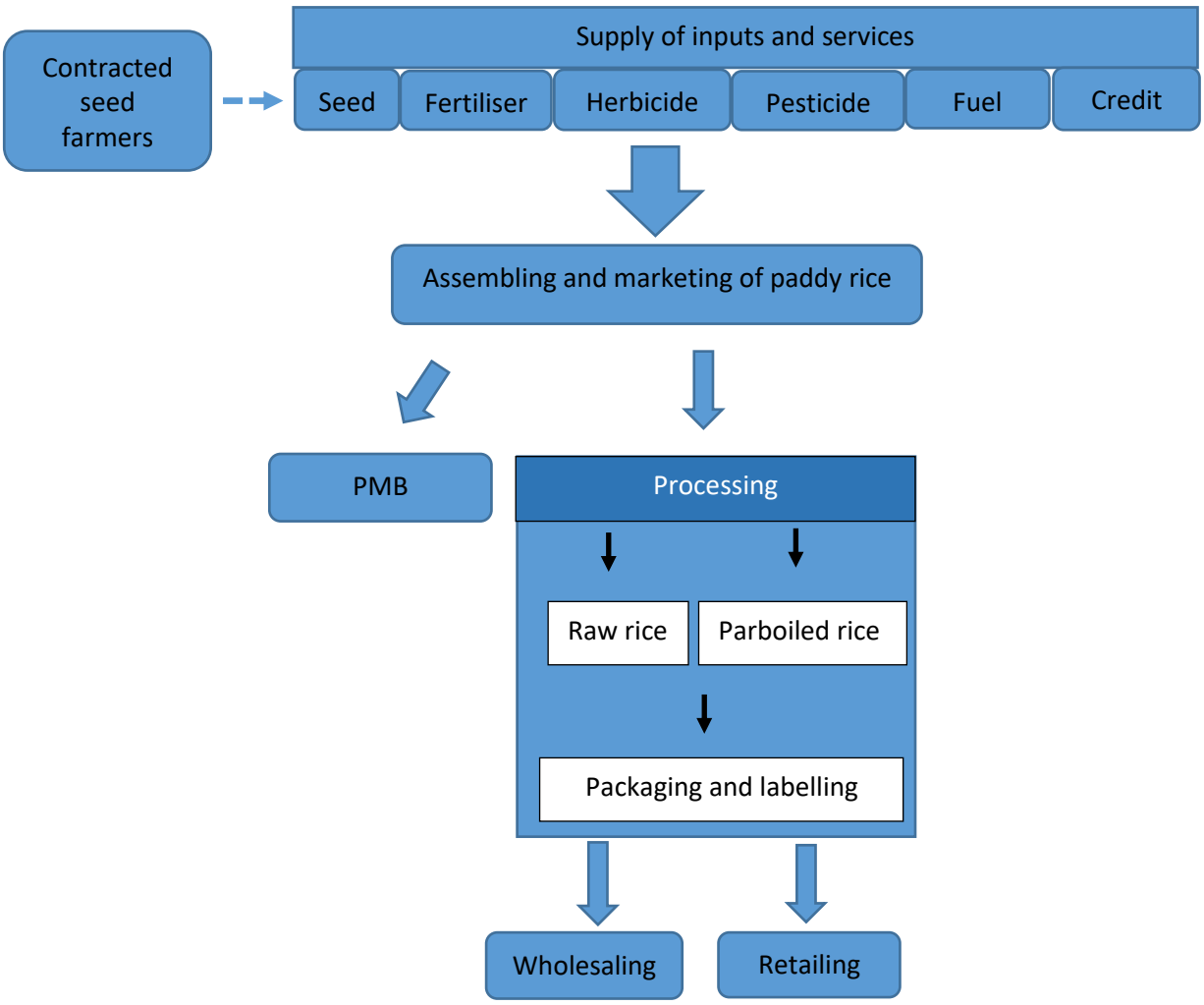

Figure 6-7: Co-op-6's rice value chain

6.7.4 Operational Performance of the Rice Value Chain Activities

Table 6-23 summarises the performance of co-operative's value chain activities. It was evident from the information provided in Table 6-23 that the co-operative has no control in paddy rice production. It was independently practiced by the member rice growers. Co-op-6 supplied a limited range of various production in puts such as seed, fertiliser, herbicide, pesticide, and fuel. There was

a wide range of financial services provided by the co-operative including cultivation loans, crop advances and mortgage services to both members and non-members.

Table 6-23: Co-operative's rice value chain activities and operational performance

Activities controlled	Operational performance
Paddy rice production	
	Member farmers produce rice and co-operative has no much influence
Supply of inputs and services	
Seed	Supplies regularly a limited range of seed varieties (3-4 varieties)
Fertiliser	Fertiliser supply re-started in 2015 after ten years following the change of fertiliser subsidy policy by the Government. Regularly supplies basic N, P, K fertiliser and does not supply mixed and new fertiliser formulations.
Herbicide	Supplies only a limited range of popular weedicides irregularly
Pesticide	Supplies limited range (2-3) of pesticides irregularly
Fuel	Regularly supply fuel used in farm machinery and automobiles
Credit and finance	Provides a wide range of credit and other financial services regularly (cultivations loans, crop advances, farm machinery loans, mortgage services, construction loans, and loans to clear land mortgages)
Assembly and marketing of paddy rice	
Purchasing and stocking of paddy rice	Buy only dry paddy rice from both members and non-members Farmer themselves need to transport their paddy rice in polypropylene woven bags made to 50.5kg and stack paddy rice bags in the warehouse.
Control of paddy rice quality	Strictly monitored at purchasing (moisture content 14% or low and lower than 5% chaff grains and impurities). Uses moisture meters at the purchasing point to determine the moisture.
Processing	
Processing form	Processes parboiled and raw rice, either long or short grain type.
Rice quality	Low to moderate. Rice contains black, half-filled and broken grains and parboiled rice produces unpleasant odor due to traditional methods used in fermenting and parboiling.
Grain size	Limited to short grain and long grain rice.
Packaging	Limited to three sizes (50kg, 20kg, 10kg) in polypropylene woven sacks printed with the brand logo.
Wholesaling	
Wholesales to other co-operatives and occasionally to private traders only when there is an excess production. Wholesale has not been a regular function.	
Retailing	
Retail formats	Retails in own retail stores located across co-operative's service area at LKR 5-10 lower than the market price
Retail markets	Mostly rural and occasionally semi-urban

The co-operative purchased paddy rice that satisfied strict quality requirements for its own processing and on behalf of PMB. The co-operative processed both raw and parboiled rice but their quality was low to moderate. There was a limited range of rice products in various size of packages but large size bulk rice packs were produced prominently. Wholesaling has not been regular and main buyers have been other co-operatives in other regions and regional private traders only when there is a surplus of production. Packed rice was mostly retailed in their own retail shops or distributed to the consumers on rations. Most of the retail shops are located in rural areas or small townships, except for the mega shop, which is located in proximity to a city.

6.7.5 Financial Performance

Financial performance of Co-op-6 is provided in Table 6-24. The co-operative has occasionally refunded patronage to some of its rice-growing members. However, there were various other indirect transfers to members in the form of sponsorships, social events, and health camps. It recorded positive profits from 2013 to 2016 except in 2014.

Table 6-24: Financial performance

Aspects of Finance	Description of performance			
Dividends paid/patronage refund and other forms of transfers to members and non-members	Paid to seed growers in some production seasons. A parcel of grocery items given to general assembly representatives for attending the annual assembly.			
Third-party/Government financial assistance	LKR 2 million in 2015 by the Government			
Year	**2013**	**2014**	**2015**	**2016**
Profit (LKR million)	8.64	-1.21	0.54	4.69
Total sales (LKR million)	13.2	14.8	17.2	12.00
Current liabilities (LKR million)	262.49	280.67	323.27	320.67
Current assets (LKR million)	246.14	253.93	359.55	356.47
Total liabilities (LKR million)	289.48	310.47	394.24	409.64
Total assets (LKR million)	345.44	360.12	447.57	476.34
Total equity (LKR million)	55.96	49.65	53.33	66.70
Leverage (T. liabilities /T. assets)	0.84	0.86	0.88	0.86
Solvency (T. equity/T. assets)	0.16	0.14	0.12	0.14
Liquidity (C. assets/C. liability)	0.94	0.90	1.11	1.11
Profit margin (Profit before tax/T. sales)	0.65	-0.08	0.03	0.39
Efficiency (T. sales/Total assets)	0.04	0.04	0.04	0.03

"Although we do not distribute our profits among the membership, we spend our profits on sponsorships and scholarships, medical camps, sports events and annual social activities in which all benefited in common," (Chairman, 2018). Co-op-6 has received government's financial support for its development as well. Co-op-6 showed some progress in its financial performance as indicated by the growth of assets and profits over the period concerned. Financial ratios also reflected Co-op-6's satisfactory financial performance.

6.8 Comparative Analysis and discussion

Following section compares the findings stemmed from individual co-operative case study analysis.

6.8.1 Comparison of Co-operative Profiles

Table 6-25 provides a comparative overview of the profiles of the co-operatives included in this study. All the co-operatives studied were established in 1970's as a result of government's multipurpose co-operative restructuring programme and grew their membership significantly. All co-operatives had been in existence for almost fifty years. The board structure of all co-operatives was similar which was prescribed by the law. There were some differences in terms of number of directors since some co-operatives have appointed directors owing to the delay in convening general meetings. Despite all co-operatives sharing a common governance structure, they were different in their conduct as reflected from the number of board members and the active village level divisions. Decline of active village level divisions suggest that they have faced some governance problems in the past. Some of the studied co-operatives had not been able to elect their total number of directors prescribed by the law (seven members). This implies current governance challenges in the studied co-operatives.

Table 6-25: Profile of study co-operatives

Item	Partially integrated			Fully integrated		
	Co-op-1	Co-op-2	Co-op-3	Co-op-4	Co-op-5	Co-op-6
Establishment	1971	1971	1971	1971	1971	1971
Common governance structure	Yes	Yes	Yes	Yes	Yes	Yes
Current board of directors	3	9	7	7	7	3
Board committees	3	5	7	6	10	7
Current membership	6,780	9,524	7,560	1,256	7,860	1,971
Starting membership (approximate number)	1,000	1,700	1,500	300	650	821
Active/initial village-level divisions	3/6	10/13	17/17	9/12	14/18	17/24
Business departments	5	5	8	6	10	7

Organization of management also demonstrated slight differences across study co-operatives. Fully integrated co-operatives had relatively more business divisions suggesting a relatively complex business scope in them compared to partially integrated co-operatives. On the other hand, partially, integrated co-operatives had a larger membership compared to fully integrated co-operatives apart from Co-op-5.

6.8.2 Integrated Activities and Operational Performance

Value chain activities controlled by the study co-operatives are summarised in Table 6-26. Interviewees in both partially and fully integrated co-operatives perceived that their members' crop yield was comparable to that of national yield. Most of the co-operative officers interviewed were saying that "*our rice growing member farmers obtain good yields since the majority of them have assured irrigation water and grow high yielding rice varieties."* However, the production of seed rice has not been a common practice in all co-operatives.

Table 6-26: Value chain activities integrated by the study co-operatives

Activity	**Partially integrated**			**Fully integrated**		
	Co-op-1	**Co-op-2**	**Co-op-3**	**Co-op-4**	**Co-op-5**	**Co-op-6**
Rice production						
Paddy rice	+	+	+	+	+	+
Rice seed	0	+	0	0	0	+
Supply of inputs, services and information						
Seed	+	+	+	+	+	+
Fertiliser	+	+	+	+	+	+
Herbicide	0	0	+	+	+	+
Pesticide	0	0	+	0	+	+
Fuel	0	0	+	+	+	+
Credit and finance	+	+	+	+	+	+
Transport and post-harvest drying facilities	0	0	0	+	0	+
Extension and training	0	0	+	0	+	+
Marketing information	+	+	+	+	+	+
Assembly and marketing of paddy rice	+	+	+	+	+	+
Processing of rice	0	0	0	+	+	+
Wholesaling of rice	0	0	0	+	+	+
Retailing of rice	0	0	0	+	+	+

Note: + = included, 0 = not included

Both partially and fully integrated co-operatives have supplied inputs and services such as fertiliser, seed, credit and other financial services, and market information. However, as shown in Table 6-26, most of the coops studied seldomly supplied logistic facilities such as transportation, and post-harvest drying facilities. Compared to partially integrated co-operatives, majority of the fully integrated co-operatives have supplied herbicide, pesticide and fuel to their members. Most of the fully integrated co-operatives provided extension and training as well.

Assembling and marketing of paddy rice were practiced by both partially and fully integrated co-operatives. Integrating further downstream, fully integrated co-operatives involved in rice processing, wholesaling and retailing as well.

Following section summarises the operational features of co-operatives' value chain. Table 6-27 summarises the production features of co-operatives' rice value chains. Some of the production decisions related to rice production such as planting dates, rice variety, quantity, and quality were taken by the farmers individually. This observation consistent with the statement made one of the officers interviewed. The officer explained "*we don't get involved in farm-level decision making in paddy rice production. However, we do have a great deal with some of the rice farmers when we contracted them to produce seed. Even in marketing, our rice growing members have the liberty to sell to the co-operative or outside*".

According to the results, none of the studied co-operatives supervised production stage of their rice value chain. Decisions pertaining to the timing of crop establishment, varietal selection, quality, and the quantity of rice to be produced were not strictly monitored or supervised by the co-operatives. This is in contrary to the theory. Theoretically, vertical integration means strict control in all the integrated activities by a firm (Harrigan, 1984; H. C. Peterson et al., 2001; Walker, 1988). This weak control in production stage decisions suggests less savings in the costs of transactions and inefficiencies particularly for those fully integrated co-operatives that have invested in specific assets to include downstream value adding stages such as processing, wholesaling and retailing as shown by S. Klein, Frazier, and Roth (1990) and Kohls and Schneidau (1962). One of the managers in the fully integrated co-operatives says "*the best variety to produce rice flour is BG 352. In some seasons we had short supply of BG 352 and had to temporarily stop the operation of our rice flour mill*". This shows that studied co-operatives have lost some of the opportunities of increasing their value-added margins while lowering operational efficiency as pointed out by Hennessy (1996). Moreover, co-operatives are exposed to uncertainty of having reliable volume of paddy rice to

deploy in processing as rice growing members in the study co-operatives are not obliged to supply the co-operative. This has encouraged members to behave opportunistically as suggested by D'aveni and Ravenscraft (1994).

Table 6-27: Operational features of rice production

Operational feature	Partially integrated			Fully integrated		
	Co-op-1	Co-op-2	Co-op-3	Co-op-4	Co-op-5	Co-op-6
Production of paddy rice						
Co-operative's influence on paddy rice production	0	0	0	0	0	0
Monitoring of paddy rice production	0	0	0	0	0	0
Co-operative's influence on seed production	NA	NA	+	NA	NA	+
Monitoring seed production	NA	NA	+	NA	NA	+

Note: 0 = none, + = yes, NA = not applicable

Considerable difference was observed in supplying inputs, services and information between partially and fully integrated co-operatives in several aspects (Table 6-28). First, a difference in the range of inputs supplied was evident between partially and fully integrated co-operatives. Fully integrated co-operatives have supplied relatively a wide range of inputs, services and information than partially integrated co-operatives. Moreover, fully integrated co-operatives have supplied at least several variants of the same input (different formulas of fertiliser for example). Equally, fully integrated co-operatives supplied inputs, services and information more frequently than partially integrated co-operatives. These results suggest that fully integrated co-operatives have performed relatively better in input, service and information supply level in the value chain compared to partially integrated co-operatives. These observations show that fully integrated co-operatives remain relatively more effective compared to partially integrated co-operatives providing inputs, services and information.

Results also revealed that studied co-operatives have failed regularly to provide some of the services such as product transportation, machines and equipment hire services, and post-harvest drying services. Lack of these services also contributed to outside selling by the members and reduced co-operatives' share of paddy rice market. This is in contrary to J. Lin et al. (2019) who demonstrated that Chinese tobacco farmer co-operatives effectively provide some logistic services such as

transport. Robb, Smith, and Webb (2013) conclude that provision of such logistic services involve significant capital investment which is challenge for co-operatives.

Table 6-28: Operational features of supplying inputs, services and information

Operational feature	Partially integrated			Fully integrated		
	Co-op-1	Co-op-2	Co-op-3	Co-op-4	Co-op-5	Co-op-6
Supply of inputs, services and information						
Inputs						
Range of inputs supplied	*	*	**	**	**	**
Variety of each input supplied	#	#	##	#	##	##
Frequency of supplying inputs	*	*	**	*	**	**
Quality of inputs supplied	**	**	**	**	**	**
Services						
Types of logistic services supplied	#	#	#	#	##	##
Frequency of supplying logistic services	*	*	*	*	**	**
Types of extension and training supplied	0	0	#	0	#	#
Frequency of supplying extension and training	0	0	*	0	**	**
Range of financial services	*	*	**	**	***	***
Frequency of supplying financial services	**	**	***	***	***	***
Information						
Types of information shared	#	#	#	#	##	##
Frequency of sharing information	*	*	*	*	**	**

Note: 0 = none, + = yes, NA = Not applicable, #= a few, ## = some, ### = many, * = low, ** = moderate, *** = high

Being consistent with Robb et al. (2013) financial analysis (presented below) in this study revealed that study co-operatives do not have much of the raised equity capital to invest in such assets. Provision of information was not regular in both partially and fully integrated co-operatives even though fully integrated co-operatives were relatively better in aspect. This corroborates with the findings of Yang et al. (2018) stemmed from farmer co-operatives in China. Yang et al. (2018) showed that even co-operatives established information sharing networks, they remain unstable as a result

of limited communication capacity, and lack of economic and social capital which are common to study co-operatives too.

Fully integrated co-operatives have effectively provided a wide range of financial services on a more regular basis to their members than partially integrated co-operatives. This implies that fully integrated co-operatives have performed relatively well in supplying financial services than their counterparts. Compared to other types of inputs and services, all the studied co-operatives have provided a wide range of financial services to member farmers more regularly (Table 6-28). This observation supports the findings of several others. For instance, Hulme and Montgomery (1994) found credit co-operatives in Sri Lanka effectively serve poor communities including farmers. Similarly, Mishra (1994) found a rise in supply of credits from co-operatives to smallholder farmers in Gujarat (India). Equally, Huppi and Feder (1990) also report on high potential of lending groups and co-operatives to provide credit to small farmers. Interviews uncovered that study co-operatives have made credits and other financial services more accessible to their members through removing access barriers. For instance, co-operatives have provided credits to members on personal guarantees instead of other collateral such as assets.

All the studied co-operatives were alike in assembling and marketing of paddy rice as can be seen in Table 6-29. Co-op-5 was slightly different only from the type of rice they bought. Both co-operatives have bought paddy rice from both members and non-members aiming to achieve economies of scale. Purchased paddy rice was stored by the co-operatives for varying durations of time. This suggests that both partially and fully integrated co-operatives have increased their value-added margin by holding stocks of paddy rice. However, assembling and marketing activities of co-operatives affected by the competition of private sector traders. Co-operatives were not as efficient as private sector counterparts in this segment of the value chain. Lack of transportation, drying, and quality monitoring facilities prevented these co-operatives buying moist rice from the farmgate as private traders do. Private traders performed relatively well in providing aforementioned services to rice farmers. Therefore, a lot of the trading has happened outside the co-operatives adversely affecting their performance. Shortage of investment capital prevented co-operatives providing additional logistic services that are important at the assembling and marketing stage.

Table 6-29: Operational features of assembling and marketing of paddy rice

Operational feature	Partially integrated			Fully integrated		
	Co-op-1	**Co-op-2**	**Co-op-3**	**Co-op-4**	**Co-op-5**	**Co-op-6**
Assembly and marketing of paddy rice						
Types of rice varieties purchased	Any	Any	Any	Any	Specific	Any
Purchased grain sizes	Any	Any	Any	Any	Long	Any
Suppliers of paddy rice	M+N	M+N	M+N	M+N	M+N	M+N
Point of purchase	CW	CW	CW	CW	CW	CW
Transportation to warehouse	Farmer	Farmer	Farmer	Farmer	Farmer	Farmer
Quality monitoring	Strict	Strict	Strict	Strict	Strict	Strict
Storage duration	Vary	Vary	Vary	Vary	Vary	Vary

Note: M+N = members & non-members, CW = co-operative warehouse

Holding rice in conventional warehouses and manual operations however suggests potential quality deterioration of stored rice and rise in storage cost owing to conventional storage handling. All the studied co-operatives have strictly monitored quality of paddy rice they buy. For example, paddy rice was checked for standard moisture content at each of their purchasing points. Such quality requirements have constrained the supply of paddy rice to the co-operatives. Even though studied co-operatives accepted paddy rice from non-members, they have not been able to collect sufficient quantities of rice to function efficiently.

One of the interviewees said "*we buy only those rice dried to standard moisture level since our co-operative have least or no facilities to dry moist paddy rice. Also, we do not provide transport facilities to farmers to transport their paddy rice to our warehouses like private traders do because we don't have enough trucks. Therefore, a majority of the farmers sell outside and we didn't get enough paddy rice*". This information highlights low level performance in assembling and marketing operations of paddy rice in both partially and fully integrated co-operatives. These results are comparable to the finding of Mengistu (2017) on Ethiopian coffee marketing co-operatives. As Mengistu (2017) reports, coffee marketing co-operatives were under supplied by the members due to the dissatisfaction caused by not having transport services from their co-operatives. Even though in a different context (USA), in their simulation study, J. S. Royer and Bhuyan (1995) demonstrated that the marketing and processing activities for co-operatives were generally characterised by low margins and little market power.

This lower-level performance in assembling and marketing operations was attributed to three counts of reasons. First, the problem of free-riding as shown by Pennerstorfer and Weiss (2013b), Cai et al. (2016), and Ahn et al. (2012) as these studied co-operatives purchased paddy rice from non-members on similar terms of trade as members. Second, opportunistic behaviour of the rice growing members as they were not contracted to supply paddy rice to the co-operative as pointed out by Bijman, Muradian, and Cechin (2011) and Ortmann and King (2007a). It was evident that when the market price is high members have sold their paddy rice to outside sellers and co-operatives got less supply. Third, the transaction requirements of the co-operatives have created an entry barrier for the farmers. All co-operatives monitored quality of paddy rice at the point of purchasing. They only bought paddy rice dried to storable moisture level (14%) or low. Farmers had to transport their paddy rice to co-operative warehouse in uniformly weighted bags. These requirements have created higher marketing cost for the members. As a result, members have sold their rice to outside sellers who travelled to farmgate and bought even moist rice.

Information presented in Table 6-30 however suggests moderate level of operational performance in processing, wholesaling and retailing activities by fully integrated co-operatives. Except Co-op-5, two other fully integrated co-operatives used conventional processing. Product quality, in general, was in the range of low to moderate. This has been a result of conventional technology used in processing. Even though fully integrated co-operatives bought quality paddy rice from the farmers, the quality has not been consistently maintained along the process. This has resulted low to

moderate quality processed rice that fetch a low market price. These findings suggest that integration of processing brought only a marginal advantage to fully integrated co-operatives.

Table 6-30: Operational features of processing, wholesaling and retailing

Value chain activity	Partially integrated			Fully integrated		
	Co-op-1	Co-op-2	Co-op-3	Co-op-4	Co-op-5	Co-op-6
Processing						
Processing form	0	0	0	R+P	R	R+P
Processing technology	0	0	0	Con	Mod	Con
Quality of processed rice	0	0	0	*	***	**
Product range of processed rice	0	0	0	*	**	**
Wholesaling of rice						
Buyers	0	0	0	C, T	C, T, S, H	C, T
Retailing of rice						
Retail formats	NA	NA	NA	Con	Con	Con
Buyers	NA	NA	NA	R	R+U	R+U

Note: 0 = None; R+P = Raw & Parboiled, R = Raw; Con = Conventional, Mod = Modern; * = Low, ** = Moderate, *** = High; C = Co-operatives, T = Traders, S = Supermarkets, H = Hotels and Restaurants; NA = Not applicable; R = Rural, R+U = Rural & Urban

These findings substantiate the findings of J. S. Royer and Bhuyan (1995) who concluded that co-operative's processing characterised with low margin and market power. Similar to what they pointed out, lack of capital to invest in process upgrading also can be seen in the study co-operatives. Low performance in processing could also be attributed to the type of product. Delgado (1986) demonstrated that coarse grains, such as maize and rice, are characterised by low transaction costs and internal cost could be higher than the saving of transaction cost from integration. Similarly, Julio Antonio Berdegué (2001) showed that benefit from collective action outweighs the cost for undifferentiated commodities for which supply chains are characterised by low transaction costs including co-operatives in Chile.

Wholesaling operations were also characterized by low level of operational performance. In general wholesale buyers include other co-operatives, regional wholesalers who deliver to regional retailers as shown in Table 6-30. Wholesaling processed rice was not performed regular. This information suggests that the wholesaling operations were also characterized by low level performance. The fully integrated co-operatives involved in rice retailing. Primarily, their retail outlets have been located in rural areas, except for a couple of modern urban retail shops. Buyers of rice products

mostly are low to moderate-income, rural and semi-urban consumers. These findings demonstrate that the majority of the fully integrated co-operatives' consumers are in the segment of low to moderate purchasing power and represent low-value market segments. Retailing has not fairly approached high-value market segments. This has been a result of their inability to produce quality rice demanded by semi-urban and urban consumers.

6.8.3 Comparison of Financial Performance

This section examines the financial performance of the partially and fully integrated co-operatives. The literature often used leverage, solvency, liquidity, profit margin, and efficiency as the measures of financial performance (Chen et al., 1985; Lerman & Parliament, 1991; Mengistu, 2017; Parliament et al., 1990). The same set of performance measures were used in this study as well. Financial data for the period from 2014 to 2016 were used since all the study co-operatives had data for the period considered except Co-op-3. Co-op-3 was excluded from the comparison since it denied to declare financial information with the researcher.

Figure 6-8 shows the leverage of partially and fully integrated co-operatives included in this study. Both partially and fully integrated co-operatives maintained at least slightly more assets than their liabilities. However, both partially and fully integrated co-operatives were at high financial risk as reflected by the leverage level close to one. In general, partially integrated co-operatives had higher leverage during the period studied compared to fully integrated co-operatives except Co-op-4. The leverage had increased in partially integrated co-operatives over the period from 2014-2016 indicating a rise in liability compared to the fully integrated co-operatives. In contrast, leverage in fully integrated co-operatives (except Co-op-4) have either marginally decreased or remained unchanged. In summary, partially integrated co-operatives have more liabilities compared to those fully integrated co-operatives. This suggests that partially integrated co-operatives have used more borrowed money to finance its assets and operations than fully integrated co-operatives. The fully integrated co-operatives therefore have marginally better financial security compared to partially integrated co-operatives.

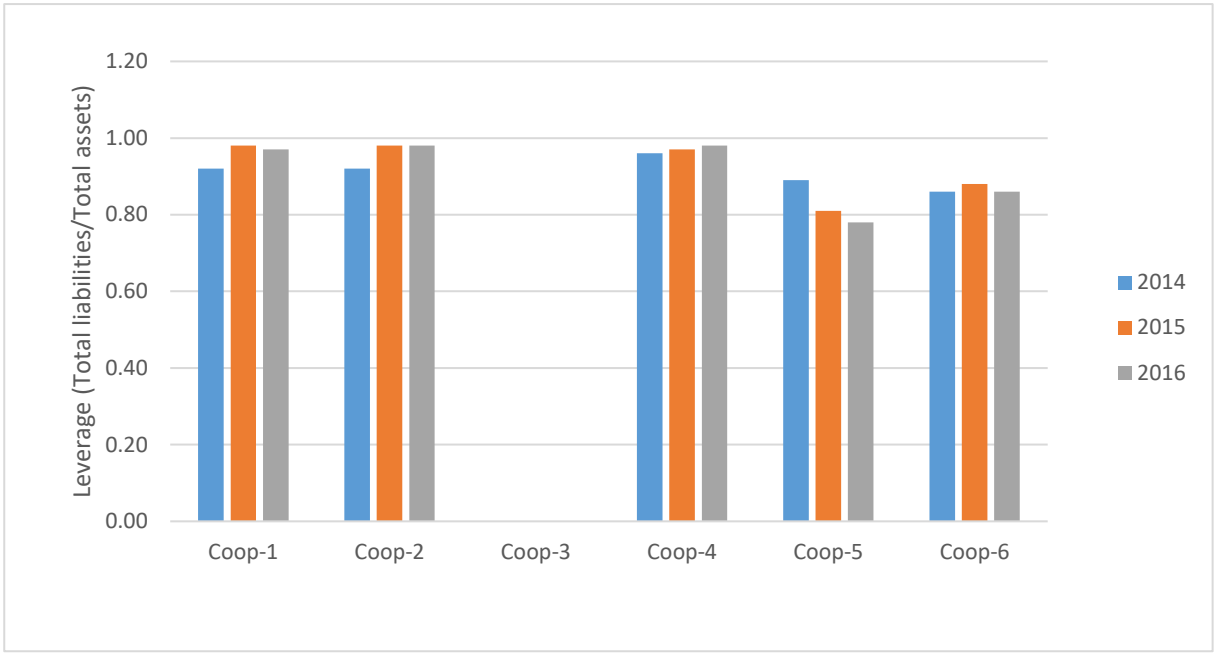

Figure 6-8: Leverage of study co-operatives

Figure 6-9 shows the solvency (equity-to-assets ratio) of partially and fully integrated co-operatives and is the converse of leverage presented in Figure 6-8. Overall, the ratio was high in fully integrated co-operatives (except Co-op-4) than partially integrated co-operatives. Apart from Co-op-4 the leverage in other two fully integrated co-operatives were either increased or remained more or less unchanged. A significant change to partially integrated co-operatives' leverage had not occurred during the same period. This result suggests that, fully integrated co-operatives are less leveraged compared to partially integrated co-operatives and a less than 20% of their assets are owed by the members. Both leverage and solvency suggest at least marginally better financial position of fully integrated co-operatives compared to partially integrated ones. This result is comparable to Quilloy (2015) who had found higher solvency among vertically integrated co-operatives in Philippine.

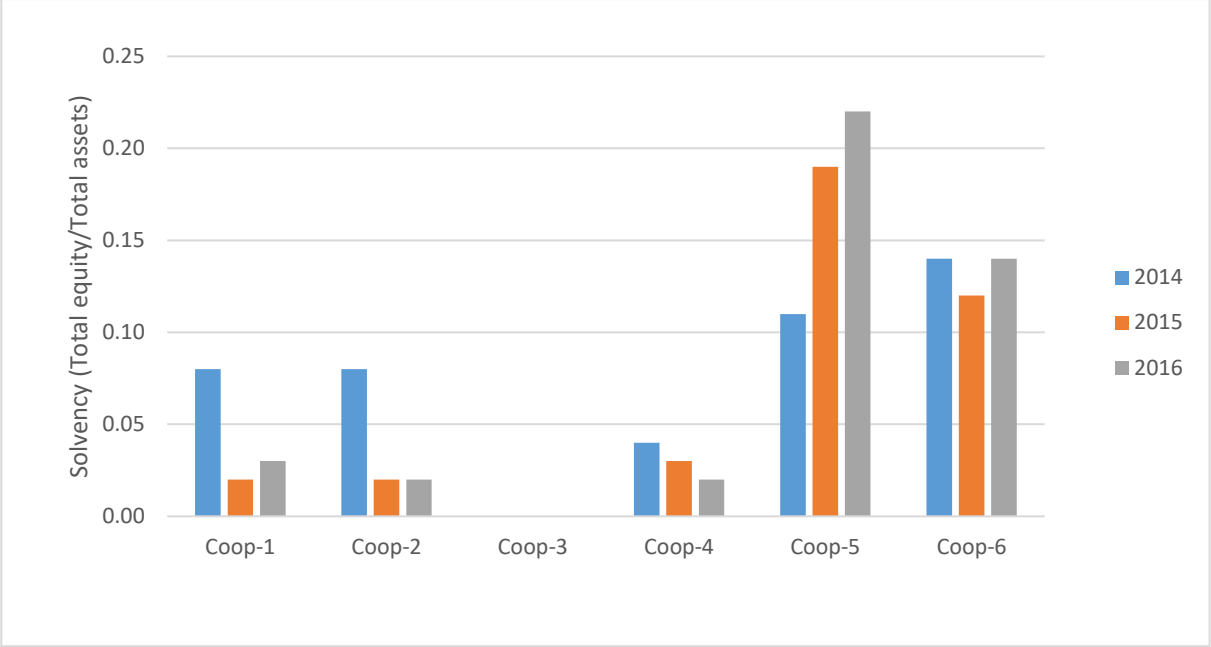

Figure 6-9: Solvency of study co-operatives

The liquidity of partially and fully integrated co-operatives is illustrated in Figure 6-10. Overall, fully integrated co-operatives were more liquid compared to their counterparts. The liquidity ratio grew annually in two of the fully integrated co-operatives over the considered period whereas it remained either more or less constant or declined in the partially integrated co-operatives. Apart from Co-op-4, remaining fully integrated co-operatives had a liquidity ratio greater than that of partially integrated co-operatives. The results demonstrate that fully integrated co-operatives have marginally a higher ability to meet their current financial obligations than partially integrated co-operatives. Though in a different context (Spain), similar findings were made by Salazar and Gorriz (2011) and they concluded that more liquid co-operatives are those with higher level of downstream vertical integration.

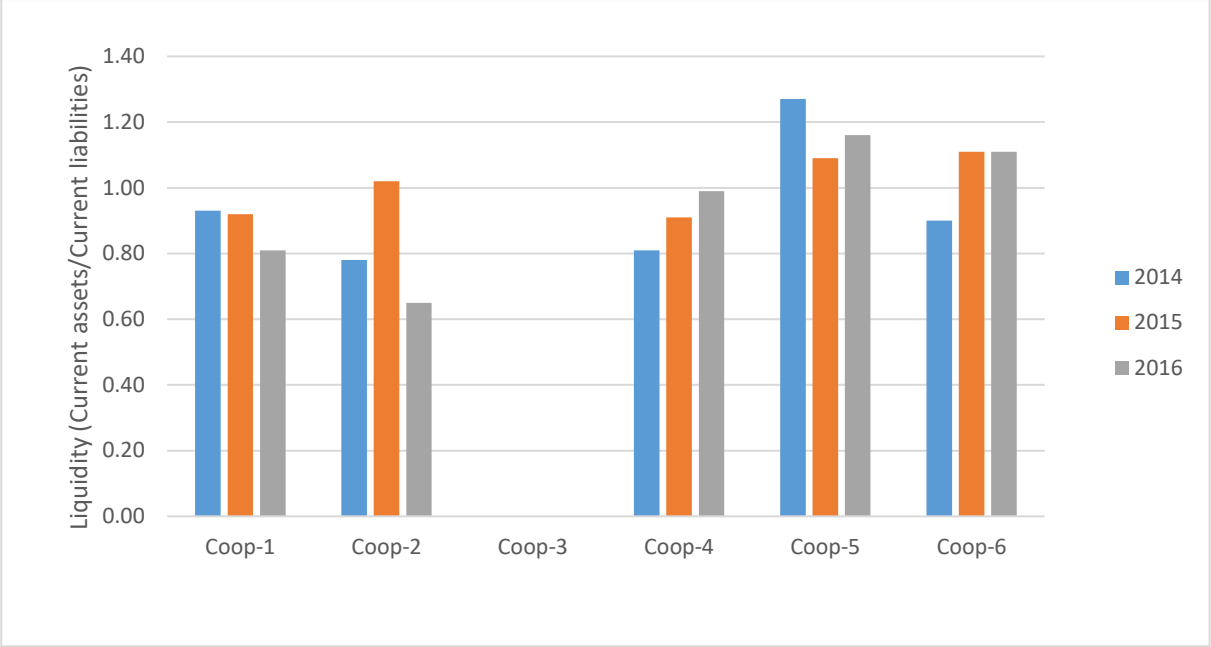

Figure 6-10: Liquidity of study co-operatives

The profit margin of partially and fully integrated co-operatives is illustrated in Figure 6-11. The Figure demonstrates higher profit margin in partially integrated co-operatives and it fluctuated annually over the period from 2014 to 2016. In contrast, fully integrated co-operatives recorded low profit margin which was also fluctuated annually. Among fully integrated co-operatives, Co-op-4 continued operating at a loss for the whole period considered. This reflects the systematic long-term problem associated particularly with unsatisfactory governance and management in Co-op-4. On the other hand, losses occurred in Co-op-1 and Co-op-6 respectively in 2016 and 2014 as well. A drop in sale occurred in the given year in Co-op-1 as a result of declined economic activity in the region consequent to the draught. "*The damage caused by the prolonged draught was significant to our service area compared to other regions. Many farmers lost their crops. It affected the economy in our region",* the general manager said. Observed drop in profit margin in Co-op-6 has been a result of low pricing for the sake of its members.

However, it was revealed from the earlier discussion that fully integrated co-operatives have supplied more inputs, services and information to their rice growing members compared to partially integrated co-operatives. Moreover, most of those inputs, services and information were subsidised. These findings suggest that fully integrated co-operatives have returned relatively a significant amount of their generated profits to members in the form of subsidised inputs, services

and information than their counterparts. This result is comparable to J. S. Royer and Bhuyan (1995). They found that members of producer co-operatives have enhanced their benefits from supplying inputs and services when their co-operatives vertically integrate by incorporating processing and wholesaling activities.

Fully integrated co-operatives also found to have provided many other social and community services to their members than partially integrated co-operatives. Such services have been provided free of charge to the members. These observations suggest that a part of the fully integrated co-operatives' surplus has invested in providing those social and community services. Overall, fully integrated co-operatives have returned a significant portion of their profit to members compared to the partially integrated co-operatives. This is similar to the findings of Zhong et al. (2018) who demonstrated that members in tightly coordinated co-operatives to receive more social and community services compared to loosely coordinated co-operatives.

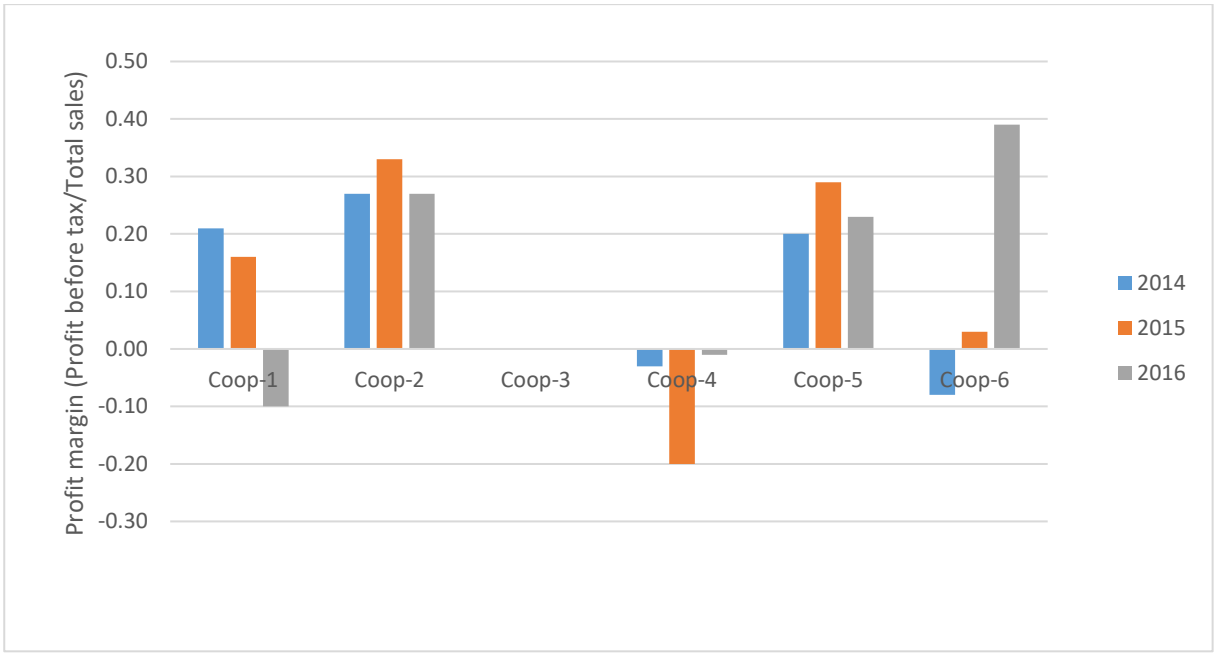

Figure 6-11: Profit margin of study co-operatives

Figure 6-12 shows the capital efficiency of the co-operatives studied. According to Figure 6-12, Co-op-1 and Co-op-4 respectively in partially and fully integrated groups were relatively low efficient compared to the other co-operatives in each group. This low efficiency in those two co-operatives could be attributable to the significant governance and management problems encountered by them. Higher efficiency of Co-op-2 in 2016 has been a result of simultaneous rise in sale and loss of assets towards the end of the year consequent to the destruction caused by the fire. Apart from the

aforementioned deviations, in general, the capital efficiency was marginally high with fully integrated co-operatives than partially integrated co-operatives. This result suggests that fully integrated co-operatives employ their assets to generate sales at least marginally better than partially integrated co-operatives. This result corroborates with Chang, Ellinger, Kim, and Franke (2016). Accordingly, rise in capital efficiency with vertical integration is attributable to strong coordination and streamlining of information, activities and processes.

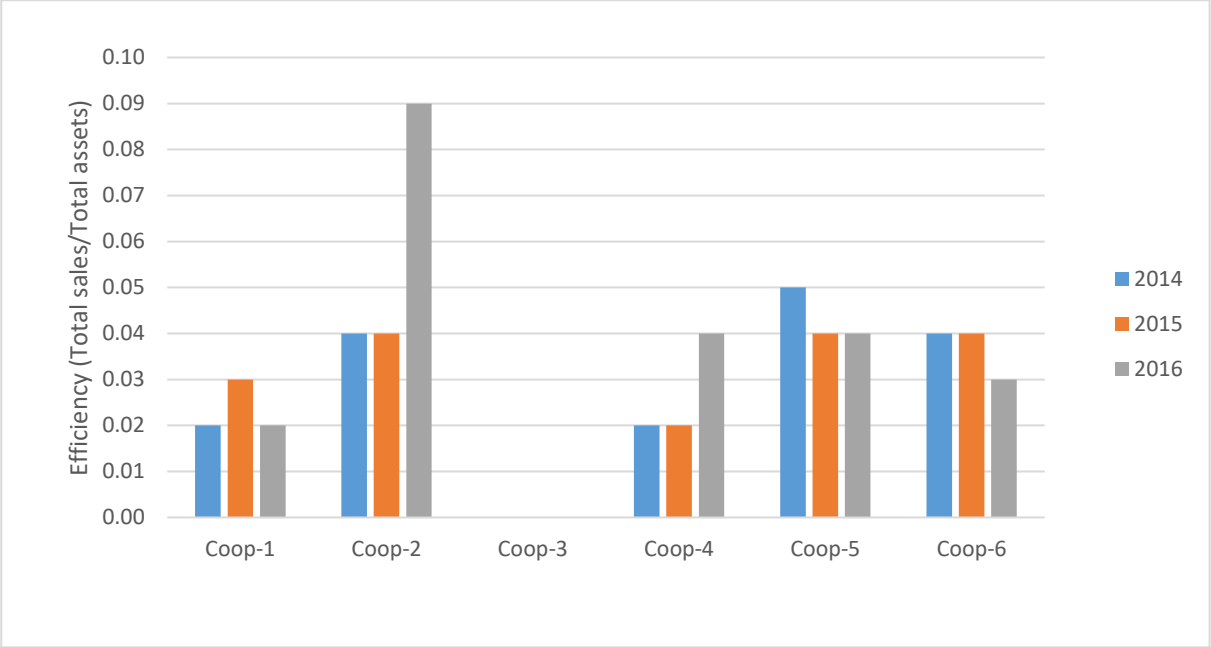

Figure 6-12: Capital efficiency of study co-operatives

Table 6-31 summarises the financial ratios introduced in the above Figures. As indicated from the arrows, partially integrated co-operatives were more leveraged, less solvent, less liquid but had high profit margin and a low capital efficiency. In contrary, fully integrated co-operatives were less leveraged, more solvent, more liquid, low profit margin and high capital efficiency. Accordingly, there is a difference in financial ratios between partially and fully integrated co-operatives.

Table 6-31: Summary of financial performance

Financial ratio	Partially integrated co-operative	Fully integrated co-operative
Leverage (Total liabilities/Total assets	↑	↓
Solvency (total equity/total assets)	↓	↑
Liquidity (Current assets/Current liabilities)	↓	↑
Profit margin (Profit before tax/Total sales)	↑	↓
Capital efficiency (Total sales/Total assets)	↓	↑

Note: Upward pointing arrow indicate high and downward pointing arrow indicate low

All the financial ratios, except profit margin, were at least marginally better in fully integrated co-operatives than partially integrated co-operatives. It was noted earlier that fully integrated co-operatives provided a range of inputs, services and information to their members as well than partially integrated co-operatives on subsidised price. Low profit margin on fully integrated co-operatives therefore has been partly a result of transferring potential profits to members as reduced price of inputs, services and information. Thereby, fully integrated co-operatives bear a significant cost in delivering their services. It is however difficult from these results to conclude that fully integrated co-operatives perform better than partially integrated co-operatives and generalise the results to all co-operatives at similar levels of integration. This analysis was based on the data base of co-operatives and one of the partially integrated co-operatives did not declare their financial data. The number of co-operatives included in the financial performance analysis was not equal and partially integrated co-operatives were less represented.

The results of the financial performance analysis corroborate with several others. For instance, though in a different geographical context, D'aveni and Ravenscraft (1994) concluded that vertical integration has a weakly positive association with performance involving multiple industries in the United States. They found rising production cost particularly with backward integration of a firm leaving them with only marginally higher profit margin than non-integrated lines of business in the same industry. In a study of Spanish agricultural co-operatives, Salazar and Gorriz (2011) on the other hand demonstrated increasing efficiency of co-operatives when integrated more downstream

activities such as processing and wholesaling. In Chinese milk co-operatives, Zhong et al. (2018) found a linear relationship between co-operatives' performance and vertical coordination (they define vertical coordination in terms of upstream and downstream relationship). Thus, Lerman and Parliament (1991) also reported increasing performance in dairy and food marketing co-operatives when they integrate forward to include processing activities.

In general, financial performance of all the studied co-operatives remained low and are at a financial risk. In particular, all studied co-operatives have over 80 percent liabilities hence less than 20 percent equity. This was attributable to a number of reasons. According to the results, both partially and fully integrated co-operatives have experienced governance and management problems at varying degrees in the history and at present as well in some of the studied co-operatives (Co-op-4 for example). These have resulted higher internal coordination and control costs eroding the savings of transactions cost from vertical integration as demonstrated by D'aveni and Ravenscraft (1994). Studied co-operatives had problems in selecting and retaining skilled, experienced and competent managers. Yang et al. (2018), Birchall (2012), Ünal, Güçlüsoy, and Franquesa (2009) suggested that such management reasons greatly influence the performance of co-operatives and disadvantage member-owned businesses. On the other hand, Government's excessive control on co-operatives and ad-hoc rice market interventions also have influenced the performance of studied co-operatives. It was revealed during the interviews that co-operative management required prior approval from the DCD on their investment plans, which is time-consuming. Birchall and Simmons (2010), Münkner and Shah (1993) claimed that excessive government control retards co-operative growth. As Cracogna (2002) and Henrÿ (2005) state, co-operatives should be state-assisted but independent for their growth and better performance.

6.9 Summary

This chapter presents the results of qualitative study that are related to the third objective of this study. Accordingly, this chapter compares partially and fully integrated co-operatives and analyse their financial performance. Each studied co-operative is described to understand their governance, management and integrated value adding activities. Irrespective of the level of vertical integration, all the study co-operatives are more comparable in their formation, governance and board structure. All the study co-operatives have experienced some degree of governance issues. There is a large and growing membership in all the co-operative but it is significantly high in fully integrated co-operatives. Organisation of management demonstrated slight differences across studied co-

operatives and management is relatively more satisfactory in fully integrated co-operatives. Fully integrated co-operatives have relatively a complex business scope compared to partially integrated co-operatives.

All the studied co-operatives produce paddy rice, supply of inputs, services and information, and assembly and market paddy rice. However, influence and supervision of paddy rice production by all the co-operatives remain low. Fully integrated co-operatives supplied comparatively a more variety of inputs, services and information slightly compared to partially integrated co-operatives. Assembly and marketing activities of both partially and fully integrated co-operatives are more comparable. Studied co-operatives get low supply of paddy rice consequent to strict monitoring of product quality by them. Despite fully integrated co-operatives integrated processing, wholesaling, and retailing activities their performance remains at a moderate level.

In general, financial performance of both partially and fully integrated co-operatives is low. Leverage in all co-operatives is not satisfactory since there are more liabilities nevertheless fully integrated co-operatives have marginally lower leverage than partially integrated co-operatives. Similarly, solvency is also low in all co-operatives despite fully integrated co-operatives are marginally more solvent compared to their counterparts. Liquidity is also low in all co-operatives due to current liabilities even though fully integrated co-operatives are slightly more liquid. Partially integrated co-operatives' profit margin is slightly high compared to their counterpart fully integrated co-operatives. Fully integrated co-operatives are slightly more capital efficient than partially integrated co-operatives. However, the results of the financial performance analysis do not let to draw firm conclusions about financial performance of studied co-operatives.

7 DESCRIPTIVE ANALYSIS OF THE STUDY SAMPLE: COMPARISON OF TWO SAMPLE GROUPS

7.1 Introduction

This chapter describes the sample of smallholder rice-growing farmers/members included in this study. Following the introduction, Section Two describes the basic demographic characteristics of the surveyed respondents. Section Three presents the characteristics of farms. Section Four summarises production, post-harvest operations, and marketing of paddy rice. Section Five reviews farms' financial performance including households' economic profit. The respondents' perceptions of future co-operative membership and rice farming are discussed in Section Six. Lastly, Section Seven summarises the chapter.

7.2 Demography of the Respondents

The demographic characteristics of the respondents surveyed of the two groups of co-operatives were comparatively described using a number of demographic variables, including age, experience in general agriculture and rice farming, education, size of their households, their off-farm work and membership information.

7.2.1 Respondents' Age

Table 7-1 includes the count and percentage of member respondents belonging to various age groups. A vast majority (around 80%) of the respondents in both groups of co-operatives were between 41 to 70 years of age. The representation of young farmer members (below 40 years) in both groups of co-operatives remained around 10%. Respondents in both groups were more equal in their mean age as it was not significantly different (p>0.05). These results indicate that both types of co-operatives mainly consisted of middle to older-aged farmer members and less represented by the young respondents.

Table 7-1: Respondents' age

Age group (Years)	Partially integrated		Fully integrated		Total sample	
	Count	Percent	Count	Percent	Count	Percent
≤ 40	15	10	17	11	32	11
41-50	41	27	42	27	83	27
51-60	47	31	51	32	98	32
61-70	41	27	40	26	81	26
≥71	08	05	07	04	12	04
Total	152	100	157	100	309	100

7.2.2 Respondents' Education

The majority of the respondents in each group (around 70%) completed lower secondary level (Table 7-2). The percentage of those respondents who attained upper secondary education was twice as high in the fully integrated co-operatives compared to the partially integrated co-operatives. Representation of low educated respondents (primary or below) remained less than 21% in either group. Respondents were not significantly different (p>0.05) in their mean education attainment between the two groups. However, data in Table 7-2 uncovered better education for the members of the fully integrated co-operatives.

Table 7-2: Respondents' education

Level of education	Partially integrated		Fully integrated		Total sample	
(Years of learning)	Count	Percent	Count	Percent	Count	Percent
Primary (<5)	32	21	25	16	57	18
Lower Secondary (6-11)	107	70	108	69	215	70
Upper secondary (12-13)	11	7	22	14	33	11
Tertiary (≥14)	2	1	2	1	4	1
Total	152	100	157	100	309	100

7.2.3 Respondents' Experience in Agriculture

Around 75% - 80% of the respondents in each group has 11 to 40 years of experience in general agriculture (Table 7-3). There was more equal representation of respondents in each group in each of the 11-20-, 21-30- and 31-40-year experience classes. Thus, two groups of respondents were not significantly different (p>0.05) in their mean years of experience in general agriculture. These results indicated that the majority of the respondents in either group were more similar with at least a few decades of experience in general agriculture.

Table 7-3: Respondents' experience in agriculture

Experience in agriculture	Partially integrated		Fully integrated		Total sample	
(Years)	Count	Percent	Count	Percent	Count	Percent
≤ 10	14	9	19	12	33	11
11 - 20	34	22	32	20	66	21
21 - 30	46	30	46	29	92	30
31 - 40	38	25	47	30	85	28
≥ 41	20	13	13	8	33	11
Total	152	100	157	100	309	100

7.2.4 Respondents' Experience in Rice Farming

In terms of experience in rice farming, the majority (about 75% - 80%) of the respondents in each group had 21-40 years of experience (Table 7-4). Representation by respondents in each group in

each of the middle three experience classes was also more comparable. Mean years of experience in rice farming was not different substantially (p>0.05) between the two groups of respondents.

Table 7-4: Respondents' experience in rice farming

Period of experience in rice farming (Years)	Partially integrated		Fully integrated		Total sample	
	Count	Percent	Count	Percent	Count	Percent
≤ 10	14	9	22	14	36	12
11 - 20	38	25	32	20	70	23
21 - 30	44	29	47	30	91	29
31 - 40	37	24	45	29	82	27
≥ 41	19	13	11	7	30	9
Total	152	100	157	100	309	100

7.2.5 Household Size

The size of the respondents' households is presented in Table 7-5. The majority of the respondents' households in each group, as a percentage (55% - 60%), consisted of 3-4 members. The data in the Table, however, indicates that 81% of the households in the partially integrated group consisted of less than four members, whereas, 87% of the respondents' households in the fully integrated group consisted of more than three members. In particular, the households as a percentage having more than five members are slightly higher in the fully integrated group. Nevertheless, no significant difference was observed in the number of household members between two groups (p>0.05).

Table 7-5: Size of respondents' households

Members in the household (Number)	Partially integrated		Fully integrated		Total sample	
	Count	Percent	Count	Percent	Count	Percent
1-2	38	25	20	13	58	19
3-4	85	56	94	60	179	58
≥ 5	29	19	43	27	72	23
Total	152	100	157	100	309	100

7.2.6 Off-farm Work

In total, 63% of the respondents had a supplementary income (Table 7-6). A significantly high proportion of respondents in the partially integrated group had off-farm work (p<0.01). The result revealed that three-fourths of the respondents in the partially integrated group and half of the respondents in the fully integrated group have off-farm work that supplemented less than half of the respondents' household income. According to the surveyed respondents, the majority of the off-farm work included casual labour and trading. Respondents involved in off farm work to

supplement their income arise from rice farming. Farmers involved in off farm work have relatively small farms and rice income alone is not sufficient to sustain their living.

Table 7-6: Respondent's off-farm work

Off-farm work	Partially integrated		Fully integrated		Total sample	
	Count	Percent	Count	Percent	Count	Percent
Yes	112	74	82	52	194	63
No	40	26	75	48	115	37
Total	152	100	157	100	309	100

X-squared = 14.31, df = 1, p-value = 0.000

7.2.7 Respondents' Transportation Vehicles

Respondents used various types of vehicles including motorbikes, three-wheelers, vans and small trucks for their transport as well as to carry farm products and inputs. Table 7-7 pertains to information on ownership of transportation vehicles. The result revealed that 45% of respondents in each group own at least a motorbike. The proportion of respondents having transportation vehicles was not significantly different between two groups (p>0.05) and both groups were comparable in possession of transportation vehicles.

Table 7-7: Ownership of transportation vehicles

Transportation vehicles	Partially integrated		Fully integrated		Total sample	
	Count	Percent	Count	Percent	Count	Percent
Own	69	45	71	45	140	45
Do not own	83	55	86	55	169	55
Total	152	100	157	100	309	100

X-squared = 0, df = 1, p-value = 1

7.2.8 Duration of Co-operative Membership

Unlike in fully integrated co-operatives, majority (41%) in partially integrated co-operatives have had members for 11-20 years. Whereas in fully integrated co-operatives majority have had members for 21-30 years (Table 7-8). The mean duration of the respondents' co-operative membership did not show a significant difference between the two groups (p>0.05). Results showed that respondents are comparable in their duration of co-operative membership.

Table 7-8: Duration of co-operative membership

Duration of membership in co-operatives (Years)	Partially integrated		Fully integrated		Total sample	
	Count	Percent	Count	Percent	Count	Percent
≤ 10	18	12	37	24	55	18
11 - 20	69	45	41	26	110	36
21 - 30	33	22	48	31	81	26
≥31	32	21	31	20	63	21
Total	152	100	157	100	309	100

7.2.9 Factors Influenced to Become a Co-operative Member

The reason/s that motivated respondents to become members in their respective co-operative is summarised in Table 7-9. Opportunity to sell paddy rice to co-operative was identified by almost one-third of the respondents, irrespective of the group, as the main reason to become a co-operative member. Respondents commented "*co-operative membership was compulsory around 70s and 80s to sell rice to the co-operative. At that time, the co-operative was the only buyer of our rice. Still, we sell rice to the co-operative when we cannot have a good price at the market*".

The second most important reason to become a member was obtaining financial services. A slightly, higher percentage of respondents in the fully integrated group identified this reason compared to their counterpart. Co-operative officers in both groups of co-operatives responded in their interviews "*our banking divisions are more attractive to the members. Members do not need to provide properties as collateral and by providing just only two personal guarantees (those who are also the members of the co-operative and have good records of transactions without defaults) they can obtain credit pretty quickly*. *Thus, we provide a range of financial services including cultivation loans, crop mortgages, property mortgages, and long-term deposits*". The majority of the respondents who provided this reason for having membership explained "*it is easy to obtain loans from the co-operative unlike other private and public banks*".

The third most important reason identified by an almost equal percentage of respondents in either group was buying inputs. Those respondents commented *"in the past we bought almost everything we need to grow rice at a lower price from the co-operative"*. Another reason for joining the co-operative was buying groceries at lower prices.

Table 7-9: Reasons for having a membership

Responses provided for being a member	Partially integrated		Fully integrated		Total sample	
	Count	Percent	Count	Percent	Count	Percent
Opportunity to sell rice to co-operative	109	33	104	31	213	32
Obtaining financial services	71	22	95	28	166	24
Buying inputs	63	19	59	17	122	18
Buying grocery goods	43	13	51	15	94	14
For voting	21	7	1	0	22	3
Interest in governance	9	3	2	1	11	2
Inherit from parents	2	1	10	3	12	2
Membership promotion	4	1	8	2	12	2
Grow seed	4	1	7	2	11	2
Employment	1	0	4	1	5	1
Total	327	100	341	100	668*	100

*Some respondents provided more than one reason

7.3 Characteristics of Rice Farms

This section describes the characteristics of rice farms including their location, size, land ownership structure, farm machinery, and equipment and other farm structures such as storage houses and drying floors.

7.3.1 Location of the Farm

Location of the farm determines a farmer's access to inputs, services, and traders of rice. If farms are located in rural areas far away from a city/township, finding inputs and trading farm products could be costly and time-consuming. Table 7-10 summarises the farms' locations in relation to their nearest city/township. More than 30% of the farms in partially integrated groups are located within a 5 km range from the nearest city/township compared to the fully integrated group, while over 90% of the farms in the fully integrated group are located at more than 5km away from the nearest city/township. Nevertheless, there was no significant difference in the relative location of the farms (p>0.05). The results suggest that the remoteness of the farms is quite comparable.

Table 7-10: Farm's distance to nearest city/township

Distance (km)	Partially integrated		Fully integrated		Total sample	
	Count	Percent	Count	Percent	Count	Percent
≤ 05	57	38	12	8	69	22
05-10	70	46	73	46	143	46
≥10	25	16	72	46	97	31
Total	152	100	157	100	309	100

7.3.2 Land Ownership

Information on ownership of rice lands is summarised in Table 7-11. Almost all the respondents (around 90% including mixed ownerships) in each group claimed leasehold lands provided by the state during the establishment of irrigated settlements in the study regions. Only less than 10% of the respondents held rented lands. About 25% of the respondents held both leasehold and rented lands. As shown in Table 7-11, the cases reported against various land ownership classes were similar between two groups. Results assert that respondents in both groups shared a common land ownership pattern.

Table 7-11: Land ownership

Ownership class	Partially integrated		Fully integrated		Total sample	
	Count	Percent	Count	Percent	Count	Percent
100% Leasehold (99 year)	133	66	145	66	278	66
100% Rented-in (short term)[+]	19	9	12	6	31	7
Mixed (Leasehold+ Rented)	50	25	61	28	111	27
Total	202	100	218	100	420*	100

*Some respondents claim two types of ownership classes

[+]an arrangement between the leaseholders and the tenants in which the tenant rent in leaseholders' lands to cultivate rice normally for few seasons (one to few years).

7.3.3 Farm Size

Farm size of the respondents was assessed at two scenarios; 1) at the beginning of co-operative membership, and 2) at the current time. This is to understand the associated changes in the farm size during the course of membership.

Farm Size at Joining the Co-operative

Table 7-12 summarised the respondents' farm size when they first joined their co-operative. Respectively, 86% and 71% of the farms in the two groups were less than 2 ha in size. The percentage of farms in the 2-4 ha size class was relatively high in the fully integrated group. None of the farms in the partially integrated group was over 4 ha despite 9% of the farms in the fully integrated group falling into this size class. The mean size of the farms, even at the beginning of membership, was significantly different between two groups (p<0.01). Results demonstrate that, even at the time of joining the co-operative, respondents in the fully integrated group had significantly larger farms.

Table 7-12: Farm size at joining the co-operative

Land size (ha)	Partially integrated		Fully integrated		Total sample	
	Count	Percent	Count	Percent	Count	Percent
≤ 02	130	86	111	71	241	78
02-04	22	14	37	23	59	19
≥04	0	0	9	6	9	3
Total	152	100	157	100	309	100

Current Farm Size

The size of current farms by the two groups of respondents is given in Table 7-13. According to the Table, a relatively high percentage of farms (53%) in the partially integrated group remained less than 2 ha in size. The corresponding figure was 43% in the fully integrated group. On the other hand, a slightly higher percentage (15%) of farms in the fully integrated group was larger than 4 ha. This figure was only 7% in the partially integrated group. Collectively, 93% and 85% of the farms respectively, in partially and fully integrated groups, were small and less than 4 ha. The mean size of the farms of two groups showed a significant difference (p<0.05). Results showed that the size of current farms in the fully integrated group was still relatively large compared to their counterpart.

Table 7-13: Current farm size

Land size (ha)	Partially integrated		Fully integrated		Total sample	
	Count	Percent	Count	Percent	Count	Percent
≤ 02	81	53	68	43	149	48
02-04	60	40	65	42	125	41
≥04	11	7	24	15	35	11
Total	152	100	157	100	309	100

X-squared = 6.0835, df = 2, p-value = 0.048

Assessment of farms size at the beginning and at current revealed an expansion of farm size in either group. However, the initial difference which existed in farm size between the two groups remained unchanged and the fully integrated group still have relatively large farms.

7.3.4 Access to Irrigation Water

A reliable supply of water is an important factor in rice farming. Water to rice production in the study area was supplied through a network of channels under gravity. Nevertheless, a particular farm's access to irrigation water depends on farm location. A respondent explained "*all rice plots in the settlement do not receive an uninterrupted supply of water. The rice plots located at the tail end of the channel often get interrupted water supply. Contrary to this, those plots located towards the head end of the channel are less interrupted*". Accordingly, a particular farm's access to irrigation

water was grouped into three such as “good (3)”, “moderate (2)” and “poor (1)”. Good indicates continued and uninterrupted access, moderate indicates moderately continued and less interrupted access and poor indicates discontinued and interrupted access.

Table 7-14 summarises farms’ access to irrigation water. A larger proportion of farms (73% and 85% respectively in partially and fully integrated co-operatives) have good access, while another 27% and 15% of respondents respectively, have moderate access. None of the farms were found to have poor access to water. Farms in two groups showed a significant association with access to irrigation water (p<0.05). Results demonstrated that a significantly high proportion of farms in the fully integrated group has good access to irrigation water.

Table 7-14: Access to irrigation water

Access to irrigation water	Partially integrated		Fully integrated		Total	
	Count	Percent	Count	Percent	Count	Percent
Good	111	73	133	85	223	79
Moderate	41	27	24	15	58	21
Poor	00	00	00	00	00	00
Total	152	100	157	100	309	100

X-squared = 5.0739, df = 1, p-value = 0.024

7.3.5 Farm Assets Owned

Farms own and/or hire various types of farm assets including farm machinery (tractors and sprayers), storage houses, and drying floors/carpets. Those assets are particularly important in enhancing efficiency in farm operations and farm-level value adding such as drying of harvested rice. A respondent explained that “*if we own tractors, we could do timely land preparation following the irrigation schedule. When we don’t have tractors, we have to hire them. However, it is hardly possible to hire a tractor at the right time and cause delays*”

Machinery and Equipment Ownership

Almost 80% of the farms in each group owned sprayers (either knapsack or power sprayers) for spraying. Around 60% of the farms in each group owned a two-wheel tractor + trailer used in land preparation and transporting farm products and inputs. Only less than 10% of farms in each group owned large and high-capacity machines such as four-wheel tractors + trailers, threshing machines and combine harvesters used respectively in land preparation and transport and harvesting (Table 7-15). The result showed that the majority of the farms in each group have owned farm machinery and equipment, although of low capacity, used particularly for land preparation and spraying. More

than 90% of the farms did not own machines used in harvesting operations such as combine harvesters.

Table 7-15: Farm machines and equipment own

Types of machinery and equipment owned	Partially integrated		Fully integrated		Total	
	Count	Percent[a]	Count	Percent[a]	Count	Percent[a]
Sprayers	121	80	123	78	244	79
Two-wheel tractor + trailer	90	59	99	63	189	61
Four-wheel tractor + trailer	16	11	08	5	24	8
Combine harvesters	2	1	5	3	7	2
Not own any	31	20	34	21	65	21

[a]Percentages were calculated against the total responses in each group

Storage Houses Owned

Farms with storage facilities are summarised in Table 7-16. Respectively, 80% and 90% of farms in partially and fully integrated groups owned either a section of the residential house or a separate storage house to store rice. However, only 32% and 36% of respondents each in partially and fully integrated groups had a separate storage house. Twice as many (20% of total respondents) of respondents in the partially integrated group had not owned any storage compared to the fully integrated group, which was accounted at 10%. Ownership of storages showed no significant association (p>0.05) with the integration and two groups look to be more similar in that aspect

Table 7-16: Storage houses owned

Storage houses owned	Partially integrated		Fully integrated		Total	
	Count	Percent	Count	Percent	Count	Percent
Section of the residential house	73	48	85	54	158	51
Separate store house	49	32	57	36	106	34
Do not own any	30	20	15	10	45	15
Total	152	100	157	100	309	100

X-squared = 3.9216, df = 2, p-value = 0.141

Availability of Drying Facilities

Table 7-17 summarised the availability of drying facilities by the respondents. Two groups of respondents were not significantly different (p>0.05) from availability of drying facilities. At least a half of the farmers in each group possesses either concrete drying floors or tarpaulin to dry their paddy rice.

Table 7-17: Drying floors own

Drying floors owned	Partially integrated		Fully integrated		Total	
	Count	Percent	Count	Percent	Count	Percent
Concrete drying floor	34	22	29	18	63	20
Tarpaulin	46	30	44	28	90	29
Do not own any	72	48	84	54	156	51
Total	152	100	157	100	309	100

X-squared = 0.82191, df = 2, p-value = 0.663

7.3.6 Farm Credit

Table 7-18 provides a summary of the respondents who used credit to finance their production activities. Proportionately, the number of credit users is high in the fully integrated group and it accounted for 62%. The respective figure reported from the partially integrated group was 36%. Results demonstrate a significantly high proportion of respondents in the fully integrated group use credit. Credit used by respondents in financing production showed a significant association with the level of integration (p<0.01). Members in fully integrated co-operatives owns relatively large farms which requires relatively a high amount of operational capital.

Table 7-18: Farm credit

Farm credit use	Partially integrated		Fully integrated		Total	
	Count	Percent	Count	Percent	Count	Percent
Obtain credit	55	36	97	62	152	49
Did not obtain	97	64	60	38	157	51
Total	152	100	157	100	309	100

X-squared = 12.505, df = 1, p-value = 0.000

The amount of credit used by the two groups of respondents is provided in Table 7-19. The amount of credit used has a high range and mean in the fully integrated group relative to their counterpart. The high and significant mean (p<0.05) proposes that respondents in the fully integrated group use a high amount of credit compared to their counterpart.

Table 7-19: Amount of credit used

Parameter	Partially integrated	Fully integrated	Total
Min. (LKR)	5,000	10,000	5,000
Max (LKR)	400,000	500,000	500,000
Mean (LKR)*	**73,578**	**92,229**	**85,287**

*Significant at 10% level

7.4 Rice Production, Post-harvest Operations, and Marketing

Rice production in Sri Lanka is discussed in detail under the background chapter. Rice is grown in two seasons during the course of a year. The effect of this seasonality on respondents' rice production is summarised in Table 7-20. According to the results, seasonality showed a significant association (p<0.01) with the respondents' rice cultivation. The number of respondents who cultivate in the *Yala* seasons was low in the partially integrated group. It implies that they were less assured of irrigation water in *Yala* seasons.

On the contrary, the cultivation of the respondents in the fully integrated group was independent of the seasonality (p>0.05) and almost all the farmers had cultivated in both seasons. This suggests that respondents in the fully integrated group were more secure with respect to irrigation water.

The association of cultivation and seasonality was substantial (p<0.01) as far as the total sample is considered. It is corroborated with the country's general rice production pattern. That is, in general, the number of respondents who cultivates in the *Yala* season is low and this is also common in the study area. However, seasonal comparison of the performance and benefits are beyond the objectives of this study. Hence, to preserve clarity and simplicity, the study worked on two season averages.

Table 7-20: Proportion of respondents cultivated in two seasons

Cultivate	Partially integrated***				Fully integrated				Total***			
	Yala		*Maha*		*Yala*		*Maha*		*Yala*		*Maha*	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Yes	112	74	146	96	148	94	154	98	260	84	300	97
No	40	26	6	4	9	6	03	2	49	16	09	3
Total	152	100	152	100	157	100	157	100	309	100	309	100

***Significant at 1 % level

7.4.1 Rice Production and Yield

Rice production data of two farmer groups is exhibited in Table 7-21. Production varies in a large range (1,913 kg – 159,871 kg) in the fully integrated group in contrast to the lower range (1,697 kg – 44,272 kg) reported in the partially integrated group. This might be a result of the difference in cultivated lands by two farmer groups. In contrast to the partially integrated group, a significantly higher mean production (p<0.01) has been recorded from the fully integrated group. It has been shown that respondents in the fully integrated group have higher production contrary to respondents in the partially integrated group.

Table 7-21: Rice production

Rice production (kg)	Partially integrated	Fully integrated	Total
Min.	1,697	1,913	1,697
Max	44,272	159,871	159,871
Mean* **	**10,959**	**14,696**	**12,661**

***Significant at 1% level

Additionally, the rice yield obtained by the two groups of co-operatives is also examined and provided in Table 7-22. The rice yield varies in a similar range from around 2000kg/ha to 10,000kg/ha in both farmer co-operatives. The mean yield between two groups does not show a substantial difference (p>0.05) and it was around 5,600kg/ha on average. In brief, two groups of respondents are more similar in tier rice yield. The difference in production found before could hardly be attributed to the difference in yield.

Table 7-22: Rice yield

Rice yield (kg/ha)	Partially integrated	Fully integrated	Total
Min.	2,121	1,920	1,920
Max	10,138	10,223	10,223
Mean	5,554	5,664	5,610

7.4.2 Post-harvest Operations and Marketing of Paddy Rice

Rice is harvested mechanically on most occasions in Sri Lanka. The results revealed that around 90% and 95% respondents, respectively, in partially and fully integrated groups, mechanically harvest their rice crop with combine harvesters.

Mechanically harvested rice contains about 20-21% of moisture. Such rice has to be sold immediately after harvesting or drying to avoid spoilage and deteriorating quality to avoid yielding a poor-quality product. Some respondents sell their rice immediately while others dry them, store and sell later. Thus, there are some other respondents doing both. Accordingly, the post-harvest operations and marketing of farm gate rice by respondents is explored below.

Drying of Paddy Rice

According to the Table7-23, all the respondents in the sample have dried at least a part of their harvest. Of the total harvest, the share of the quantity dried range from 3% to 100% in both farmer groups. This range suggests that some respondents dry their whole harvest in the sample, while others dry only a part of it. Notably, the respondents in the fully integrated group dry a larger

proportion (76%) of their harvest in contrast to the partially integrated group (66%). This share of the dried harvest is significantly high (p<0.05) in the fully integrated group.

Table 7-23: Share of dried crop

	Partially integrated	Fully integrated	Total
Count of respondents (%)	100	100	100
Min (%)	3	3	3
Max (%)	100	100	100
Mean (%)**	**66**	**76**	**71**

**Significant at 5% level

Storing of Harvest

Table 7-24 includes a summary of respondents who stored their rice. The percentage of respondents stored their rice was high (78%) in the fully integrated group, whereas, the corresponding percentage of farmers in the partially integrated group was estimated at 57%. Thus, this function of storing harvest demonstrated a significant association with the level of integration (p<0.01). According to respondents, they store their rice expecting to sell at a higher price during the off season.

Table 7-24: Storing of harvest

	Partially integrated		Fully integrated		Total	
	Count	Percent	Count	Percent	Count	Percent
Store harvest	87	57	123	78	210	68
Do not store harvest	65	43	34	22	99	32
Total	152	100	157	100	309	100

X-squared = 10.051, df = 1, p-value = 0.001522

A summary of the storage duration that respondents hold their harvest until marketing is provided in Table 7-25. Relatively, a slightly higher range of storage length has been reported in the partially integrated group. In contrast, longer storage duration was reported in the fully integrated group (5.6 weeks).

Table 7-25: Storage duration

Parameter	Partially integrated	Fully integrated	Total
Count of respondents (%)	57	78	100
Min (weeks)	1.0	1.0	1.0
Max (weeks)	16.0	14.0	14.0
Mean (weeks)***	**4.4**	**5.6**	**5.0**

Mean storage length was found to be significantly different (p<0.01) between the two groups. This also suggests that respondents in the fully integrated group store their harvest, relatively, for a longer duration compared to the respondents in the partially integrated group.

Marketing of Paddy Rice

Table 7-26 summarises three marketing options chosen by respondents in marketing their rice. They include sale either in wet, dry or both forms of rice. Respectively, 51% and 61% of partially and fully integrated groups sold in dry form. Another 35% and 27% respectively sold in wet. Lower than 14% have sold both wet and dry rice. Various marketing options chosen by respondents were not significantly associated with the group to which they belong (p>0.05) b. This result revealed that two groups of respondents were not distinguishable from the marketing options they chose.

Table 7-26: Marketing paddy rice

Form	Partially integrated		Fully integrated		Total	
	Count	Percent	Count	Percent	Count	Percent
Sell dry paddy rice	108	51	135	61	243	56
Sell moist paddy rice	74	35	61	27	135	31
Sell both	30	14	27	12	57	13
Total	212	100	223	100	435*	100

*Some respondents market in both dry and wet forms

X-squared = 2.079, df = 2, p-value = 0.354

Marketing of Moist Paddy Rice

Table 7-27 summarises the quantity of wet rice marketed by the respondents. The quantity of wet rice sold by respondents in the fully integrated group has a high range in contrast to their counterpart. Nevertheless, a substantial difference (p>0.05) was not found in the quantity of wet rice sold by two groups of respondents. In general, respondents in each group have sold around 8,000kg of wet rice.

Table 7-27: Marketing of moist paddy rice

Parameter	Partially integrated	Fully integrated	Total
Count of respondents (%)	49	39	34
Min (kg)	940	779	779
Max kg)	33,244	50,252	50,252
Mean (kg)	8,303	7,702	8,032

t = 0.53628, df = 121.54, p-value = 0.5927

It was also found that 100% of the farmers have sold wet rice to regional traders/millers. Those who sold wet rice mentioned "*one and only buyer of wet rice is regional traders/millers*"

Buyers of Moist Paddy Rice

Only regional traders/miller bought moist paddy rice from the respondents. More than 90%of the regional traders bought moist paddy rice at farm gate. The average price received by the respondents in partially and fully integrated co-operatives respectively was Rs. 44.00 and Rs. 43.68 per kilogram. Respondents in the partially integrated co-operatives received a slightly higher price for moist paddy rice compared to their counterpart. Respondents explained that they harvested early in the season and the price for moist paddy rice was high at that time.

Marketing of Dry Paddy Rice

Marketing of dry rice by the respondents is provided in Table 7-28. As discussed before, a relatively larger proportion of respondents in the fully integrated group sell dry rice. As given in Table 7-28, they also sell larger quantities of dry rice. According to the Table, the range of the quantity of dry rice sold by the respondents in the fully integrated group varies largely compared to their counterpart. Similarly, the mean quantity of dry rice sold by them was significantly high (p<0.01). This suggests, in general, respondents in the fully integrated group sell a larger quantity of dry rice than their counterpart does.

Table 7-28: Marketing of dry paddy rice

Parameter	Partially integrated	Fully integrated	Total
Respondents (%)	71	86	79
Min (kg)	447	995	447
Max kg)	43,038	156,954	156,954
Mean (kg)* **	**7,917**	**13,044**	**10,765**

t = -3.254, df = 181.12, p-value = 0.001358

Buyers of Dry Paddy Rice

According to the Table7-29, around 80% of the respondents in both groups have sold their dry paddy rice to the regional traders/millers. Occasions that respondents sold their dry paddy rice to co-operatives was around 20%. In marketing dry rice as well, respondents used the regional trader/miller as their buyer. Thus, on about 70% of the occasions, respondents have sold their dry paddy rice at the farm gate. Only less than 30% of the occasions the respondents have transported their rice to the trader's place. A respondent says "*it is very easy to sell to regional traders/millers*

since they come to our door step to buy unlike co-operatives to which we have to transport to their warehouse"

Table 7-29: Buyers of dry paddy rice

Buyer	Partially integrated		Fully integrated		Total	
	Count	Percent	Count	Percent	Count	Percent
Regional trader/miller	84	78	110	81	194	80
Co-operative	24	22	25	19	49	20
Total	108	100	135	100	243*	100

*Some respondents have sold in wet rice

Both groups of respondents have received the highest price for their dry paddy rice from the regional traders/millers (Table 7-30). Compared to the respondents in the partially integrated group, their counterpart received slightly higher prices from regional traders/millers. It was found earlier that respondents in fully integrated co-operatives store their paddy rice relatively a longer time than their counterpart wishing to get a higher price towards the off season. Sellers can negotiate the price with regional traders/milers since they are flexible in their price policy. Respondents in both groups have received equal prices for their dry rice from the co-operatives. Co-operatives have a fixed price policy and same price is paid to suppliers irrespective of the time. The price received from other buyers was not available since there were no instances found that respondents sold to them.

Table 7-30: Price received for dry paddy rice from the buyer

Buyer of dry rice	Partially integrated	Fully integrated	Total
Regional trader/miller	49.45	50.65	50.00
Outside trader/miller	NA	NA	NA
Co-operatives	49	49	49
PMB	NA	NA	NA

7.4.3 Total Quantity of Paddy Rice Sold

The total quantity of paddy rice output sold is presented in Table 7-31. The range of the quantity of total rice sold (including both dry and wet rice sold) varied greatly in the fully integrated group in a wide range. In contrast, this showed a narrow range in the partially integrated group. The mean of the total quantity of rice sold also showed a similar pattern. While a low mean value was reported in the partially integrated group, members in the fully integrated group have sold a significantly (p<0.01) higher quantity of paddy rice. This would have been a result of relatively larger area of land cultivated by the respondents in the fully integrated group.

Table 7-31: Total quantity sold

Parameter	Partially integrated	Fully integrated	Total
Count of respondents (%)	100	100	100
Min (kg)	1,100	1,813	1,100
Max (kg)	43,038	156,954	156,954
Mean (kg)* **	**9,052**	**13,330**	**11,226**

t = -3.0135, df = 210.11, p-value = 0.003)

The quantity of paddy rice output sold has been further analysed and Table 7-32 contains the share of marketed production. According to the Table, it was apparent that the share of production sold was a relatively narrow range in the fully integrated group compared to their counterpart. Nevertheless, both groups of respondents have sold almost an equal share of their products without a significant difference (p>0.05). In brief, both groups of respondents sell more than 80% of their rice production in wet or/and dry form.

Table 7-32: Share of production sold

Parameter	Partially integrated	Fully integrated	Total
Count of respondents (%)	100	100	100
Min (%)	41	53	41
Max (%)	100	100	100
Mean (%)	84	89	86

t = -4.2704, df = 297.04, p-value = 2.629e-05

7.4.4 Reasons for Immediate Sale of Paddy Rice

Respondents were asked to furnish reasons for selling their paddy rice immediately after harvesting (either in moist or/and dry form). Responses provided are summarised in Table 7-33. Urgent need for cash has been the main reason to sell paddy rice immediately after harvesting. It accounts for 53% and 51% of the responses furnished by the respondents in each partially and fully integrated co-operatives respectively. The second most important reason has been identified as the difficulties faced by the farmer in drying and the associated cost. This includes 19% and 15% of the responses received respectively from partially and fully integrated groups. Another 15% and 8% of the responses provided by the partially and fully integrated groups, advised that the higher price has been the immediate reason to sell. Lack of a proper place to dry accounted for 13% and 10% of the responses provided respectively by the respondents in partially and fully integrated groups. Apart from the above reasons, weather-related issues such as coincidence of rain during harvesting have compelled respondents to sell their rice immediately.

Table 7-33: Reasons affected on immediate selling of paddy rice

Reasons	Partially integrated		Fully integrated		Total	
	Count	Percent	Count	Percent	Count	Percent
Urgent need of cash to settle dues	53	42	47	51	100	55
Difficult and costly to dry	24	19	14	15	38	21
Got a high price	19	15	7	8	26	14
No place to dry	17	13	9	10	26	14
Wet from rain	4	3	12	13	16	9
No place to store	6	5	3	3	9	5
No time to dry	3	2	1	1	4	2
Total	126	100	93	100	219	121

7.5 Farm Financial Performance

This section analyses the financial performance of respondents. Various financial performance indicators including cost of production, revenue, gross margin, profits and households' economic profits from rice farming were analysed.

7.5.1 Cost of Production Per Hectare

Cost of production per hectare of rice was calculated and a summary is presented in Table 7-34. Both owned farm inputs (such as family labour, self-produced seeds, and so forth) and bought inputs (fertiliser, agrochemicals, hired labour, land rent, and so forth.) were included in calculating the cost of production per hectare. Data showed a high range in cost of cultivation in each group and it was slightly higher in the partially integrated group compared to their counterpart. This could be attributed to the differences in input use among respondents.

It was noted during the field survey that there were observable differences, particularly in the use of pesticides, insecticides, and fertiliser. Some respondents viewed "*prices of pesticides and herbicides vary greatly among commercial brands. In some occasions, repeated applications had to be done to control some pest and disease attacks*". Similarly, some others said "*we do apply commercial fertiliser mixtures in addition to the general N:P: K fertilisers and some hormones to increase the yield which is costlier than normal N:P: K fertilisers*"

The mean cost of cultivation per hectare of paddy rice was compared between the two groups of respondents. It showed a significant difference between two groups (p<0.05). The result

demonstrated that the respondents in the fully integrated group grew a hectare of rice land at a significantly lower cost relative to their counterpart.

Table 7-34: Cost of production per hectare

Parameter	Partially integrated	Fully integrated	Total
Min (LKR/ha)	36,850	37,925	36,850
Max (LKR/ha)	280,170	224,506	280,170
Mean (LKR/ha)**	**128,920**	**119,808**	**124,291**

**Significant at 5% level
t = 2.3156, df = 297.22, p-value = 0.02126

7.5.2 Cost of Production Per Kilogram of Paddy Rice

Complement to the cost of area cultivated discussed above, the cost of producing a kilogram of rice is shown in Table 7-35. The cost of producing a kilogram of rice had a relatively high range in the partially integrated group along with the lowest value reported. The reason for this could be the low input use of some respondents in this group. Several respondents expressed, "s*ince we avoided some preliminary field preparations such as bund plastering and application of fertiliser*". Further, the mean cost of producing a kilogram of rice between two groups of respondents was found to be substantially different (p<0.05). Results indicated that respondents in the fully integrated group produced a kilogram of rice at a significantly lower cost compared to the partially integrated group. This finding was consistent with the cost of growing a hectare of land discussed before.

Table 7-35: Cost of production per kilogram of paddy rice

Parameter	Partially integrated	Fully integrated	Total
Min (LKR/kg)	7.56	11.00	7.56
Max (LKR/kg)	43.00	47.00	47.00
Mean (LKR/kg)**	**23.61**	**21.79**	**22.69**

t = 2.4499, df = 306.8, p-value = 0.015

7.5.3 Gross Revenue

Gross revenue was calculated per hectare of land. It was taken as the value of paddy rice produced (including non-marketed produce valued at market prices) from a hectare of land (Verhofstadt & Maertens, 2014). Table 7-36 included gross revenue statistics of the two groups of respondents. The revenue from a hectare of land ranged widely in the partially integrated group relative to the other group. This could be due to the exceptionally high yield and the price received by a commercial seed grower included in the partially integrated group. A commercial seed farmer explained "*I invented my own method of growing rice using a specific method of sowing seeds. No other farmer in the area*

gets as much high yield as I get. I produce my own seed rice and sell at a price as double as the market price of paddy rice".

The result revealed a significantly different means of gross revenues generated by the two groups of respondents from a hectare of land (p<0.05). Respondents in the fully integrated group received fairly a high gross revenue from growing a hectare of rice land compared to their counterpart. This could be thought of as a combined effect of several reasons even though their crop yield was not significantly high compared to their counterpart. Nevertheless, it was found before that the respondents in the fully integrated group marketed significantly a larger quantity of dry rice, which always fetched a high price, after storing for a significantly extended duration of time compared to their counterpart.

Table 7-36: Gross revenue per hectare of land

Parameter	Partially integrated	Fully integrated	Total
Min (LKR/ha)	76,485	88,720	76,485
Max (LKR/ha)	853,680	438,936	853,680
Mean (LKR/ha)**	**228,001**	**245,098**	**236,688**

t = -1.9393, df = 291.01, p-value = 0.05144

7.5.4 Gross Margin

A gross margin refers to the total income derived from an enterprise less the variable costs incurred by the enterprise. In calculating gross margin, all annual production costs and revenue of rice farming (there are two crops during the course of a year) were estimated first on a per-hectare basis. Calculated gross margins are presented in Table 7-37 in percentage terms. Put it in other way, it is the percentage of the revenue from a hectare of land retain in the farm after making variable costs.

The gross margin ranged widely in each group. The negative minimum margin indicates losses incurred by some respondents in both groups. The mean margin reported in the fully integrated group has a higher value than their counterpart does. A comparison of mean margins also demonstrated a significant difference (p<0.01). These results indicate that respondents in the fully integrated group retain a greater share from each rupee of revenue they generate in contrast to the respondents in the partially integrated group.

Table 7-37: Gross margin %

Gross margin	Partially integrated	Fully integrated	Total
Min (%)	-65.00	-61.00	-65
Max (%)	89.00	79.00	89
Mean (%)* **	**37.67**	**45.65**	**41.72**

t = -2.8809, df = 306.74, p-value = 0.004245

7.5.5 Gross Profit Per Kilogram of Paddy Rice

Table 7-38 includes the gross profit made by two groups of respondents from a kilogram of rice. Gross profit from a kilogram of rice varied widely in the partially integrated group compared to their counterpart. Some farmers incurred losses as indicated by negative values. The mean gross profit per kilogram of paddy rice was high in the fully integrated group. A significant difference in mean gross profit per kilogram was found between two groups (p<0.01). High gross profit margin in the fully integrated group could be attributed to their low cost of production and the higher price obtained by the majority of respondents by selling dry paddy rice.

Table 7-38: Gross profit per kilogram of paddy rice

Parameter	Partially integrated	Fully integrated	Total
Min (LKR/kg)	-29.46	-32.79	-32.79
Max (LKR/kg)	80.31	50.01	80.31
Mean (LKR/kg)* **	**18.70**	**22.91**	**20.84**

7.5.6 Households' Economic Profit from Paddy Rice

Households' economic profit was calculated as the value of the crop produced (including non-marketed produce valued at market prices) minus variable production costs (including purchased inputs, hired labour, hired machinery costs, land rent, and the non-cash cost of equity inputs such as family labour and own seeds). Table 7-39 presents a summary of the households' economic profit from rice farming. Figures given in the Table show a higher range of economic profit in the fully integrated group. Minimum economic profit in this group was found to be negative. This indicated a loss of economic profit of some respondents in the fully integrated group from rice farming. There was also a wide range in the economic profit of rice in the partially integrated group. However, this range was smaller, compared to their counterpart.

The mean economic profit of the fully integrated group was accounted for at LKR 321,568 per year per hectare. The respective figure reported in the partially integrated group was LKR 251,425 per year. This difference in mean economic profit between the two farmer groups is considerable

(p<0.00). Respondents in the fully integrated group with bigger farms had a much higher economic profit from rice farming compared to the respondents in partially integrated group.

Table 7-39: Households' economic profit from rice

Economic profit	Partially integrated	Fully integrated	Total
Min (LKR/year/ha)	6,066	-51,873	-51,873
Max (LKR/year/ha)	684,918	728,616	728,616
Mean (LKR/year/ha)* **	**251,425**	**321,568**	**287,064**

t = -4.183, df = 307, p-value = 0.000

7.6 Future Co-operative Membership and Rice Farming

This section presents the opinion of respondents about the future in terms of co-operative membership and strategies

7.6.1 Co-operative Membership

Respondents were questioned on their intention to stay in the membership in their respective co-operative in the next five years. While 80% of respondents in the partially integrated group intended to continue membership, 20% wished to exit their co-operative. Similarly, 76% of respondents in the fully integrated group wished to continue their membership while 24% was willing to exit. Nevertheless, the majority (75%-80%) in each group, were expecting to continue their membership for the next five years. The two groups were not significantly different in their opinion to continue or quit the membership (p>0.05). These findings suggested that the majority of the respondents in both groups will remain in their membership for the next five years.

Table 7-40: Respondents' intention either to continue or quit membership

Membership	Partially integrated		Fully integrated		Total	
	Count	Percent	Count	Percent	Count	Percent
Continue	122	80	119	76	241	78
Quit	30	20	38	24	68	22
Total	152	100	157	100	309	100

X-squared = 0.65645, df = 1, p-value = 0.4178

There were 241 respondents in the total sample expecting to continue the membership in the next five years. The reasons given by them to continue the membership are summarised in Table 7-41. "Obtaining credit and other financial services" was the first most important reason identified by the respondents in each group. The second most acknowledged reason by the respondents in each group to continue membership was the opportunity to sell paddy rice to their co-operatives.

However, this percentage was below 35% in both groups and do not represent the majority. The third important reason identified by the respondents was “buying inputs”.

The factors influenced to become a member (section 2.9) and the factors contributed still to continue it were similar and directly related to rice farming. However, the relative importance of those factors has changed over time. For instance, the opportunity to sell rice to co-operative was recognised as the prominent factor to become a member then. However, at present the ability to obtain credit and other financial services has become the prominent factor to continue their membership.

Table 7-41: Reasons to continue membership

Reasons	Partially integrated		Fully integrated		Total	
	Count	Percent	Count	Percent	Count	Percent
Obtaining credit and other financial services	57	33	53	38	110	45
Opportunity to sell paddy rice to co-operative	54	32	35	25	89	36
Buying inputs occasionally	20	12	16	11	36	15
Cast vote	17	10	6	4	23	9
Still get some services	8	5	13	9	21	9
Buying grocery goods	3	2	6	4	9	2
Governing member	5	3	3	2	8	3
Self-satisfaction	4	2	4	3	8	3
Produce seed rice	3	2	1	1	4	2
Expected future benefits	0	0	3	2	3	1
Total responses	171	100	140	100	308*	125

*Some respondents provided more than one reason while some others did not give any

There were 68 respondents in the sample who wished to exit from membership. The reasons provided by them for exiting membership are included in Table 7-42. Accordingly, drop of member benefits, and unsatisfactory services have been identified by those members as most influential reasons to withdraw their membership. This information revealed that some of the members are discouraged from being reduced their benefits and unsatisfactory services of their co-operatives. A respondent who wished to exit the membership said “*services of the co-operative were unreliable. It does not supply inputs and buy paddy rice regularly”*

Table 7-42: Reasons to quit membership

Reasons	Partially integrated		Fully integrated		Total	
	Count	Percent	Count	Percent	Count	Percent
Limited member benefits	23	64	22	59	45	61
Unsatisfactory service	9	25	11	30	20	27
Division dissolved	1	3	3	8	4	6
Poor governance	3	8	1	3	4	6
Total responses	36	100	37	100	73*	100

*Some respondents provided more than one reason

7.6.2 Future Rice Farming

Respondents were questioned about their view to continue rice farming in the future. Responses to this question are summarised in Table 7-43. More than 90% of the members in both groups indicated that they would stick to growing rice since they are left without a choice. Two reasons to stick to rice farming are; 1) lack of other alternative employment opportunities and, 2) diversification of rice lands involve high investment in drainage improvement and 3) prohibition of growing perennial crops in rice lands. It was evident from this result that the majority of the respondents in both groups will be involved in rice farming for the next five years since they have limited options. No significant (p>0.05) association has been found between respondents' choice to continue rice farming and the level of integration.

Table 7-43: Perception of continuity of rice farming

Membership	Partially integrated		Fully integrated		Total	
	Count	Percent	Count	Percent	Count	Percent
Continue	142	93	148	94	290	94
Quit	10	7	9	6	19	6
Total	152	100	157	100	309	100

X-squared = 0.0053021, df = 1, p-value = 0.942

7.7 Summary

This chapter describes the sample of rice growing member farmers in partially and fully integrated co-operatives included in this study. The descriptive analysis demonstrated that respondents were comparable in most of their demographic characteristics except for a few. For example, respondents in both partially and fully integrated groups were comparable in their age, education, experience in rice farming, household size, duration of co-operative membership, and transportation vehicles

they own. However, respondents were undistinguished between partially and fully integrated co-operatives from their involvement in off-farm work. Significantly a large number of respondents in partially integrated groups have been involved in off-farm work.

Respondents were distinguishable between partially and fully integrated co-operatives from certain farm characteristics. More importantly, the respondents were substantially different from the size of their farms, accessibility to irrigation water, and use of farm credits. Farm size, better access to irrigation water and use of credit were significantly high among the respondents in fully integrated group. Respondents were more comparable in other aspects of farm characteristics. For example, location of farms, land ownership structure, duration of co-operative membership, ownership status of farm machinery and equipment, storage houses and drying floors found to be identical between the respondents in partially and fully integrated co-operatives.

Preliminary analysis also disclosed important dissimilarities among the respondents in partially and fully integrated co-operatives in certain aspects such as production, post-harvest, and marketing activities. Respondents in fully integrated co-operatives produced a large quantity of rice, more involved in post-harvest activities such as drying and storing of harvest and marketed more dry rice than wet rice. Nevertheless, both groups of respondents were identical in rice yields.

The descriptive analysis also showed that respondents were different in their financial performance. Respondents in fully integrated co-operatives grew hectare of rice and produced a kilogram of rice at a lesser cost. They also found to have significantly high gross margins and households' economic profit from rice.

Moreover, regardless of partially and fully integrated co-operatives, around 80% of the respondents wished to continue in their co-operative membership. The reasons they identified to continue membership were more linked with rice farming. The majority of the respondents displayed their intention to obtain credit and other financial services, and inputs from, and sell rice to, their co-operatives.

Overall, the preliminary analysis in this chapter provides important insights into the study sample. Important distinctions between the respondents in partially and fully integrated co-operatives were identified that would have been presented certain implications into main data analysis.

8 COMPARISON AND ANALYSIS OF BENEFITS, FINANCIAL PERFORMANCE AND DISCUSSION

8.1 Introduction

This chapter reports the main results of the quantitative study. Following the introduction, Section Two summarises and compares survey data on six themes of member benefits. Section Three presents the results of the exploratory factor analysis employed to further analyses the member benefits aiming to identify key areas of benefits. Section Four compares and analyses the members' financial performance. Section Five summarises and discusses the results.

8.2 Perceived Member Benefits

This section summarises and compares the survey results of member benefits of partially and fully integrated co-operatives. Member benefits were measured as perceived by the respondents on a five-point Likert-type scale (Strongly disagree (1), Disagree (2), Moderately agree (3), Agree (4), and Strongly agree (5)). The section is organised under six benefit themes; production and marketing, benefits in supplying services, inputs and information, ownership benefits, social benefits, community benefits and environmental benefits.

8.2.1 Perceived Production and Marketing Benefits

Seven statements were used to identify various production and marketing benefit dimensions (Table 8-1) A higher percentage (around 30% -40%) of the respondents in each partially and fully integrated co-operatives either "moderately agree" or "disagree" on all seven statements and the mean score ranged between 2 and 3. These results suggest that respondents perceived that the production and marketing benefits from their co-operatives, regardless of the level of vertical integration of their respective co-operatives was moderate to low.

However, two items of production and marketing benefits; "income increase" and "price increase" were significantly different between the respondents in partially and fully integrated co-operatives. Members of the fully integrated co-operatives perceive that they received higher income and better prices for their produce. Other benefit items identified in Table 8-1 were not significantly different between the partially and fully integrated co-operatives and remained moderate to low.

Table 8-1: Perceived production and marketing benefits

	Mean scale (Total sample)	Partially integrated					Fully integrated				
		% - Strongly agree (5)	% - Agree (4)	% - Mod. agree (3)	% - Disagree (2)	% - Strongly disagree (1)	% - Strongly agree (5)	% - Agree (4)	% - Mod. agree (3)	% - Disagree (2)	% - Strongly disagree (1)
Income increase* **	2.79	5	11	32	44	8	6	21	39	28	6
Price increase **	2.79	7	17	25	37	14	7	26	34	20	13
Production increase	2.71	3	14	24	39	20	8	20	41	25	6
Assets' increase	2.52	3	15	32	33	17	2	15	33	29	21
Quality increase	2.51	5	14	27	34	20	3	19	24	34	20
Yield increase	2.49	2	13	30	39	16	3	14	27	39	17
Land increase	2.41	5	10	24	42	19	4	10	27	40	19

***Significant at the 1% level, ** Significant at the 5% level

8.2.2 Perceived Benefits in Supplying Services, Inputs and Information

Results of the perceived benefits in supplying services, inputs, and information are summarised in Table 8-2. The Table presents the responses provided by the respondents to 25 statements used to identify various benefits pertaining to the supply of services, inputs, and information. Members in general perceived lower than moderate benefits and it is reflected in the average scale being less than three.

Nevertheless, members perceived lower than moderate benefits, members in fully integrated co-operatives perceived significantly higher benefits from services. For instance, members in fully integrated co-operatives had relatively and significantly high perception on "easy access to credit", "low interest on credit", "get grocery goods at a low price", "high interest on savings", "get production trainings", and "get production technology" statements. These high perceptions held on above statements imply that benefits from services are much better for the members in fully integrated co-operatives. Quick access to financial services such as credit, subsidised goods, and services such as grocery goods, and fuel have been important benefits for the members in fully integrated co-operatives.

Table 8-2: Perceived benefits in supplying, services, inputs and information

	Mean scale (Total sample)	Partially integrated					Fully integrated				
		% - Strongly agree (5)	% - Agree (4)	% - Mod. agree (3)	% - Disagree (2)	% - Strongly disagree (1)	% - Strongly agree (5)	% - Agree (4)	% - Mod. agree (3)	% - Disagree (2)	% - Strongly disagree (1)
Services											
Easy access to credit**	2.77	11	15	22	25	27	18	18	26	19	19
Low interest on credit***	2.36	3	11	22	20	44	13	17	15	30	25
Lower grocery price***	2.24	0	13	17	32	38	3	15	27	35	20
High interest on savings**	2.05	2	7	16	30	45	5	10	15	37	33
Get production training*	1.77	1	3	11	32	53	4	4	15	31	46
Get production technology*	1.68	1	3	5	31	60	4	4	7	34	51
Get farm monitoring	1.77	3	1	5	28	63	6	3	14	38	39
Reduce transport cost	1.69	1	1	13	37	48	1	3	8	40	48
Get fertiliser on credit	1.69	3	1	12	25	59	1	4	16	22	57
Get seed on credit	1.69	1	3	10	28	58	1	6	13	25	55
Reduce cost of hiring farm machinery	1.64	0	3	9	31	57	1	5	12	25	57
Reduce marketing cost	1.62	0	3	10	29	58	1	1	10	42	46
Get agrochemicals on credit	1.60	0	3	13	20	64	0	6	11	27	56
Inputs											
Reduce weedicide cost***	2.08	3	4	17	34	42	1	11	22	42	24
Reduce pesticide cost**	2.04	1	9	16	30	44	2	6	31	31	30
Get seeds of high value rice**	1.73	0	3	12	30	55	3	5	11	29	52
Get quality agrochemicals***	1.71	0	3	10	28	59	1	2	20	37	40
Get quality fertiliser*	1.70	0	2	11	31	56	0	4	18	31	47
Reduce fuel cost	2.00	5	11	13	26	45	3	6	19	29	43
Reduce fertiliser cost	1.83	1	1	20	39	39	1	1	17	41	40
Reduce seed cost	1.79	1	1	16	39	43	3	3	13	35	46
Get quality seed	1.76	0	3	13	32	52	3	3	13	34	47
Get high yielding seed	1.64	1	3	7	25	64	3	4	10	31	52
Information											
Get price information***	2.13	1	7	16	34	42	4	16	21	25	34
Get market information	1.65	0	5	8	30	57	1	8	10	28	53

***Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level

Moreover, members in fully integrated co-operatives have relatively better benefits by having production trainings and getting access to technology. Overall, these results demonstrate that members in fully integrated co-operatives have relatively more benefits from various services compared to their counterpart.

Similarly, compared to the respondents in partially integrated co-operatives, respondents in fully integrated co-operatives had significantly benefited from buying inputs from co-operatives. Relatively and significantly higher perception was held by the respondents in fully integrated co-operatives on “reduce weedicide cost”, “reduce pesticide cost”, “get seeds of high value rice”, “get quality agrochemicals”, and “get quality fertiliser” statements. These statements suggest that some quality production inputs have been relatively cheaper and more affordable to the members in fully integrated co-operatives. As they perceived there has been a reduction of their input costs and this could be a result of subsidised input prices. On the other hand, respondents in fully integrated co-operatives have also been able to provide better quality inputs.

Information benefits to respondents in general have been low as indicated by the mean scale on respective statements that vary around two. Respondents in fully integrated co-operatives, however, received better quality information comparatively to their counterpart. In particular, price information has been more available to the members in fully integrated co-operatives. They had a significantly higher perception on “get price information” than the respondents in partially integrated co-operatives. According to the results, information benefits have been relatively better for the respondents in fully integrated co-operatives.

8.2.3 Perceived Ownership and Control Benefits

The summary of the responses on perceived ownership benefit statements is given in Table 8-3. It was found that the majority of the respondents in each partially and fully integrated co-operatives either “disagree” or “strongly disagree” on all six perceived ownership benefit statements. The mean scale of all six statements had a value lower than three. This suggests that members’ benefits were below moderate. Relatively, more positive and comparable responses were received on statements; “vote in electing board directors” and “receive co-operative business training” with a mean scale around 2.5 from the respondents. Accordingly, the execution of an individual’s control right in their enterprise and receiving business training have considered moderate to low important ownership benefits by the respondents in both partially and fully integrated co-operatives. Except for the first two statements, the other four statements had an average scale below 2. This implies

that respondents were not benefitted or only marginally benefitted in terms of other ownership benefit dimensions identified in Table 8-3. However, the respondents' perceptions were significantly different on "able to influence on rice business strategies" and "receive dividends" statements between partially and fully integrated co-operatives. Accordingly, respondents in the fully integrated co-operatives perceived that they benefitted relatively better being able to influence rice business and receiving dividends from their co-operatives compared to the respondents in the partially integrated co-operatives.

Table 8-3: Perceived ownership and control benefits

	Mean Scale (Total sample)	Partially integrated					Fully integrated				
		% - Strongly agree (5)	% - Agree (4)	% - Mod. Agree (3)	% - Disagree (2)	% - Strongly disagree (1)	% - Strongly agree (5)	% - Agree (4)	% - Mod. Agree (3)	% - Disagree (2)	% - Strongly disagree (1)
Able to influence rice business strategies*	1.68	1	3	5	32	59	3	4	13	28	52
Receive dividends**	1.51	0	1	8	19	72	0	8	7	24	61
Vote in electing board directors	2.55	4	22	20	27	27	2	25	22	31	20
Receive co-operative business training	2.29	1	9	25	39	26	1	16	23	37	23
Able to raise the voice	1.43	0	0	7	27	66	0	2	3	32	63
Receive rebates	1.36	1	1	3	29	66	0	1	3	24	72

** Significant at the 5% level, * Significant at the 10% level

8.2.4 Perceived Community Benefits

The results of the perceived community benefits are given in Table 8-4. The vast majority of the respondents in the partially integrated co-operatives marked "strongly disagree" on all eight statements. Except for "promote leaders" and "promote women's leadership", majority of the respondents in the fully integrated co-operatives also elected "strongly disagree" on the remaining six statements given Table 8-4. In general, the majority of the respondents in each partially and fully integrated co-operatives perceived low to very low social benefits according to the result. Conversely, the majority of the respondents in the fully integrated co-operatives agree (29%) on "promote leaders" and disagree (31%) on "promote women's leadership". On the other hand, the

mean scale ranged from 2 to 3 on those two statements in each of the partially and fully integrated co-operatives. Accordingly, respondents in each partially and fully integrated co-operatives moderately perceived that promotion of leaders has been an important community benefit for them. Notably, the responses on "promote leaders" were substantially different among the respondents and the respondents in fully integrated co-operatives had a relatively more positive agreement on the statement. This implies that respondents in the fully integrated co-operatives perceived that community benefits, in the form of promoting leaders by their co-operatives were much better for them, relative to their counterpart.

Table 8-4:Perceived community benefits

	Mean scale (Total sample)	Partially integrated					Fully integrated				
		% - Strongly agree (5)	% - Agree (4)	% - Mod. Agree (3)	% - Disagree (2)	% - Strongly disagree (1)	% - Strongly agree (5)	% - Agree (4)	% - Mod. Agree (3)	% - Disagree (2)	% - Strongly disagree (1)
Promote leaders*	2.78	5	26	22	19	28	9	29	24	20	18
Promote women's leadership	2.25	4	22	20	27	27	2	25	22	31	20
Create employment	1.84	0	3	13	42	42	0	4	22	36	38
Promote education	1.82	0	8	14	37	41	1	3	15	32	49
Promote democracy	1.81	3	3	5	44	45	4	4	11	38	43
Sponsor religious activities	1.77	0	2	21	25	52	0	0	22	35	43
Provide access to government services	1.51	0	4	5	30	61	0	2	9	25	64
Sponsor schools	1.5	0	1	6	38	55	0	1	7	32	60

* Significant at the 10% level

8.2.5 Perceived Social Benefits for Members

Table 8-5 includes the results of perceived social benefits for the members. As shown in Table 8-5, "strongly disagree" was the highest recorded response among respondents on all eight statements. Together, the "disagree" and "strongly disagree" responses accounted for more than 80% of all statements except "financially support illness". The mean scale is less than two for almost all the statements. This highlights the fact that the majority of the respondents in each partially and fully integrated co-operatives did not perceive satisfactory social benefits. Except for "financially support illness" the mean scale for the remaining statements was found to be lower than 2 (close to one in

most cases) and it implies very low or lack of social benefits at all. Only occasionally paid monetary payments in support of illnesses were identified by the respondents as at least marginally important social benefit to them.

Table 8-5: Perceived social benefits for members

	Mean scale (Total sample)	Partially integrated					Fully integrated				
		% - Strongly agree (5)	% - Agree (4)	% - Mod. Agree (3)	% - Disagree (2)	% - Strongly disagree (1)	% - Strongly agree (5)	% - Agree (4)	% - Mod. Agree (3)	% - Disagree (2)	% - Strongly disagree (1)
Financially support illnesses	1.99	0	10	22	23	45	1	6	30	22	41
Compensate crop failures	1.72	1	6	10	22	61	0	3	16	30	51
Facilitate experience sharing	1.53	0	1	9	34	57	1	2	6	32	59
Provide subsidised health services	1.37	0	1	5	24	70	1	1	10	19	69
Support family ceremonies	1.31	0	0	5	22	74	0	1	6	23	71
Provide subsidised funeral services	1.29	0	2	5	19	74	1	0	6	15	78
Support during member families' deaths	1.24	0	0	2	17	81	0	0	3	20	77
Support during natural hazards	1.22	0	0	2	20	78	0	1	3	18	79

Moreover, responses on any of the statements were not significantly different between the respondents. This demonstrates a lack of significant difference in perceived social benefits by the members of both type of co-operatives.

8.2.6 Perceived Environmental Benefits

Seven statements were used to identify environmental benefit dimensions. The summary of the responses received on each statement is given in Table 8-6. As shown in the Table, over 70% of the respondents, irrespective of their co-operative, answered "strongly disagree" to all seven statements. Altogether, "disagree" and "strongly disagree" responses amounted to almost 100% on each of the seven statements in both partially and fully integrated co-operatives. Responses on all environmental benefit statements except "help reduce pesticide use" were comparable among the respondents. Moreover, the mean scale of all seven statements was inclined to 1. These results

suggest the respondents' lack of perception of any environmental benefits to them. However, respondents' perception of "help reduce pesticide use" was significantly different between the partially and fully integrated co-operatives. This suggests a significantly less negative perception of the respondents in the fully integrated co-operatives compared to their counterparts about benefitting from reduced pesticide use. The information revealed from the interviews also corroborates the respondents' perception of lack of environmental benefits. "*We have not been able to do much to promote environmentally friendly rice farming apart from conducting some awareness programmes on harmful effects of pesticide use*" interviewees told.

Table 8-6: Perceived environmental benefits

	Mean scale (Total sample)	Partially integrated					Fully integrated				
		% - Strongly agree (5)	% - Agree (4)	% - Mod. Agree (3)	% - Disagree (2)	% - Strongly disagree (1)	% - Strongly agree (5)	% - Agree (4)	% - Mod. Agree (3)	% - Disagree (2)	% - Strongly disagree (1)
Help reduce pesticide use**	1.14	0	0	1	9	90	0	0	1	16	83
Promote efficient use of irrigation water	1.37	0	2	1	27	70	0	1	1	29	69
Promote organic fertiliser use	1.26	0	0	1	24	75	0	0	1	24	75
Help reduce soil erosion	1.17	0	0	1	14	85	0	1	2	15	82
Help reduce soil fertility degradation	1.12	0	1	0	16	83	0	0	1	11	88
Help reduce herbicide use	1.09	0	0	0	9	91	0	0	0	8	92
Help reduce water contamination by fertiliser and chemicals	1.06	0	0	0	7	93	0	0	0	6	94

According to the results presented above, members' benefits were marginal to moderate in general, in all studied co-operatives. Altogether, 60%-70% of the respondents were "disagree" and "strongly disagree" on almost all perceived benefit statements. Nevertheless, a majority of the members in fully integrated co-operatives had significantly better perception on majority of the benefit items compared to partially integrated co-operatives. This finding corroborates the findings of several others. Abdelrahman (2017) found that farmers' benefits from agricultural co-operatives were marginal in Egypt. Similarly, Wu and Ding (2018) also reported on low member benefits in Chinese

agricultural co-operatives. Wu and Ding (2018) also found significantly high dissatisfaction among members in agricultural co-operatives in China. Furthermore, Z. Hu, Zhang, and Donaldson (2017) ascertain that co-operative failed to deliver expected benefits to smallholder members. Findings in this study, however, marginally support the claims of those who demonstrated significant benefits from co-operatives to their members (IFAD, 2003; Markelova et al., 2009; World Bank, 2002, 2007).

According to the results, production and marketing benefits were moderate for the members in all co-operatives studied in general. This result is consistent with Bakucs et al. (2012) to some extent. According to above authors, members in Hungarian agricultural co-operatives derived significant marketing benefits. Despite in a different context, this result also shows support for Hernández-Espallardo, Arcas-Lario, and Marcos-Matás (2013). These researchers found that the members in Spanish agricultural co-operatives derive better marketing benefits such as higher prices for their products. Despite production and marketing benefits were moderate, those benefits were relatively high among members in fully integrated co-operatives. For some of the beneficial items such as "income increase" and "price increase", members in fully integrated co-operatives had significantly high perception. This suggests relatively better production and marketing benefits for those members in fully integrated co-operatives.

Benefits in supplying services, inputs and information were at a low to moderate level for all the members in general. More importantly, members had more service benefits compared to inputs and information. These results corroborate with other studies to some extent that emphasise on service, input and information related benefits gained by the members of co-operatives. For instance, Markelova et al. (2009) found that members in agricultural co-operatives in many parts of the developing countries have benefitted from co-operatively provided services and inputs. According to the results, credit services provided by the co-operatives have been an important service benefit to members. This is similar to the findings made by Tanrivermis and Bayaner (2006) on Turkish agricultural co-operatives. Above authors have reported that members in their study co-operatives have gained easy access to credit at low interest. Credit and other financial service benefits found in this study also corroborate with the findings of Hulme and Montgomery (1994) who reported that members of co-operatives in Sri Lanka have benefitted from increased access to credit.

The benefits in supplying inputs found in this study moderately support the findings of several others. For example, Getnet and Anullo (2012) found that members have benefited from declined

input costs. Similarly, Kaganzi, Ferris, Abenakyo, Sanginga, and Njuki (2007) found that farmers in Uganda have increased access to inputs and obtained discounts.

As shown by the results, there were moderate information benefits to members from their co-operatives. In particular, members were moderately benefited from price information where as these benefits were significantly high for the members in fully integrated co-operatives compared to their counterparts. Findings of information benefits in this study are consistent with several others including Fischer and Qaim (2012a) and Lapar et al. (2006).

Results revealed moderate to low ownership and control benefits. By means of ownership benefits, members have demonstrated greater authority in electing their board of members for their co-operatives. This supports the findings of Birchall (2012) and Österberg and Nilsson (2009) who identified having greater control, governance and strategy formulation as important member benefits. Despite the benefits of involving strategy formulation and dividends were low, those benefits were relatively and significantly high for the members of fully integrated co-operatives. This result is consistent with (Zhong et al., 2018) who noted members of tightly vertically coordinated co-operatives to have relatively high patronage refund in Chinese dairy co-operatives.

Community benefits were also found to be moderate to low. However, promotion of leadership was found to be relatively an important benefit to members compared to other community benefit dimensions. This result is similar to Nugussie (2010) who showed people become members of agricultural co-operatives in Ethiopia to be represented in administration committees.

According to Table 8-5, and Table 8-6, almost 80% of the members in all the study co-operatives responded “disagree” and strongly disagree” on almost all the items of social and environment benefit dimensions. This suggests that members in both partially and fully integrated co-operatives have least or no social and environmental benefits. These findings do not strongly support the others’ claims on social and environmental benefits of co-operatives to their members such as promotion of democracy and equity (Fairbairn, 1991), trust building (Majee & Hoyt, 2009), empower people to hold accountable Merrett and Walzer (2001), and development of skills and knowledge Bacon et al. (2008). With respect to environmental benefit, Mojo et al. (2015) demonstrated improved environmental performance of members, V. Kumar et al. (2015) showed improved ecological resilience, Ovando et al. (2013) identified conservation of common properties, Galappaththi et al. (2016) investigated information-sharing on ecological sustainability, Ma et al.

(2017b) found enhancing soil quality, and Haque et al. (2009) reported on building sustainable ecological systems. Results of this study did not provide strong evidence to support aforementioned findings of other researchers regarding the environmental benefits.

8.3 Exploratory Factor Analysis (EFA)

In the previous section, survey results of the perceived benefits of the respondents are summarised and compared between partially and fully integrated co-operatives. This section further analyses those perceived benefits to identify key benefits relevant to the study sample reflected in 61 statements. This was achieved by applying EFA on 61 benefit statements. The subsequent section reports on the results of EFA. The conceptual overview, assumptions, and procedure followed in implementing EFA in this study are discussed in Chapter Five.

Following the correlation analysis, 14 statements were eliminated initially before beginning the preliminary iterations of EFA owing to their low correlations with other items. Most of the 14 low-correlated statements were related to perceived social and environmental benefits. Accordingly, five out of eight social benefit statements ("Provide subsidised health services", "Support family ceremonies", "Provide subsidised funeral services", "Support during member families" and "deaths, Support during natural hazards") were excluded. It was also noted in the earlier section that most of the social benefit statements had low scale responses (strongly disagree and disagree). Five out of seven environmental benefit statements were also eliminated from the analysis as well. They included "Promote efficient use of irrigation water", "Promote organic fertiliser use"', "Help reduce soil erosion", "Help reduce soil fertility degradation" and "Help reduce water contamination by fertiliser and chemicals". They had low correlations with other statements below +/- 3. As discussed in the previous section, irrespective of the type of co-operative, respondents perceived no environmental benefits at all. Likewise, one statement, each from the ownership, community and supplying inputs, services and information benefit categories were also eliminated from the analysis upon observing low correlations.

Results of the Kaiser-Meyer-Olkin test of sample adequacy (MSA) and Bartlett's Test of Sphericity are given in Table 8-7 and they suggest the appropriability of data to perform EFA. Interestingly, all 47 statements/items had an MSA value which exceeded the heuristic of 0.7 (was above 0.8 in the majority of the statements/items), indicating that the correlations were adequate for factor analysis. Likewise, a significant Bartlett's test with reportedly small *p* values led to reject the null

hypothesis of lack of sufficient correlations between the statements/items (Table 8-7). Both test results strongly support the quality of data to perform EFA.

Table 8-7: Kaiser-Meyer-Olkin test of sample adequacy (MSA) and Bartlett's Test

Test statistics		Parameters for data represented in 47 statements
KOM		0.910
Bartlett's Test of Sphericity	Approx. Chi-Square	7445.80
	Df	1081
	Sig.	0.000

Some of the statements/items had low loadings on factors. Those statements/items with low loadings below the cut-offs (since the sample is 309 in this study, the cutoff was set to 0.35 following Hair (2007)) have also been eliminated in subsequent iterations. Majority of the low correlated items represented community, social and environmental related benefits. For example, statements such as "Financially support illnesses" and "Support family ceremonies" which represented social benefits reported low correlations with other items. Statements that represented community benefits such as "Create employment", and "Promote education" also were low correlated with other items. Majority of the low correlated items belong to environmental benefit groups including those statements such as "Reduce pesticide use", "Reduce herbicide use", "Help reduce soil fertility degradation", and Promote efficient use of irrigation water". This implies that majority of the environmental benefit items do not share common meanings with other statements.

Further iterations of many rounds of EFA reduced total items from 47 to 35 and eliminating further 12 items. Those 12 statements represented all the benefit groups. Statements such as "Receive dividends", "Get quality agrochemicals", "Get farm monitoring" and "Facilitate experience sharing" were among the statements eliminated. There were several reasons behind eliminating those twelve items from the subsequent iterations of EFA. Some of the statements have loaded into multiple factors with equal loadings (for example "Receive dividends", "Get farm monitoring", "Get quality agrochemicals"). Such statements loaded into multiple factors were eliminated. Some statements (for example "Sponsor schools") were eliminated having below cut-off loadings. Similarly, those statements loaded into factors without bearing a common meaning with other statements were also eliminated from the analysis.

Finally, a meaningful factor structure was emerged when remaining 35 statements were used. Factor structure resulted when 35 statements yielded 5 factors. This iteration of EFA satisfied three criterions (Cumulative percentage of variance, 1< Eigenvalue or Kaiser's criteria, Scree test, Parallel analysis) suggested in the literature to identify the number of factors. However, these five factors explained only around 50% of the variance. Figure 8-1 plots parallel analysis and scree plot together and shows the number of suggested factors by the two criteria.

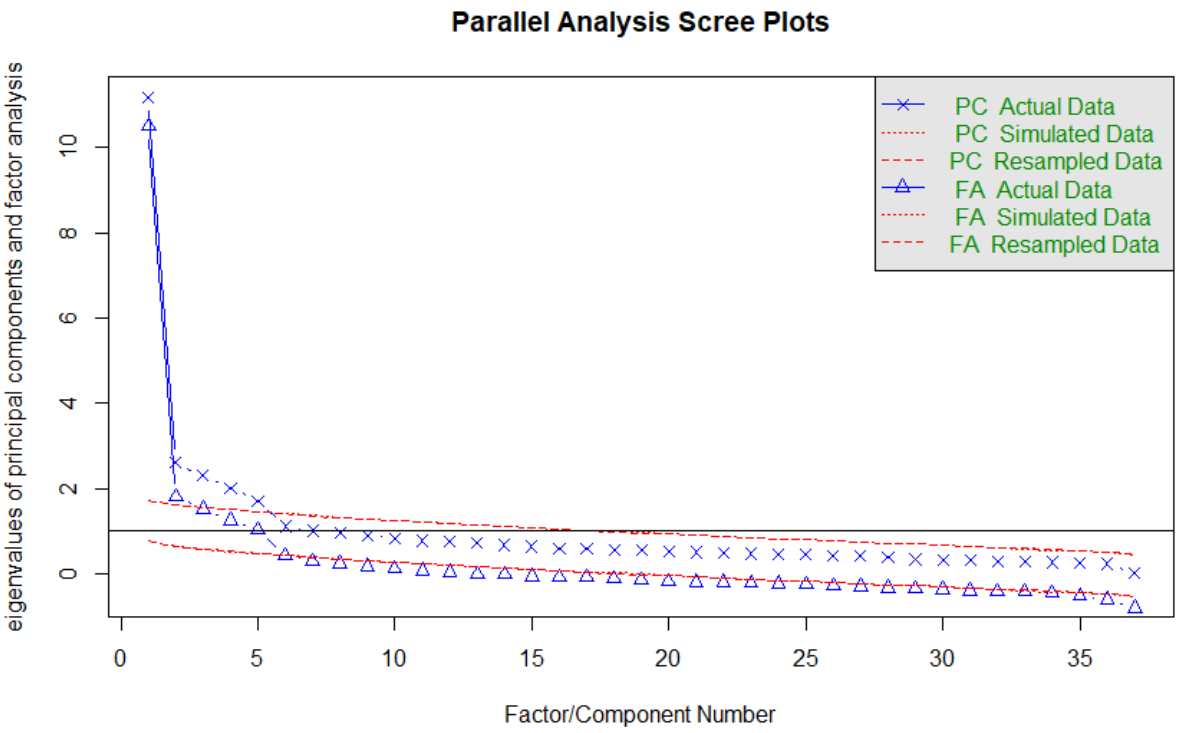

Figure 8-1: Parallel analysis scree plot of data

Table 8-8 includes the final five-factor solution retained from the final iteration of EFA. Five factors together explained 47.1% of the total variance in data. This was the highest recorded variance resulting from all meaningful iterations of EFA. However, this was below the recommended cut-off of 60%. Recorded low variance was due to two reasons. First, the study used 61 statements. It is more likely to get low explained variance when the number of variables is large. The second is the sample size. The sample size of this study was 309 which is relatively large and there is a high likelihood of getting low explained variance when the sample size is large (R. A. Peterson, 2000). Literature on the other hand indicate that 30% of the cases that undertake factor analysis end up with less than 50% of the explained variance and depending on the number of variables and sample

size variances below 50% still considered reliable (Thompson, 2007). Despite it is low, the variance came out in this study was accepted as reliable.

In order to identify a simple structure for the simplicity of interpretation, the varimax rotation method was applied following H. F. Kaiser (1958). The last iteration of the EFA disclosed five key areas of member benefits. Most of the statements had high loadings over 0.50. There were some items still loaded simultaneously in more than one factor, even in the final iteration. Those statements/items were seemingly relevant to the underlying constructs and capturing different dimensions. Communalities (h^2) indicate the degree to which each variable is participating or contributing to the factor solution. Reported lower values imply that some of the statements/items cannot be fully defined by the factors and have uniqueness.

Nevertheless, the majority of the items had factor scores above 0.5 they were all relatively low. This was attributable to the number of variables and the number of factors extracted in this study. More the number of variables used in the analysis and the number of factors extracted, the smaller the average factor loading (R. A. Peterson, 2000). A total of 61 variables were used in the analysis and six factors were extracted which are relatively large. However, there is no consensus as to what constitute a “high” or “low” factor loading (R. A. Peterson, 2000). Hair et al. (2014) noted that for social science research, factor loadings of 0.5 or above are practically significant. Thus, there are empirical evidence in social science and business research those considered cut-off values in the range of 0.2 to 0.7. (Fabrigar et al., 1999). Based on above, the factor loadings resulted in this study considered reliable.

The chi-square statistic of factor sufficiency was significant ($p<0.01$) indicating that five factors are not sufficient. Even though the explained variance increased with adding further factors, their meanings were ambiguous. Further, factor loading was very low and they were below the defined cut-off. Therefore, relying on other criteria (rule of 1< Eigenvalue or Kaiser’s criteria, Scree test and Parallel analysis) except for the variance, only five factors were extracted. Following the extraction of factors, internal consistency of items gathered in each factor was constitute determined via Cronbach’s alpha. The factors were examined using Cronbach’s coefficient alpha to test inter-item reliability. Alpha coefficients ranged from 0.77 to 0.93 for all the key benefits except one reflects a very good reliability as suggested by Streiner (2003). Democracy and education benefit that included 3 benefit variables returned an alpha of 0.67 which was also reasonably strong according

to Streiner (2003). Overall, four of the extracted factors were highly reliable while the remaining one was in the acceptable range (R. K. Henson & Roberts, 2006).

The first factor accounted for 14.3% of the variance and, conceptually, it proposes ***business and financial benefits*** that a member could expect from their co-operative membership. A set of statements loaded on factor 1 are mostly reflecting financial benefits in the form of subsidised inputs and services related to the production and other social and community services. For instance, "Reduce fuel cost" statement loaded onto this factor implies that members have financially benefited from reduced fuel cost to them. The statement "Financially support illnesses" suggests direct financial assistance granted to members. Moreover, statements such as "Able to influence rice related business strategies" suggest the opportunity that the members have for contributing to the decisions related to rice business activities.

Factor 2 proposes ***livelihood benefits***. This second factor explained 10.1% of the total variance and statements have higher loadings with a value of around 0.6 or above. Statements included in this factor are indicative of direct livelihood benefits. Most of the statements loaded on the factor 2 generally suggest livelihood related benefits. This factor consisted of statements such as "Income increase", "Yield increase", "Production increase", "Quality increase" and "Price increase". All these statements reflect benefits related to the livelihoods of the members.

Factor 3 suggests ***technology and information benefits***. It explained 8.0% of the total variance. The statements loaded on this factor reflect technology and information related benefits. For example, "Get seeds of high-value rice", "Get production technology" and "Get information about new markets" like statements were loaded on this factor. Those statements imply the benefits derived from accessing new technology and information by the members.

On the other hand, factor 4 shows the concept of ***low-cost inputs***. This factor explained 7.4% of the variance and, except for two, other statements had higher loadings. Those statements such as "Reduce weedicide cost", "Get seed on credit", "Get agrochemicals on credit", and "Get fertiliser on credit" had high loadings on this factor. They indicate the benefits of having in kind credits and services. Availability of production inputs and services on credit for co-operative members have been an important benefit according to the result.

Table 8-8: Five factor solution of key benefit areas

Statement (variable)	Business and financial	Livelihood	Technology and information	Low-cost inputs	Democratic control and education
Reduce fuel cost	0.518				
High interest on saving	0.627				
Easy access to credit	0.603				
Financially support illnesses	0.601				
Sponsor religious activities	0.573				
Low interest on credit	0.567				
Get price information	0.491				
Get grocery goods at a low price	0.458				
Compensate crop failures	0.498				
Receive co-operative business training	0.475				
Create employment	0.363				
Able to influence paddy/rice related business strategies	0.485				
Income increase		0.617			
Yield increase		0.656			
Production increase		0.597			
Land increase		0.645			
Assets increase		0.697			
Quality increase		0.634			
Price increase		0.608			
Get quality fertilizer			0.356		
Get seeds of high-value paddy/rice			0.540		
Get production technology			0.628		
Get information about new markets			0.523		
Get production training			0.461		
Get quality seed			0.451		
Reduce pesticide cost				0.373	
Reduce weedicide cost				0.509	
Get seed on credit				0.689	
Get agrochemicals on credit				0.715	
Get fertilizer on credit				0.728	
Get high yielding seed				0.366	
Promote leaders					0.961
Vote in electing board					0.963
Promote education					0.407
Eigenvalues	**10.9**	**1.8**	**1.5**	**1.3**	**1.1**
% variance	**14.3**	**10.1**	**8.0**	**7.4**	**7.2**
Cronbach's alpha	**0.87**	**0.87**	**0.83**	**0.77**	**0.67**

*Loadings below 0.35 have been removed

The last factor (05) seemingly underlies the concepts of ***democratic control and education benefits***. It accounts for 7.2% of the explained variance and two statements out of three had higher loadings. The three statements/items loaded in the factor clues about recognition of leadership ("Promote leaders"), exercise of control rights ("Vote in electing board") and education ("Promote education"). Collectively, those statements uncover the conceptions of democracy and control benefits enjoyed by the members.

8.3.1 Comparison of Key Benefits

Following the extraction, factor scores were computed for identified key areas of benefits applying the regression method following DiStefano, Zhu, and Mindrila (2009). Factor scores were generated for key five areas of benefits for 309 respondents. Mean values of factor scores in partially and fully integrated co-operatives are included in Table 8-9. Analysts have used factor scores in various subsequent analyses such as analysis of variance (ANOVA), correlation and multiple regression analysis (DiStefano et al., 2009; Grice, 2001a, 2001b; Kawashima & Shiomi, 2007; Keskin, Daskiran, & Kor, 2007). These were standardised scores (with zero mean and standard deviation = 1). The computed factor scores were decomposed to partially and fully integrated co-operatives to see whether the scores are different between them. All mean scores in partially integrated co-operatives were negative and small. The negative sign indicates low benefits. The mean scores of the fully integrated co-operatives were positive but slightly larger than zero and that implies slightly higher benefits.

A two-sample t-test was performed on factor scores following Kawashima and Shiomi (2007) who performed an analysis of variance (ANOVA) on factor scores in their study. According to the results, mean scores of two key areas of member benefits were significantly different between the co-operatives. They are; 1. Business and financial, and 2. Technology and information. Thus, their mean score values were larger in the fully integrated co-operatives. This suggests that respondents in the fully integrated co-operatives have significantly better business and financial, and technology and information benefits compared to the partially integrated co-operatives.

Table 8-9: Comparison of key areas of benefits

Key benefit area	Mean factor scores		t-test of difference	
	Partially integrated	Fully integrated	t-stat.	Prob.> ItI
Business and financial	-0.12740	0.1233437	-2.45	0.0149**
Livelihood	-0.02876	0.0278473	-0.546	0.5854
Technology and information	-0.09854	0.0954026	-1.999	0.0465**
Low-cost inputs	-0.07276	0.0704524	1.4045	0.1612
Democratic control and education	-0.00173	0.0016773	-0.029	0.9761

**Significant at 5% level

Business and financial benefit was identified as the main key benefit among five key areas of benefits. This key benefit represents various financial returns to members in the form of subsidised prices of inputs and services, high interest on members' savings, financial grants during emergency situations such as crop failures and illnesses, various sponsorships given to members or their families, better prices received for products and so forth. Moreover, this includes the benefits of controlling a business directly linked to members' farming enterprises. Members receive business training, leadership training and involve in developing business strategies. This result corroborates with the finding of many others. Nevertheless, in a different context, this finding is comparable to Alho (2015). According to Alho (2015) members of Finish agricultural co-operatives considered financial-oriented benefits as an important member benefit from their vertically integrated co-operatives. This result also supports the findings of Möllers, Traikova, Bîrhală, and Wolz (2018). As they reported that smallholder members of Romanian agricultural co-operatives have benefited from quick access to capital and various family support services and sponsorships. Fischer and Qaim (2012a), and Nugussie (2010), also found accessibility to credit services as an important member benefit in their studies. Furthermore, Bernard and Spielman (2008) reported that 71% of the respondents in their study has identified they benefitted through credit.

More importantly, business and financial benefit were significantly different between partially and fully integrated co-operatives. This finding concludes that significantly better business and financial benefits were accrued to the respondents in the fully integrated co-operatives. Accordingly, the members get better business and financial benefit when their co-operatives are fully vertically integrated.

Livelihood benefit was the second most important key area of benefits according to the results. This constituted benefit items such as increased income, yield, production, product price, assets, and

product quality. These results support other recent studies that discuss livelihood benefits. For instance, Sisay et al. (2017b) examined direct and indirect livelihood benefits to members from seed producer co-operatives in Ethiopia. Bacon et al. (2008) also showed similar livelihood benefits of members link to fair trade co-operatives in Nicaragua in the form of enhanced knowledge on farming, rise of investment on farming infrastructure, and monetary savings. R. King et al. (2013) ascertain that increased economic opportunities, alternative ways of living, improved knowledge and supplying tools to develop lands as important benefits among the members of Latin American agricultural co-operatives.

Additionally, members have realised livelihood benefits through improved bargaining position (Rist et al., 2010), innovative technology development (Haque et al., 2009), better income, more savings and reduced input costs (Getnet & Anullo, 2012), exposure visits and training access (Nugussie, 2010), better price (Bernard & Spielman, 2009; Möllers et al., 2018; Wollni & Zeller, 2007), technical training (Ekepu et al., 2017), extension services, input provision, (Bernard & Spielman, 2008), access to assets (Fischer & Qaim, 2012a), producing safe products through technical assistance and monitoring (Naziri et al., 2014).

However, members' livelihood benefits were more comparable between partially and fully integrated co-operatives as shown by the results. This suggests that co-operative members have more comparable livelihood benefits regardless of whether their co-operative is fully integrated or partially integrated. This could be a result of co-operative's operating principles that promotes equity.

The third important key area of members' benefit is technology and information. This key area consisted of benefits from accessing technology and information. Members have obtained seeds of high-value crops, production technology, and market information from their co-operatives. The meaning of benefit statements included in this key area of benefit suggest access to technology and market information. These results support the findings of many others. For instance, authors have demonstrated that members of co-operatives have benefitted significantly through the adoption of IPM technology (Ma & Abdulai, 2019), water-saving irrigation technology (Zhang, Fu, Wang, & Zhang, 2019), price information (Bernard & Spielman, 2008), and promoting adoption of innovations through efficient information flow (Fischer & Qaim, 2012a) due to their co-operatives.

This study also found that the respondents in fully integrated co-operatives accrued significantly better technology and information benefits compared to their counterparts. This difference could be linked to relatively better technology and information services provided by the fully integrated co-operatives to their members compared to partially integrated co-operatives. These results conclude that the members have better technology and information benefits when their co-operative is fully vertically integrated than partially integrated.

Low-cost inputs were the fourth important key area of member benefits found in this study. This key area of benefit included the statements related to the inputs and services members receive on credit from their co-operatives (such statements; “Get seeds on credit”, “Get agrochemicals on credit”, and “Get fertiliser on credit”). This supports the findings of Mevlüt and Ali (2019) who reported that members in agricultural co-operatives in Turkey have recognised that the inputs and services provided to them on credit by their co-operatives have been an important benefit for them. Provisions by co-operatives on credit may have helped smallholders who do not have required operating capital to carry out their farming activities.

A significant difference in members’ credit availability benefit was not found between partially and fully integrated co-operatives. This result suggests similar credit availability benefits to respondents irrespective of the co-operatives’ level of vertical integration.

Democratic control and education was the fifth most important key member benefit. Figueiredo and Franco (2018) have also identified similar democracy and control benefits of members in a developed country context. They found great satisfaction among members in Portugal co-operatives when they have more power and control in their co-operatives. This can be associated with members’ ability to be involved in controlling decisions for their benefits.

Members’ democratic control and education benefit was not significantly different between partially and fully integrated co-operatives. Obviously, this is attributed to the unique governance and control arrangements embedded in partially and fully integrated co-operatives. This result is contrary to the findings of Alho (2015) who concludes a declining significance of control benefits when a co-operative is more vertically integrated. However, Alho (2015) referred vertical integration to the allocation of control rights of a co-operative to a downstream firm in a product value chain which is different from the vertical integration defined in this study.

8.4 Comparison and Analysis of Farm Financial Performance

Number of farm-level financial and non-financial performance measures are discussed in the descriptive results chapter. This section compares and analyses members' farm financial performance. Influenced by the work of several others (Chagwiza et al., 2016; Chagwiza, Muradian, Ruben, & Tessema, 2013; Minten, Randrianarison, & Swinnen, 2009; Miyata, Minot, & Hu, 2009; Verhofstadt & Maertens, 2014; Warning & Key, 2002), this study considered cost of production, profit per unit of produce and households' annual economic profit as the indicators of farm financial performance. Accordingly, the cost of production per kilogram of rice (COP), profit per kilogram of rice (Profit) and the households' economic profit from rice farming were compared and analysed.

The first two indicators were measured per unit basis (per kilogram of rice). Per unit financial measures were used in order to eliminate the influence of size factors such as differences in farm size. The mean values of three financial performance indicators are provided in Table 8-10. All three indicators showed a significant mean difference between the members in partially and fully vertically integrated co-operatives ($p<0.05$). According to Table 8-10, farmers in the fully integrated co-operatives, on average, produced a kilogram of rice at a significantly lower cost compared to their counterparts. Conversely, the profit per kilogram of rice and household's economic profit from rice were significantly high among the members in fully integrated co-operatives than the partially integrated co-operatives. These simple mean comparisons demonstrate that the respondents in the fully integrated co-operatives have both higher profits and households' economic profit from rice.

Table 8-10: Financial performance indicators

Financial performance indicator	Partially integrated	Fully integrated	Total sample	t-statistics	Prob.> ltl
Cost of production (LKR/kg)	23.61	21.79	22.69	2.4499	0.015**
Profit (LKR/kg)	18.70	22.91	20.84	-2.7497	0.006***
Households' economic profit from rice (LKR/Year)	482,324	850,824	669,556	-3.5982	0.000***

***Significant at 1% level, **Significant at 5% level

However, this simple comparison between the respondents could have been biased, as the initial assignment of the members into co-operatives have not been random. It was evident from a number of sources (discussions with DCD's officials, and interviews with co-operative officers) that the studied co-operatives have defined geographical boundaries. Interviewed officers of both types of co-operatives said; "*only those people reside within our co-operative area can become members. It*

is illegal to be members of more than one multi-purpose co-operative societies by the law". Only those residents who live within the service area of a co-operative are eligible to become a member of that particular co-operative. Accordingly, individuals are lacking choice in their membership between the partially and fully vertically integrated co-operatives. Therefore, the simple mean comparison could lead to erroneous conclusions regarding co-operatives' influence on members financial performance. To overcome this ambiguity, PSM model was performed on data to estimate the average treatment effect (ATE). The theoretical foundation of PSM methodology and its implementation are discussed in Chapter 5. This section reports the results of PSM model.

8.4.1 Specification of PSM Model

A number of observable covariates were used in estimating the propensity scores. As shown in Table 8-11, respondents in partially and fully integrated co-operatives were distinguishable from some of the characteristics. However, the respondents in both partially and fully integrated co-operatives were almost similar in their demographic and household characteristics except for their involvement in off-farm work. As a percentage, relatively a large number of respondents in the partially integrated co-operatives were involved in off-farm work.

Table 8-11: Descriptive statistics of control variables used in the PSM model

Variable	Partially integrated	Fully integrated	Total sample	t-test of difference	
				t-stat.	Prob.> ItI
Respondent's demographics and household characteristics					
Respondent's age (years)	53.41	54.70	54.05	-1.0402	0.299
Respondent's education (years)	9.07	9.09	9.08	-0.0679	0.946
Respondent's experience in rice farming (years)	28.23	26.65	27.43	1.1514	0.2505
Respondent's household size (Persons)	3.73	3.82	3.78	0.4927	0.623
Off-farm work (0=don't have off-farm work, 1=have off-farm work)	0.74	0.52	0.63	3.9954	0.000***
Farm characteristics					
Farm size when joined the co-operative (Hectares)	0.89	1.46	1.18	-4.04	0.000***
Contextual factors					
Access to irrigation water (3=good, 2=moderate, 1=poor)	1.42	1.03	1.22	9.1432	0.000***
Distance to nearest township (km)	7.92	8.62	8.27	-1.6065	0.109

***Significant at 1% level, **Significant at 5% level

Respondents were also different in their farm characteristics when they initially join the respective co-operatives. The size of the farm when they joined the co-operative was used to represent farm characteristics, because the current farm size could have been influenced by the treatment and could have violated the conditional independent assumption. Therefore, the original farm size, instead of current farm size, was used to satisfy this fundamental requirement. Respondents in the fully integrated co-operatives had relatively large farms and their size was significantly different to that of the respondents in partially integrated co-operatives.

There were important contextual differences among the respondents. In particular, access to irrigation water was significantly different between them. Respondents in fully integrated co-operatives have significantly higher access to irrigation water. However, there were no difference between the respondents in terms of relative location of their farms. Relative distance of respondents' farms to nearest township were comparable between two groups of respondents.

8.4.2 Results of PSM Model

This section reports the results of the PSM model. The conceptual overview, assumptions, and procedure followed in implementing PSM are discussed in Chapter 5 (Section 5.12.6). The propensity score is the probability of being selected for the treatment (being a member of the fully integrated co-operatives in this case). According to the results, assignment into fully integrated co-operatives was influenced by a number of factors such as respondents' demographic and household characteristics, farm characteristics and contextual factors as shown in Table 8-12.

Table 8-12: Estimates of the PSM model

Variable	Estimate	Std. Error	Pr(>|z|)
Intercept	-6.781	1.661	0.000***
Respondent's demographics and household characteristics			
Respondent's age (years)	-0.000955	0.019471	0.961
Respondent's education (years)	0.022681	0.052914	0.668
Respondent's experience in rice farming (years)	-0.013256	0.016065	0.409
Respondent's household size (Persons)	0.313496	0.101557	0.002***
Off-farm work (0=don't have off-farm work, 1=have off-farm work)	-0.727390	0.288830	0.011 **
Farm characteristics			
Farm size when join the co-operative (Hectares)	0.486239	0.138670	0.000***
Contextual factors			
Access to irrigation water (3=good, 2=moderate, 1=bad)	1.137154	0.348506	0.001 ***
Distance to nearest township (km)	0.314038	0.046899	0.000 ***

***Significant at 1% level, **Significant at 5% level, *Significant at 10% level

Of the respondent's demographic and household characteristics, household size and off-farm work have significantly determined the selection of individuals into fully integrated co-operatives ($p <$ 0.00). However, those two covariates had contrasting signs. Respondent's household size had a positive sign and this implies that respondents with larger households are more likely to be a member of fully integrated co-operatives. Having more members in a household could be seen as a reliable source of farm labour, particularly during peak labour demand stages of the crop's lifecycle such as sowing and harvesting. Particularly, when the farm size is large, demand for manual labour is high. It was found that respondents in fully integrated co-operatives have relatively large farms and obviously they need more labour. Moreover, households with reliable supply of labour are best positioned to be involved in labour demanding value-adding activities such as post-harvest drying of rice and other logistic operations such as transporting harvest from their farms to storage houses. These results suggest that the respondents with a greater number of members in their households are highly likely to become members of fully integrated co-operatives.

Conversely, off-farm work had a negative sign. This suggests that the respondents with off-farm work are less likely to be members of fully integrated co-operative. This could be attributed to the higher opportunity cost of being involved in further value-adding activities such as post-harvest drying to meet the quality requirements compared to involvement in off-farm work. Furthermore, descriptive results revealed that those respondents with off-farm work held relatively small landholdings. Hence, it may be costly for them to be involved in value-adding activities through co-operatives due to lack of economies of scale.

Farm characteristics have played an important role in deciding the membership. In particular, initial farm size at the time of joining a co-operative has been an important determinant of assigning to partially and fully integrated co-operatives. Result shows that farm size when joining the co-operative had positively and significantly ($p <$ 0.00) influenced on the probability of being selected into two groups of co-operatives. This finding suggests that the respondents with relatively larger farms are more likely to become members of fully integrated co-operatives. This could be a result of economies of scale. Large farms could result more volume of production which could bring necessary economies of scale in production and value adding activities. Accordingly, it would have been more advantageous for individuals with large farms to join a fully integrated co-operative and add more value to their products.

Contextual factors also have influenced the selection into co-operatives. Two of the contextual covariates; access to irrigation water and distance to nearest township, had significantly ($p < 0.00$) influenced assignment into two groups of co-operatives. Respondents with better access to water had a higher probability to become a member of a fully integrated co-operative. Accordingly, the respondents with assured supply of irrigation water to their farms are less vulnerable to production risk. They are in a position to plan production operations more precisely than those with less assured irrigation water supply. There is also higher chance to grow high value rice varieties (such as "Keeri samba" and other short grain rice varieties that take at least two more weeks for maturity compared to long grain varieties which are low value) when there is better access to irrigation water. These findings suggest a higher probability of respondents with better access to irrigation water to become members of fully integrated co-operatives.

The second contextual factor; farms' relative location has been an important determinant of becoming a member of fully integrated co-operatives. The covariate "distance to nearest township" had a positive and significant effect on the probability of selecting into fully integrated co-operatives. This explains that the respondents who own remotely located farms from a township are more likely to become members of fully integrated co-operatives. Remotely located farms are more likely to encounter higher transaction cost in supplying inputs, services, information, marketing and other value adding services. Fully integrated co-operatives in such situations can replace the market by supplying whole range of inputs and services of a product value chain by lowering the transaction cost. These observations explain that the individuals with remotely located farms who face relatively higher transaction cost are more likely to become members of fully integrated co-operatives.

8.4.3 Checking the Balancing Property

Following the estimation, the propensity score model was evaluated for its balancing property. Matching was carried out with one of the nearest neighbour matching options (one-to-one). Nearest neighbour matching is the most straightforward matching method. One-to-one (also called optimal matching) matching is efficient, and substantially improves the power and robustness of the matched inferences. It is appropriate when there is an almost equal number of treated and control units (B. B. Hansen, 2004; B. B. Hansen & Klopfer, 2006). This has resulted in a significant reduction in the matched sample compared to the original. The size of the matched sample reduced to 46%

of the original sample. Only 70 sample units (indicated in Figure 8-2) of the fully integrated co-operatives have matched with 70 units of partially integrated co-operatives.

Plot of propensity scores is shown in Figure 8-2 where each circle represents a sample unit's propensity score. Uppermost stratification indicates that there were five unmatched units in the fully integrated co-operatives (treatment units). This was possible when one-to-one matching was performed because there were five more treated units (157 sample units of fully integrated co-operatives) than control units (152 sample units of partially integrated co-operatives) in the original sample. The middle stratifications show the close match between the sample units of fully integrated co-operatives and the matched units of partially integrated co-operatives. The propensity scores of matched fully integrated and matched partially integrated sample units had skewed in opposite directions. The propensity scores of fully integrated sample units concentrated towards one whereas scores of the partially integrated sample units concentrated towards zero.

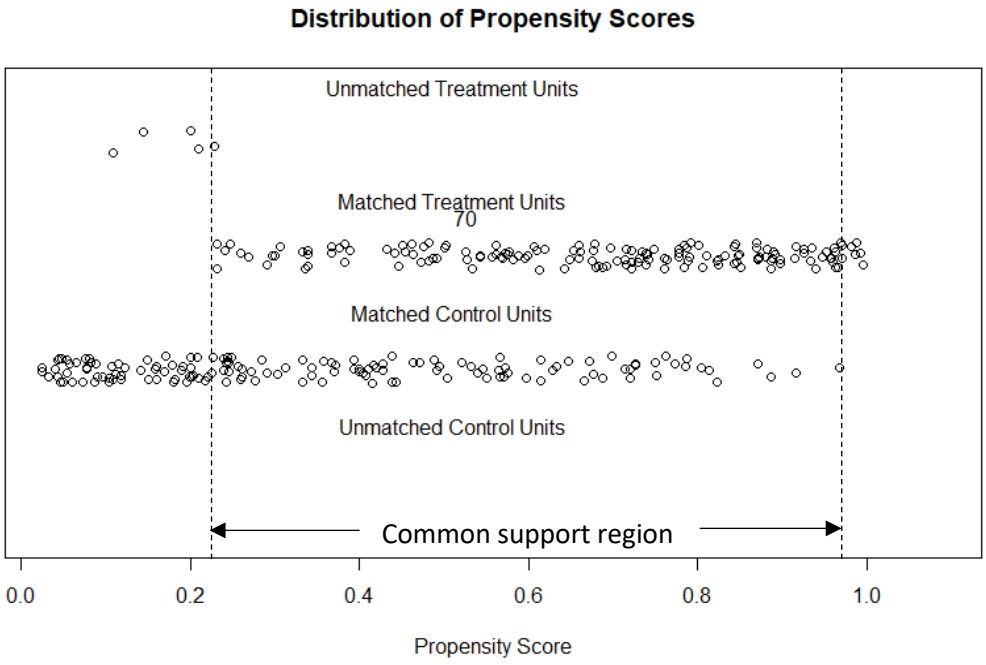

Figure 8-2: Distribution of propensity scores

The lowermost stratification shows that there were no any unmatched sample units (control units). This indicates that, except for five fully integrated sample units, all applicable fully integrated and partially integrated sample units have been utilised in estimating the propensity scores.

Those middle two stratifications in Figure 8-2 shows that there is a substantial overlap in the common support region in propensity scores. With respect to this study, the common support region is the region that overlap propensity scores corresponding to the sample units of partially and fully integrated co-operatives (two middle strata of circles lie between two dash lines in Figure 8-2).

Figure 8-3 shows the histograms of propensity scores before and after matching. It compares the distribution of propensity scores of partially and fully integrated sample units before and after the implementation of matching. Only minor deviations were observed between matched and original samples of fully and partially integrated co-operatives. Histograms were slightly different before and after matching of fully integrated sample units. Sample units corresponding to the propensity score below 0.2 have been eliminated after the matching. A notable difference was not observed before and after matching of partially integrated sample units.

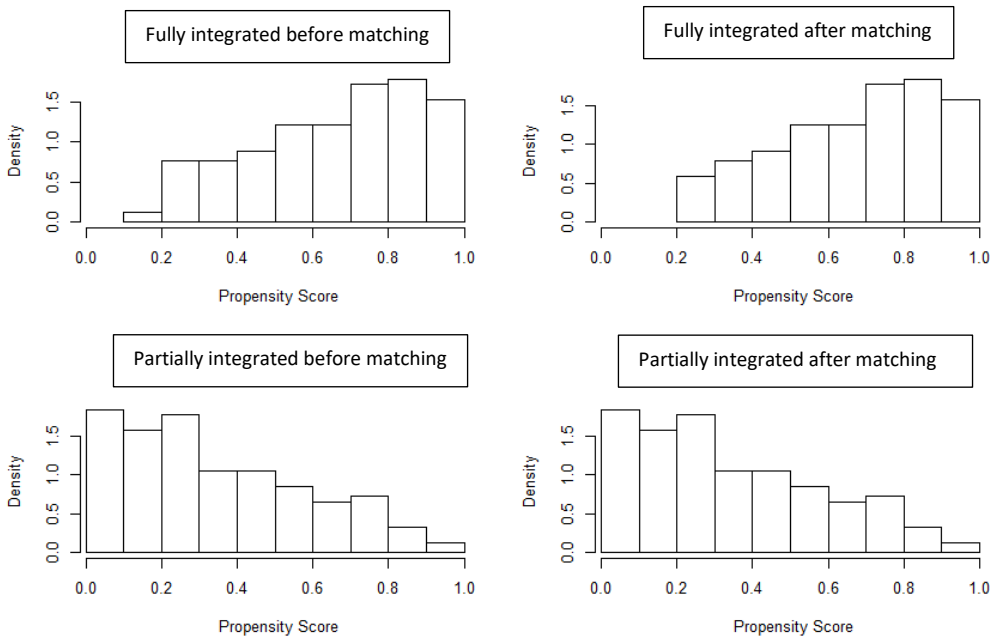

Figure 8-3: Histograms of propensity scores before and after matching

8.4.4 Average Treatment Effect

Estimates of the average treatment effects with re-sampled data are summarised in Table 8-13. Average treatment effect estimates of two of the financial performance indicators were consistent with the result of their mean comparisons apart from cost of production. The average treatment effect of the cost of production, however, was not significant, which showed a significant mean difference between the respondents before. The average treatment effect of cost of production is

inconsistent with the result of the mean comparison. This indicates that the cost of production among members of fully integrated co-operative was not significantly reduced compared to the partially integrated co-operatives. This result explains the fact that further downstream integration of co-operatives beyond product marketing, has not significantly reduced the cost of production of the sample of rice-growing members.

Contrary to the cost of production, average treatment effect of profit and households' economic profits from rice was consistent with the results of the mean comparison. It was found that respondents in fully integrated co-operatives earn LKR 4.57 more profit from a kilogram of rice compared to their counterparts and this was significant (p<0.05). Respondents in fully integrated co-operatives also earned significantly (p<0.1) higher economic profit from rice compared to their counterparts. Results demonstrated that the annual rice income of the respondents in the fully integrated co-operatives was as much LKR 323,351 higher than their counterparts. This concludes that the sample of respondents in fully integrated co-operatives have better profits and higher economic profits compared to their counterparts. On the other hand, further downstream integration of beyond assembling and marketing significantly increased economic profit from rice of the sample of rice growing members.

Table 8-13: Estimated average treatment effects

Financial performance indicator	**ATE**
Cost of production (LKR/kg)	-1.11
	(1.1795)
Profit (LKR/kg)	4.57**
	(1.9659)
Households' economic profit from rice (LKR/Year)	323,351*
	(170,953)

**Significant at 5% level, *Significant at 10% level
Standard errors are shown in parentheses

The result concludes that the members in fully integrated co-operatives have better financial performance. These findings support those of others who discuss differences in members' performance in different co-operatives (Bernard, Collion, et al., 2008; Bernard & Taffesse, 2012; Chagwiza et al., 2013; Francesconi & Heerink, 2011; Hellin et al., 2009; Shumeta & D'Haese, 2016; Verhofstadt & Maertens, 2014).

It was interesting to know significantly better financial performance among the respondents in fully integrated co-operatives despite majority of them perceived low to very low benefits from their co-operatives. This difference in financial performance seems to be a composite effect of many benefits those study co-operatives offered to members. Results revealed significantly high business and financial and production technology and information-related benefits among the respondents in fully integrated co-operatives compared to their counterparts. These two key areas of perceived benefits included a number of benefit dimensions for which respondents in the fully integrated co-operatives perceived and they have substantially benefitted, compared to their counterparts.

Following the application of PSM, respondents' cost of production was not significantly different between partially and fully integrated co-operatives. This could be attributed to the lack of significant difference in benefits the respondents have in supplying inputs and services from their co-operatives that have a direct impact on the cost of production. Consistent with this, the comparison of operational performance in input and service supply activities had only a marginal difference between partially and fully integrated co-operatives with slightly better performance in fully integrated co-operatives.

8.5 Determinants of Farm Financial Performance

This section presents the results of the series of linear regression analysis. The procedure followed in estimating the linear regressions are discussed in section 5.12.6 in Chapter 5. Results demonstrated that there is a number of other determinants of household's economic profit apart from the co-operative's level of vertical integration. Farmers' demographic and household characteristics, farm characteristics, contextual factors also significantly determined household's economic profit from rice apart from the co-operatives' level of vertical integration. These results were consistent across five regression specification as shown in Table 8-14.

Of the demographic and household characteristics, respondents' education, experience in rice farming and off-farm work have significantly determined household's economic profit. In particular, respondents' education and experience in rice farming have positively and significantly determined household's economic profit. This means for those who are better educated and more experienced, the economic profit from rice was greater. This could be considered as a result of efficient management skills and technical knowhow of those respondents shaped by their education and experience. Contrary to this, respondents' off-farm work had negatively associated with their annual rice income. That is, annual rice income was low for those respondents who had off-farm

work in the sample. When respondents take up off-farm work, they might have to compromise part of their time available to work on their own farm. Involvement in off-farm work, on the other hand, might have reduced the supervision of hired labor leading to costly production due to inefficiencies ultimately lowering the economic profit from rice.

Table 8-14: Estimated regression coefficients

Variable	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5
Dependent variable					
Log households' economic profit from rice (LKR/year)					
Intercept	11.839***	11.646***	11.833***	11.125***	11.478***
	(0.467)	(0.558)	(0.5557)	(0.567)	(0.479)
Independent variables					
Farmers' demographics and household characteristics					
Farmer's age (years)	-0.009	-0.010	-0.010	-0.008	-0.008
	(0.007)	(0.007)	(0.0068)	(0.007)	(0.007)
Farmer's education (years)	0.063***	0.059**	0.059**	0.068***	0.066***
	(0.018)	(0.018)	(0.0182)	(0.018)	(0.018)
Farmer's experience in rice farming (years)	0.010*	0.010*	0.011*	0.009	0.009
	(0.006)	(0.006)	(0.0059)	(0.006)	(0.006)
Farmer's household size (Persons)	0.042	0.056	0.041	0.069**	0.051
	(0.035)	(0.035)	(0.0348)	(0.034)	(0.035)
Off-farm work (0=don't have off-farm work, 1=have off-farm work)	-0.352***	-0.425***	-0.371***	-0.422***	-0.371***
	(0.107)	(0.108)	(0.109)	(0.105)	(0.106)
Farm characteristics					
Farm size (Hectares)	0.115**	0.121***	0.102*	0.123**	0.104**
	(0.041)	(0.003)	(0.041)	(0.040)	(0.041)
Contextual factors					
Access to irrigation water (3=good, 2=moderate, 1=bad)	0.212*	0.305**	0.239*	0.322***	0.248**
	(0.124)	(0.125)	(0.125)	(0.122)	(0.124)
Distance to nearest township (km)	-0.011	0.017	-0.003	0.013	-0.006
	(0.015)	(0.014)	(0.016)	(0.013)	(0.015)
Co-operatives' level of vertical integration					
Integration dummy (1=fully integrated, 0=partially integrated)	0.396***		0.343**		0.338***
	(0.119)		(0.123)		(0.122)
Key areas of benefits					
Factor 1 (Business and financial)		0.092	0.054		
		(0.059)	(0.061)		
Factor 2 (Livelihood)		0.049	0.037		
		(0.057)	(0.057)		

Factor 3 (Technology and information)		0.099* (0.059)	0.077 (0.059)		
Factor 4 (Credit availability)		-0.013 (0.057)	-0.023 (0.056)		
Factor 5 (Democracy and control)		0.023 (0.051)	0.024 (0.050)		

Table 8-14: Continued

Items of benefits with the largest mean scale					
Income increase				0.037 (0.056)	0.009 (0.056)
Price increase				-0.022 (0.052)	-0.022 (0.051)
Easy access to credit				0.140*** (0.043)	0.123*** (0.043)
Promote leaders				-0.054 (0.045)	-0.058 (0.044)
R^2	0.222	0.212	0.227	0.223	0.240
Adjusted R^2	0.198	0.177	0.190	0.192	0.207
F-statistic	9.375	6.052	6.166	7.042	7.168
P-value	0.000	0.000	0.000	0.000	0.000

***Significant at 1% level, **Significant at 5% level, *Significant at 10% level
Standard errors are shown in parentheses

Inclusion of a dummy variable in the regression models, as a proxy to represent co-operatives' level of vertical integration, produced consistent results to PSM analysis and comparison of means of financial performance indicators. The integration dummy was significant and it was positively associated with households' economic profit. This result consistently confirms the findings of the mean comparison and estimates of average treatment effects of households' economic profits reported in previous sections. This finding recurrently suggests the fact that further downstream integration of the study co-operatives to include processing, wholesaling and retailing activities increase members' economic profit. On the other hand, respondents in the fully integrated co-operatives have significantly higher economic profits compared to their counterparts.

Alternate inclusion of the integration dummy and key areas of benefits in the regression (columns Reg. 2 and 3 in the Table) also produced an interesting result. Once the iteration dummy was omitted in Reg. 2, technology and information benefit was significantly and positively associated

with households' economic profit out of five key areas of benefits. Alternatively, none of the key areas of benefits was significant once the integration dummy was included in Reg. 3. In there, the integration dummy was significant with a positive sign. These alternatively significant results in two alternative regressions suggest the complementarity between the level of vertical integration and key areas of member benefits.

Accordingly, it can be concluded that the respondents who had significantly benefitted from technology and information derived significantly high economic profits from rice. It was found earlier in this chapter that respondents in the fully integrated co-operatives had a better perception of technology and information benefits. It is apparent, accordingly, for the respondents in fully integrated co-operatives to have a higher economic profit induced by the technology and information benefits they enjoyed.

Similarly, the alternative inclusion of four original perceived benefit statements with the highest mean scales and integration dummy also produced interesting results. In Reg. 4, "easy access to credit" was significant and positively related to the households' annual rice income. This suggests that those respondents who had better access to credit have better annual rice income. Earlier in this chapter, it was discussed that the respondents in the fully integrated co-operatives held a relatively and significantly high perception that benefits from "easy access to credit" were much better compared to the respondents in the partially integrated co-operatives. Based on this, it is possible to conclude that respondents in the study sample who accessed credit easily from their co-operatives obtain higher annual rice incomes. It is obvious, therefore, that the respondents in the fully integrated co-operatives have a higher annual rice income.

In Reg. 5 those four original perceived benefit items (measured on 5 point-Likert type scale) with highest mean scales and the integration dummy were simultaneously included to check the complementarity between them. In there, both "easy access to credit" and integration dummy were significant. Both had positive signs indicating higher perception of "easy access to credit" and full integration results in higher economic profits. Being consistent with the results of Reg. 4, respondents' perceptions of "easy access to credit" have impacted households' economic profit. The result of Reg. 5 further suggests that the four benefit statements included in the model do not account for the total variance in annual rice income.

According to the results, financial performance was attributed to various other households, farm, and contextual factors apart from the co-operative's level of vertical integration. This result supports those of other studies (Abebaw & Haile, 2013; Ali & Abdulai, 2010; Bernard, Taffesse, et al., 2008; Bijman et al., 2016; Cunguara & Darnhofer, 2011; Fischer & Qaim, 2012a; Shumeta & D'Haese, 2016; Verhofstadt & Maertens, 2014; Wang et al., 2012; Wossen et al., 2017) who demonstrated similar association of members performance to various demographic, farm and the contextual factors.

As shown in Table 8-14, households' economic profit from rice was positive and significantly associated with respondents' education. This evokes the fact that better income is attributed to better-educated members. These results support the findings of several other studies. For instance, Shumeta and D'Haese (2016) found that better-educated members in co-operatives have sold large volumes of coffee and obtained better income compared to less-educated members. Bernard, Taffesse, et al. (2008) found that educated members getting better prices compared to less educated members. Ji et al. (2019) found a positive association between adoption of safe production technology and education. However, this result contradicts with the findings of Abebaw and Haile (2013) who reported a negative relationship between better technology education level of co-operative members in Ethiopia.

The positive and significant association between respondents' rice farming experience and households' economic profit suggests that more-experienced members derive higher economic profits. This is in contrast to the findings of Ji et al. (2019). Despite not particularly on financial performance, they found better technology adoption by less experienced co-operative members. Similarly, the positive and significant association of household size and households' economic profit implies that larger the size of households, greater the financial performance. This is in contrary to the findings of Ma and Abdulai (2016) that found a negative relationship between household size and income.

Negative association of households' economic profit and off-farm work suggests lower economic profit for those members involved in off-farm work. This corroborates the findings of Ji et al. (2019) who demonstrated higher rate of technology adoption by the members who do not have off-farm job experience. Financial performance of such individuals could be further low if such an individual is a member of a partially integrated co-operative. The results showed that there was a significantly large percentage of respondents in the partially integrated co-operatives involved in off-farm work.

Association of farm size and households' economic profit suggest that large land holders perform financially better. This has been a result of economies of scale of large farms in supplying inputs, services, and marketing of large quantities of products. Further, financial performance could be further high among the large farm holders who are members of fully integrated co-operatives. According to the result, there was significantly a large number of large farm holders in the fully integrated co-operatives. This result consistent with Verhofstadt and Maertens (2014), Shumeta and D'Haese (2016), and Bernard, Taffesse, et al. (2008), who found that co-operative members with large farms perform better compared to those members with small farms. This finding however does not corroborate with, Fischer and Qaim (2012a) and Ito et al. (2012) who found much better performance among members with small farms.

Positive and significant association between access to irrigation water and households' economic profit propose that members live in the regions with better agriculture infrastructure gain better financial performance. Particularly, rice is grown mainly under flooded conditions and water is a critical input in rice production (Tuong & Bouman, 2003). Thus, according to the results, farms of the members of fully integrated co-operatives located in the areas with better access to irrigation water. This suggests, further better financial performance for the members of fully integrated co-operatives whose farms are located in the areas with developed agriculture infrastructure.

This result corroborates with several others who found association of contextual factors on the performance of co-operative members. For example, Verhofstadt and Maertens (2014) found higher benefit among co-operative members when their farms are located remotely from the markets. Corsi et al. (2017), on the other hand, found members of co-operatives with secure land tenure have better access to the local market compared to those without proper tenure security. This finding contradicts with Abebaw and Haile (2013) found that low technology adoption by the co-operative members when their farms are more remotely located from the market.

8.6 Summary of Results

This chapter introduces the results pertaining to the third objective of this study. First, survey data on member benefits were summarised and compared to provide an overview of various benefit items brought under the six dimensions. Irrespective of the co-operatives' level of vertical integration, preliminary analysis of data demonstrated low to moderate member benefits for the members of study co-operatives. Preliminary analysis further revealed that there were no social and environmental benefits to members. However, for most of the benefit items in each benefit

dimension, respondents in fully integrated co-operatives held relatively and significantly higher perception. This suggests relatively higher benefits for the members when their co-operatives are fully integrated.

Application of EFA on benefit data led to identify five key areas of member benefits in study co-operatives. They are; business and financial, livelihood, technology and information, credit availability, and democracy and control. Of them, respondents in the fully integrated co-operatives had relatively better and significant business and financial, and technology and information benefits compared to those in partially integrated co-operatives. Other key areas of benefits (livelihood, credit availability, and democracy and control) remained comparable between the respondents in partially and fully integrated co-operatives. Accordingly, it can be concluded that members receive better business and financial, and technology and information benefits when their co-operatives are fully integrated.

A comparison of financial performance revealed that they are significantly different between the respondents in partially and fully integrated co-operatives. Results demonstrated significantly lower cost of production, higher profits and households' economic profit from rice among the respondents in fully integrated co-operatives. Except for the cost of production, these results remained consistent with the ATE and suggested they are unbiased. These results propose that members financial performance will rise when their co-operative is fully integrated.

Further analysis of financial performance revealed other factors associated with members' financial performance apart from the co-operatives' level of vertical integration. Respondents' demographic and household, farm, and contextual characteristics were found to be associated with financial performance in addition to the level of co-operatives' vertical integration.

9 GENERAL DISCUSSION AND CONCLUSIONS

9.1 Introduction

This chapter provides an overall discussion and conclusion of this research. Following the introduction, Section Two reiterates aims and objectives of this study. Section Three provides a discussion of the findings which coincide with the research objectives and hypotheses. Section Four discusses the link between this study's results and key literature. Section Five reviews the implications of this study, while the limitations are discussed in Section Six. The last section describes the contribution of this study and outlines recommendations for future research.

9.2 Aims and Objectives of the Research

This research aimed to analyse vertical integration in agricultural co-operatives by paying attention to co-operative performance, members' benefits, and performance. Following the development of the theoretical framework drawn from four distinct bodies of literature (collective action, co-operative, value chain, and vertical coordination), this research followed a sequential mixed-methods approach starting with a qualitative study and following with a quantitative study. The qualitative study aimed to analyse and compare the performance of co-operatives studied. The quantitative study aimed to analyse and compare members' benefits and financial performance, using survey data. Overall, the study achieved four objectives as follows:

Objective 1: to develop a framework to analyse the benefits and performance of vertically integrated co-operatives.

Objective 2: to analyse and compare the performance of partially and fully integrated co-operatives in Sri Lanka's rice sector.

Objective 3: to analyse and compare members' benefits of partially and fully integrated co-operatives in Sri Lanka's rice sector

Objective 4: to analyse and compare the members' financial performance of partially and fully integrated co-operatives in Sri Lanka's rice sector.

The following section presents the overall study discussion.

9.3 Overall study discussion

This section links the key findings that emerged from qualitative and quantitative studies with the study objectives.

Objective 1: to develop a framework to analyse the benefits and performance of vertically integrated co-operatives.

Comprehensive review of relevant literature enabled developing a unique framework to analyses vertically integrated agricultural co-operatives using theory on co-operatives, collective action, value chain, and vertical coordination. The framework consists of four important components. First, the framework includes two levels of vertical integration; partially integrated co-operatives and fully integrated co-operatives. Partially integrated co-operatives centrally control the supply of inputs, services and information, production, and assembling and marketing of primary products. Fully integrated co-operatives centrally control the supply of inputs, services and information, production, assembly and marketing of primary products, processing, wholesaling, and retailing. The second component is the performance of co-operatives. This is measured with conventional financial ratios used to measure the performance of businesses since vertical integration is driven mainly by economic objectives of co-operatives than their social objectives. It was hypothesised that fully integrated co-operatives have better financial performance since they would be able to add and capture more value by taking control of the whole value chain from input supply through to the retail of final consumer products. The third component is the member benefits. These benefits are measured as perceived by the members. It was expected that members of fully integrated co-operatives would have better benefits as a result of better performance of fully integrated co-operatives. The fourth component is the members' performance. This is measured as financial performance of members including their cost of production, profits per unit of produce and households' economic profit. The framework suggests to have better financial performance among the members of fully integrated co-operatives since they have a better ability to reduce coordination costs and appropriate more value compared to partially integrated co-operatives since they control all the value chain activities from input supply through to the retail of final consumer product.

Objective 2: to analyse and compare the performance of partially and fully integrated co-operatives in Sri Lanka's rice sector.

Although this study assumed to have better performance in fully integrated co-operatives, results of the co-operatives' financial performance were inconclusive. Arriving at a firm conclusion was

hindered by insufficient data and the small sample size. Of the total sample of co-operatives included in this study, one of the partially integrated co-operatives denied declaring their financial information and a reliable comparison of performance could not be performed due to the limitation of data. The overall financial performance of both groups of co-operatives was unsatisfactory and found to be financially unhealthy. In particular, the leverage of these co-operatives was over 80%, while solvency accounted for almost below 20%. These ratios suggest high debt levels in the co-operatives studied. The liquidity ratio value of around one suggests that these co-operatives are facing a challenge of meeting their current obligations. Annually fluctuated low-profit margins suggest that these co-operatives have not satisfactorily managed their sales costs. Despite partially integrated co-operatives having relatively higher margins, it cannot be reasonably concluded that fully integrated co-operatives are less profitable. Fully integrated co-operatives distribute a significant share of their surplus to members in more ways than partially integrated co-operatives. In terms of efficiency, both partially and fully integrated co-operatives were more comparable, suggesting that both generate comparable sales from the assets they own. Finally, low efficiency ratio (around 0.02 – 0.05) implies that the co-operatives are less efficient in employing their assets to generate sales.

Performance of co-operatives was affected for a number of reasons. Despite vertical integration implying strict control of value adding activities, weak control of some due to the organisation's value adding activities was observed. This weak control impacted performance of co-operatives and did not significantly contribute to the added value and capturing of higher value. For example, low to moderate levels of control intensity was observed in production and supply of inputs and services. Weak control of co-operatives' paddy rice marketing activities was also noted and a significant portion of members in both partially and fully integrated co-operatives sell to outside. Services such as product transport and paddy rice drying facilities were not regularly supplied by both partially and fully integrated co-operatives to the members. These control weaknesses exist at different activity levels resulting in low value added and appropriation.

Both partially and fully integrated co-operatives experienced some degree of governance and managerial challenges in the past. Poor governance and management also affected the performance of co-operatives. Directors and managers in both partially and fully integrated co-operatives were found to be less competent. Renumeration schemes of these co-operatives were also less attractive to absorb competent managers.

Objective 3: to analyse and compare members' benefits of partially and fully integrated co-operatives in Sri Lanka's rice sector.

Analysis of benefits revealed five groups of key member benefits in the co-operatives studied. They are: business and financial, livelihood, technology and information, low-cost inputs, and democratic control and education. Two of the five groups of key benefits were found to be significantly different between partially and fully integrated co-operatives. These results partially support the research hypothesis that members in fully integrated co-operatives have better benefits than partially integrated co-operatives. Fully integrated co-operatives had significantly better business and financial benefits. In fact, the members in fully integrated co-operatives benefited from more business support services provided by their co-operatives. Members in fully integrated co-operatives received better opportunities to become involved in formulating business strategies, received better price information, accessed subsidised credit, received various financial receipts in the form of better compensation and sponsorships. Moreover, they gained cost reduction through better subsidised fuel and interests on credit and this could have reduced some of their operational and capital costs.

The fully integrated co-operatives had better technology and information benefits compared to the partially integrated co-operatives. According to the results, fully integrated co-operatives provided better technology and information services. For instance, fertiliser and seeds provided by the fully integrated co-operatives were more technologically improved compared to partially integrated co-operatives. Fully integrated co-operatives also provided more technical training which could have contributed to technology upgrading. Additionally, fully integrated co-operatives provided better market information.

Three of the key benefit groups found in this study were comparable between partially and fully integrated co-operatives. First, both partially and fully integrated co-operatives had more comparable livelihood benefits. This suggests similar increase in farm income, price, and production along with comparable growth in farm and household assets such as land and product quality.

Second, a significant difference in low-cost input benefits was not found between partially and fully integrated co-operatives. This result concludes that there has been comparable reduction of most of the production inputs such as pesticide, weedicide, chemical and fertiliser costs for both partially and fully integrated co-operatives. Both partially and fully integrated co-operatives provided more

comparable services on a credit basis. For instance, co-operatives provided fertiliser and agrochemicals on credit at comparable terms of transactions such as interest free settlement of credit at the end of the cropping season.

Third, members' democracy and education benefits were also comparable between partially and fully integrated co-operatives. This is attributed to the unique governance and control arrangements embedded in both partially and fully integrated co-operatives as stipulated in the Co-operative Societies Law of 1972 of Sri Lanka. The low defined the composition of directors and method of voting (one-member-one-vote). The low also recognised the principle of member education in co-operatives. Therefore, member education has been a mandatory function of the co-operatives regardless of their level of vertical integration. This result is contrary to the findings of Alho (2015) who found declining control benefits when a co-operative is more vertically integrated contractually with another downstream firm.

Objective 4: to analyse and compare the members' financial performance of partially and fully integrated co-operatives in Sri Lanka's rice sector.

The results of this study revealed better financial performance for the members of fully integrated co-operatives compared to partially integrated co-operatives. The results support the hypothesis that members in fully integrated co-operatives have better financial performance than the members in partially integrated co-operatives. Moreover, this result was consistent across the analytical tools used for the comparison. Unexpectedly, the cost of production was inconsistent between mean comparison and PSM model. Profit per kilogram of rice and households' economic profit from rice remained consistent between the two statistical tools. These results suggest that fully integrated co-operatives have further potential to increase members' farm financial performance than partially integrated co-operatives. Better farm financial performance of the members in fully integrated co-operatives is a composite effect of a range of benefits derived by the members from their co-operatives. For example, the members of co-operatives reduced their cost of production by sourcing low-cost inputs from co-operatives. The analysis of benefits showed that the members in fully integrated co-operatives had relatively high business and financial, and technology and information benefits. These two key areas of benefits included a range of benefit dimensions, such as higher product prices, subsidised inputs, services, information, technology, and credit.

Discovery of an inconsistency between members' perceptions about their benefits and what the actual financial performance results demonstrated was compelling. Analysis of benefits revealed that the majority of members in both partially and fully integrated co-operatives was of the opinion that they did not have substantial benefits from their co-operatives. However, the comparison of actual financial performance suggested significantly better financial performance among the members of fully integrated co-operatives.

Regression analysis also demonstrated a significant association between members' perceived benefits and actual financial performance indicators. This result also confirms the complementary association between members' perception and actual financial performance even though members did not strongly believe in it. This inconsistency between members' perception and their actual financial performance suggests a substantial lack of awareness in members about their benefits as members of their co-operatives.

Further, analysis explored varying farm financial performance among different socio-economic groups of members. For instance, financial performance varies depending on members' household characteristics such as education, farming experience and household size. Accordingly, better financial performance was attributable to those better-educated, more experienced members with relatively large households. On the other hand, those members who were involved in off-farm work encountered low financial performance. Farm financial performance also varied depending on members' farm characteristics. It was found that large scale farmers derived better financial performance and benefitted from economies of scale. Financial performance varied among members depending on their contextual factors such as access to irrigation water as well. Higher financial performance was attributed to those members who had better access to irrigation water. These results suggest that the benefits of co-operatives are not comparable among all members. Benefits are substantially different among different socio-economic groups within the membership.

9.4 Link between results and key literature

The first objective of this study was not addressed by the hypothesis. The outcome of the first objective was the theoretical framework. Combining theories on collective action, co-operatives, value chain and vertical coordination, the framework to analyse co-operatives' vertical integration was developed and described.

The second objective was to analyse and compare the performance of partially and fully integrated co-operatives in Sri Lanka's rice sector. The hypothesis that fully integrated co-operatives have better performance remains inconclusive. Thus, co-operatives were characterised with unsatisfactory performance. Unsatisfactory performance has been a result of a number of factors. Control inefficiencies caused by limited managerial capacity, capital problems, side selling by members, and historical governance issues are among them. Integration of value-adding activities expanded the business scope of the co-operatives. Expansion of business scope overloaded the already limited management capacity of these co-operatives leading to inefficient and ineffective managerial control. This result is consistent with some others (Coulter et al., 1999; Delion, 1999; Rondot & Collion, 2001; Stringfellow, Coulter, Hussain, Lucey, & McKone, 1997). Moreover, the above authors have shown that the expansion of business scope in co-operatives and other collective enterprises come at the expense of performance.

Several other studies (Bontems & Fulton, 2009; Cadot, 2015; M. L. Cook, 1995) also concluded that vertical integration for co-operatives is less rewarding due to their institutional weaknesses that affect organisational efficiency. The co-operatives included in this study embedded some of the institutional weaknesses of traditional co-operatives in their structures as identified in previous research. In particular, studied co-operatives have a large and a heterogeneous membership, suggesting the presence of control problem due to the divergent preferences of members. As defined by the co-operative low, the co-operatives studied adopted democratic control. Hence the right of control is not proportionate to the number of shares held by the members and it is less likely to encourage member investments on vertical integration. On the other hand, Brazda and Schediwy (1989) and M. E. Fulton and Hueth (2009) argue that member support in such co-operatives is more likely to degrade leading to weaker control.

Performance also have been affected by the weak control of some of the organisation's value chain activities. For instance, all co-operatives had a low degree of control in paddy rice production activities. Control intensity of supplying inputs, services and information also remained moderate to low. This is contrary to the findings of Coffey (1993) who suggests that co-operatives deserve a strong position in coordinating input marketing. Provision of inputs and services has been influenced by the lack of required operational capital. This was in support of studies conducted by Hampel (2016) and Robb et al. (2013). All the co-operatives supplied market information with some degree

of effectiveness being consistent with the findings of Guinnane (2001), who suggests that co-operatives can effectively provide information.

It was interesting to note that all the co-operatives studied effectively supply credit and other financial services. This is consistent with the findings of Hulme and Montgomery (1994) and Mishra (1994) who concluded that co-operatives are more effective in providing credits. The co-operatives studied tailored loan terms more closely with the borrowers and credit was provided with personal guarantees of other members who were not defaulters. This is in support of Guinnane (2001) who demonstrated that co-operatives have the ability to capitalise on superior information and to impose inexpensive, but effective sanctions on defaulters.

Control arrangements in paddy rice marketing operations adopted by the study co-operatives seems to be creating a high level of member dissatisfaction resulting in a high share of outside selling. The co-operatives strictly monitor the moisture content of paddy rice only when they are transported to the co-operative warehouses by the members themselves. Rejection of paddy rice can happen at this point if they do not meet the required storable moisture content. In such cases, farmers have to transport paddy rice to a drying floor and re-transport it to the co-operative warehouses. This doubles the farmers' transport costs. Even though this strict quality monitoring has discouraged free-riding on quality by the members, as noted by Pennerstorfer and Weiss (2013a), it constrained the supply of paddy rice to the co-operatives. However, this moisture monitoring arrangement has not been supportive for the member farmers and created a high degree of dissatisfaction.

Fully integrated co-operatives-controlled rice processing, wholesaling and retailing activities, unlike partially integrated co-operatives. However, this study's results suggest a low to moderate level of operational performance in those activity levels too. This corroborates the findings of Cadot (2015) who suggests that co-operatives are not greatly rewarded by vertical integration. Low level of performance in these activity levels was a result of conventional technology and control inefficiencies. Consequent to control inefficiencies and lack of process upgrading, the value of the final product has not increased substantially as argued by Pennerstorfer and Weiss (2013a).

The results of this study revealed five key areas of benefits: business and financial, livelihood, technology and information, low-cost inputs, and democratic control and education. Comparable benefits were identified by some others as well (Abebaw & Haile, 2013; Getnet & Anullo, 2012; Haque et al., 2009; Hussein, 2001; R. King et al., 2013; V. Kumar et al., 2015).

Business and financial benefits were considered most important by the members of all co-operatives. This finding supports the findings of Alho (2015) who found similar member benefits in co-operative contractually integrated with downstream firms in the value chain. Moreover, this benefit was better for fully integrated co-operatives. This finding suggests that members can derive better business and financial benefits when their co-operatives are fully integrated.

Livelihood benefit was the second most important group of benefit according to the results and support the findings of many others who have reported similar livelihood benefits among co-operative members (Getnet & Anullo, 2012; R. King et al., 2013; V. Kumar et al., 2015). Livelihood benefits include; growth of income, yield, product price, assets, and product quality. This benefit was more comparable among the members of partially and fully integrated co-operatives.

The third important group of member benefit was technology and information. This group of benefit emphasises technology and market information in particular. Abebaw & Haile (2013), Chagwiza et al. (2016), Hussein (2001) and Wossen et al. (2017) also found similar technology and information related member benefits in co-operatives. More importantly, the technology and information benefits were significantly better for fully integrated co-operative members. The results suggest that members' technology and information benefits are much better when a co-operative is fully vertically integrated.

Low-cost inputs were the fourth important group of member benefits found in this study. This is in conformity with Stewart (1984) and Tanrivermis and Bayaner (2006). Accordingly, receiving of services and inputs at a low price on cash or credit from co-operatives was an important benefit to members. Members in both partially and fully integrated co-operatives equally benefited from low-cost inputs. These results suggest that the level of vertical integration has no impact on low-cost input benefits.

The fifth most important group of member benefit was democracy and control. Members in both partially and fully integrated co-operatives had comparable democracy and control benefits. This is attributable to the unique governance structure of studied co-operatives prescribed by the co-operative law. The one member, one vote way of control adopted in studied co-operatives has ensured equal member participation in setting policies and making decisions relevant to their businesses.

Significantly better farm financial performance among the members in fully integrated co-operatives was found in this study. This confirms the fact that members perform financially better when their co-operatives are fully integrated as argued by Zhong et al. (2018). They found better performance among the members of co-operatives tightly coordinated with other actors in the value chain than loosely coordinated co-operatives.

Moreover, members' farm financial performance varied depending on their socio-economic, farm and contextual factors. These findings are consistent with other similar studies (Markelova et al., 2009; Shumeta & D'Haese, 2016) that demonstrated varying performance among co-operative members driven by comparable socio-economic factors. For instance, members involved in off-farm work received significantly low financial performance. This corroborates the findings of Ji et al. (2019).

This study found that individuals with large farms have significantly better farm financial performance compared to those with small farms and supports the findings of Bernard, Taffesse, et al. (2008); Verhofstadt and Maertens (2014). This suggests better financial performance for members with relatively large farms resulting from economies of scale associated in supplying inputs, services, and marketing of farm products.

Contextual factors also are associated with members' farm financial performance. In particular, access to irrigation water was positively and significantly associated with the household's economic profit per hectare, suggesting better financial performance for those farmers with better access to irrigation water. Being consistent with Verhofstadt and Maertens (2014) and Corsi et al. (2017), this study also concludes that members' financial performance is also driven by contextual factors. Rice is grown mainly under flooded conditions, and water is a critical input in rice production (Tuong & Bouman, 2003). Moreover, members in fully integrated co-operatives had significantly better access to irrigation water compared to their counterparts. These observations, therefore, suggest much higher financial performance from vertical integration for those members who live in a context of developed infrastructure such as better irrigation facilities.

9.5 Implications

Findings in this study suggest important theoretical and practical implications. These implications are discussed below.

9.5.1 Theoretical Implications

Although recent studies (Chagwiza et al., 2016; Ma & Abdulai, 2016, 2017a; Vandeplas et al., 2013; Verhofstadt & Maertens, 2014) on co-operatives have documented their benefits and many advantages to members, member benefits and performance were not analysed in vertically integrated co-operatives. It is argued that, vertically integrating business enterprises can add value to products, command more value, and gain competitive advantage (Giuliani et al., 2005; Harrigan, 1984; M. E. Porter, 1985). To date, there is no reliable evidence on whether fully vertically integrated co-operatives outperform partially integrated co-operatives, or that they provide better benefits to their members and enhance member performance. This research takes an important step towards addressing this gap in research and contributes to the literature on agricultural co-operatives focusing on value chain integration.

A comprehensive review of literature helped to identify relevant concepts and theories applicable to the problem, exposed existing gaps in the relevant literature, provided valuable insights into co-operatives' vertical integration and enabled the development of a framework to examine and analyse co-operatives' vertical integration. The framework combined elements of collective action, co-operative, value chain and vertical coordination theories.

A new definition of co-operatives' vertical integration was introduced. The framework viewed vertical integration from the perspective of value chains. Vertical integration was defined as the organisation of few, or all successive activities, in the agri-food value chain from input supply through to the retail of final consumer products under one managerial control of a co-operative through the ownership of value-adding operations or other methods. This definition embeds either or both ownership and control elements emphasised by Ollila and Nilsson (1997), Royer (1995) and Salazar and Gorriz (2011). This definition is distinct from the traditional vertical integration of product market/distribution chains viewed from the perspective of transaction costs that emphasise ownership (Williamson, 1981). The framework thus identifies two levels of co-operatives' vertical integration. Building on the work of other scholars (H. C. Peterson et al., 2001; M. E. Porter, 1980, 1985; J. S. Royer & Bhuyan, 1995; Sporleder, 1992) the co-operative's vertical integration in this study is treated as a strategy to gain competitive advantage operating in a particular product value chain. The framework is applied in Sri Lanka's rice sector.

9.5.2 Practical implications

Five key areas of member benefits have been identified in this study. Those key benefit areas suggest directives for managers on how to align the organisation of co-operatives' rice value chain business activities in such a way as to meet the expectations of rice growing members. For instance, business and financial benefits were perceived by members as being important to them. Therefore, increasing the effectiveness of controlling these services such as subsidised credit, services such as transport, drying facilities and inputs would further enhance members' benefits and their performance.

This study found that fully integrated co-operatives contributed to better farm financial performance despite having a low to moderate level of control in their value chains compared to partially integrated co-operatives. This suggests the potential of further enhancing members' benefits and performance by enhancing the control of co-operatives' value chains by improving managerial quality. Weak operational performance has been a result of less competent managerial control in most of the value-adding activities and conventional technology. Investment in process upgrading, enhancing the managerial quality and proper alignment of control of value-adding activities distributed among several business departments is important. Potentially, creating a new managerial position to coordinate all the rice value chain activities distributed across various business departments would be appropriate.

There were considerable control weaknesses across each stage of the co-operatives' value chain. For instance, the type of rice to grow, time of planting and quality requirements were not shared with rice-growing members. This reduced the reliability of paddy rice supply to the co-operative in terms of required quality and quantity. Product differentiation in rice is mostly decided at the production stage rather than the processing stage, despite the processing stage having a significant role in deciding quality. This weak control between co-operative and rice-growing members resulted in lost potential value in the chain. Therefore, managers need to take action to strengthen coordination between the co-operative and their rice-growing members.

This study discovered a discrepancy between members' perceived benefits and actual farm financial performance. Although majority members in both partially and fully integrated co-operatives perceived very low benefits, members' farm financial performance was significant. This contradiction proposes low awareness of members about the benefits of their co-operatives.

Therefore, managers need to take action to educate and make aware members to retain them and get their active participation in the co-operative.

Strengthening of co-operative education is an important area where the government and promoters of co-operatives can intervene and invest. Managerial competencies in the co-operatives studied were found to be low, while recruiting and retaining qualified managers was a challenge. It is equally important to prepare co-operative managers (including directors) to face the challenges presented by modern markets and formulate competitive strategies. For this, continued training is needed. The government can also partly support the remuneration of managers to attract and retain competent managers.

Lack of investment in upgrading the value-added process has hindered co-operatives' performance and development. Financing their investment capital was a challenge for both partially and fully integrated co-operatives. Either the government or promoters of co-operatives should support co-operatives financially to upgrade logistics and processing facilities to enable processing quality rice that could reach high-value markets.

In promoting vertically integrated co-operatives, policymakers and promoters should take into account the existing socio-economic conditions (demographic and household characteristics, farm characteristics and contextual factors) of farming communities since their financial performance is attributed to those factors too. Recognising these socio-economic differences among the farming communities in promoting co-operatives is vital to ensuring the fair distribution of benefits and for the success of vertical integration.

9.6 Limitations of the Study

This study followed a mixed-methods research methodology using both qualitative and quantitative data collection and analysis. While the combination of qualitative and quantitative methodologies significantly improved the quality and validity of the research, it was not free from limitations. The study applied cluster sampling to select partially and fully integrated co-operatives. Clusters of partially and fully integrated co-operatives, however, were not proportional. There were only three fully integrated co-operatives and more partially integrated co-operatives in the study area. The study included only three from each partially and fully integrated co-operatives given the financial and time constraints.

This study pertained to a single time horizon. At the time of this study, there had been a significant drop in the country's rice production, including in the study area, consequent to a prolonged drought. The rice supply had dropped, significantly elevating imports. The price of rice had been climbing over the annual average, and the rice market was distorted at the time of the study. Therefore, the data used in this study might not have reflected the average situation.

The co-operatives studied were multi-purpose enterprises. The scope of business in co-operatives studied are not only limited to rice value chain business activities and their services, and are also open to non-members. Co-operatives' performances, hence, are not only attributable to their rice value chain business activities. Isolation of a surplus merely created by the rice value chain activities, was complicated and time-consuming. Therefore, the study relied on aggregated financial data on measuring co-operatives' financial performances. Thus, these financial performance measurements might not have best represented the performance of rice value chain business activities.

9.7 Contribution and Future Research

This study contributes to the body of knowledge by introducing a framework combining the theory drawn from collective action, co-operatives, value chain, and vertical coordination to analyse vertically integrated co-operatives. The framework was also empirically applied to analyse vertically integrated co-operatives in a staple food grain sector of a developing country predominant with smallholders.

As part of the framework, two levels of co-operatives' vertical integration are identified contrary to the often referred to one level in the previous literature (Ollila & Nilsson, 1997; J. S. Royer, 2007; J. S. Royer & Bhuyan, 1995). This division of vertical integration into two levels allows for comparative analysis and informs about the associated competitive advantage of partially and fully integrated co-operative enterprises. Even though vertical integration implies the greatest control, among alternative vertical coordination options, past literature did not recognise whether control of a part, or the whole of a value chain, has more advantage for co-operatives. This study established that undertaking the control of all successive stages of a product value chain has more advantages for co-operative members than controlling a part of a value chain. It was found that members of fully integrated co-operatives have better benefits and financial performance. This study also introduced a new definition for co-operatives' vertical integration from the value chain perspective in contrast to conventional transaction cost and market chain perspectives discussed in past literature.

This study is one of the very few studies that examine the vertical integration in a staple food grain sector, and rice in particular. More importantly, co-operatives' vertical integration in the staple food grain sectors has not been analysed in developing countries. Gonzalez-Rivera and Helfand (2001) analysed the extent, pattern, and degree of rice market integration in Brazil. Their study, however, looked at industry level and were not focused on organisations. Abdul-Rahaman and Abdulai (2018b) thus assessed the farm performance of rice farmers under three different vertical coordination arrangements; written contract, verbal contract and spot markets but the integrator was not a co-operative.

The study also combined elements of qualitative and quantitative research methods. Therefore, this has made it possible to validate and cross-check the information and to draw meaningful conclusions. For example, interviews with managers inquired about the inputs and services provided by their co-operatives to the members. Members, on the other hand, questioned about what they perceived about the inputs and services they accessed from their co-operatives.

Moreover, the application of the PSM method to compare members' performance in vertically integrated co-operatives is also an important methodological contribution. The PSM has been widely applied to compare members versus non-members (for example; Fischer and Qaim (2012a), Verhofstadt and Maertens (2014), and Abebaw and Haile (2013). However, this tool has not been applied to compare members of differently integrated co-operatives. This study suggests that PSM can be successfully implemented to compare members of different co-operatives and overcome selection bias.

Many future research directions arise from this study. This study could be replicated to analyse and compare co-operatives' vertical integration in other agricultural commodity sectors in Sri Lanka and elsewhere in the developing world predominant with smallholder agriculture. This would generate more empirical evidence on co-operatives' vertical integration in staple food grain and high-value agri-food commodity sectors and verify this study's findings. Outcomes of such investigations will explore the commodity sectors for which co-operatives have the advantage from vertical integration.

Finding what level of vertical integration has a better advantage for co-operatives would be another important direction to study in order to identify the optimum level of co-operatives' vertical integration. For this, a sample of heterogeneously integrated co-operatives can be used from a particular commodity sector. Additionally, it can be extended to analyse the member benefits and performance across such heterogeneously integrated co-operatives to see at what level of integration there are maximum benefits to members.

This study included only a small number of partially and fully integrated co-operatives to compare their financial performance, and hence the generalisability of the results across partially and fully integrated co-operative is limited. Therefore, replicating the study, including a large sample of co-operatives would supplement the results of this study and enhance the reliability of results allowing for generalisation.

Additionally, cross-sectional data collected at a single point in time can constrain the ability to observe the changes of vertical integration over time. In future research, examining co-operatives' vertical integration with panel data would provide valuable research outcomes that would explain the temporal dynamics of vertical integration.

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Publication of the results of pilot study

Appendix A

Organisational attributes of co-operatives and farmer companies

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Abstract

How collective enterprises can provide smallholders access to modern markets is widely discussed. Smallholder farmers collectively gain economies of scale, technology access, pool their capital resources to invest in value-adding activities and gain bargaining power. Different forms of collective enterprises have emerged around the developing world, where smallholder farmers are predominant. Nonetheless, information is scant as to how, and which of their attributes help them to establish and sustain value-adding activities. This study examines external factors that influence the establishment of value-adding activities and compares institutional, group, governance, and management attributes adopted by co-operatives and farmer companies in Sri Lanka. Results revealed that farmer companies devised relatively better institutional attributes to overcome some of the institutional problems that discourage investment in value-adding activities compared to co-operatives. However, neither co-operatives nor farmer companies have devised institutional attributes advanced enough to attract adequate equity capital to establish and upgrade value-adding activities. The centralised governance structure adopted by farmer companies is seemingly vested with more authority of control compared to co-operatives. Both enterprises fail to attract and retain innovative managers. Not being able to formulate competitive value-adding strategies could affect the sustainability of such activities. Regardless of the form of collective enterprise, both have established their value-adding activities with either full or partial financial support from the government and debt capital.

Keywords: Co-operatives, farmer companies, value-adding activities, smallholders

Introduction

Rapid transformation of the agri-food industry in developing countries has included consolidation, specialisation, organisational and institutional changes like vertical coordination of value chains, private grades and standards, the growth of supermarkets and high-value exports (Narrod et al., 2009; Reardon et al., 2009). This transformation was triggered by market liberalisation, privatisation, urbanisation and the growth of the middle-income class particularly in Asian, African and Latin American countries (Reardon et al., 2009) and Sri Lanka (Athukorala et al., 2017; Jayasinghe-Mudalige, 2010). For example, in the rice industry, large scale millers have acquired advanced milling technology, established brand names and their own retail outlets selling rice directly to the consumers (Liyanapathirana, 2006).

New developments in agriculture and food industry have opened new challenges to smallholder farmers in contemporary markets along with some opportunities. Epaarachchi, Jayanetti, and Weliwita (2002) and Henegedara (2002) also claim that liberal economic and trade policies since the late 1970s present challenges. Smallholder farmers are constrained by poor access to capital and financial services, technology, skills and the information required to implement standards and certifications, lack of economies of scale, and weak bargaining power (Henegedara, 2002; Reardon et al., 2009; S. Singh, 2016; Wiggins et al., 2010).

It is argued that collective enterprises in the form of co-operatives, farmer organisations, producer groups, and farmer producer companies (Markelova et al., 2009; Trebbin & Hassler, 2012; Valentinov, 2007) have the capacity to help smallholders by reducing the high transaction costs they face in the market. In response, policy makers and development organisations increasingly promote farmer collective enterprises as a strategy to provide smallholders' access to markets.

Evidence from other developing countries suggests that smallholders, through collective action and institutional support have increased participation in high value markets (Narrod et al., 2009), bargaining position in relation to foreign traders (Roy & Thorat, 2008), access to rewarding markets (Okello, Narrod, & Roy, 2007), and sustainable market links with urban fast-food outlets (Kaganzi et al., 2007).

Sri Lanka too, has historically promoted various forms of collective enterprises aiming at developing smallholder agriculture linkages to markets (Esham & Usami, 2005; Rosairo et al., 2012). However, they have attracted very limited scholarly attention. Hulme and Montgomery (1994) and Winslow

(2002) have respectively studied the inclusiveness of the poor in financial co-operatives and showed how ad-hoc state interventions caused failure in co-operatives. Several authors have studied the performance of farmer companies in Sri Lanka (Esham & Usami, 2005, 2007; Rosairo et al., 2012; Wijayaratna, 1997), but do not determine which form of collective enterprises is best placed in integrating value adding activities.

Barrett (2008) argues if collective action can bring benefit to food grain farmers in a similar way, as for high-value crops. The Sri Lankan rice sector provides a good contextual basis to answer these questions. It is the single most important staple food crop grown predominantly in smallholdings occupying 34% of the countries' total agricultural lands. Some (for example; Korale Gedara et al., 2016; Rosairo et al., 2012) report the presence of co-operatives and farmer companies in the Sri Lankan rice sector. S. Senanayake and Premaratne (2016) argue that rice farmers could benefit from involvement in value adding-activities through farmer groups. Empirical evidence suggests that stallholder farmers have benefited in various ways from collective enterprises in other developing countries predominant with smallholders (for example; Markelova et al., 2009; Narrod et al., 2009; Okello et al., 2007; Roy & Thorat, 2008)

Yet, important questions such as what forms of collective enterprises are best positioned to link smallholder farmers to markets through value adding and how they integrate value-adding activities in Sri Lanka, have not satisfactorily been answered. Hence, this paper aims to contribute to this void in knowledge by using two forms of collective enterprises namely; co-operatives and farmer companies found in the Sri Lanka paddy/rice sector. In particular, this paper intends to answer two research questions; 01) how different forms of collective enterprises integrate value-adding activities and 02) which of their attributes have assisted them in establishing and sustaining value-adding activities. The objectives of this study are twofold. First, to describe and compare value-adding activities integrated by farmer companies and co-operatives. Second, to identify external factors that influence the integration of value-adding activities and to compare the attributes of farmer companies and co-operatives that do.

The paper is organised as follows. The first section introduces the research context, the research questions, and objectives. Section two reviews relevant literature and proposes a conceptual framework. Section three explains the research method followed in this inquiry. Section four includes the results of comparing farmer companies with co-operatives on their value adding activities and attributes. The last section consists conclusions and recommendations.

Literature review and conceptual framework

Commons (1931) says that collective action ranges all the way from unorganised custom to the many organised going concerns, such as the family, the corporation, the co-operative association, the trade association, the trade union, the reserve system, and the state. Thus, collective action occurs at different arenas. For example, the evolution of institutions to facilitate business trading (Greif et al., 1994), organisation of community water enterprises (Hicks & Peña, 2003), gaining international cooperation (Snidal, 1985), provision of national defense (Wallner, 2002), farmers managing irrigation systems (Shivakoti & Ostrom, 2003) and farmer co-operatives (Olson, 1965).

According to Rasmussen and Meinzen-Dick (1995), collective action is the "voluntary action taken by a group to achieve common interests". Markelova et al. (2009) argue that farmer groups, producer/farmer organisations, farmer companies, and agricultural co-operatives are some common forms of collective action in agriculture. They are composed of a group of individuals, who invest time and money to pursue shared objectives.

Many have identified some common institutional constraints in generating efficient outcomes in situations where a group of individuals tries to pursue a common interest (Bendor & Mookherjee, 1987; Feiock, 2013; Morck & Yeung, 2003; Olson, 1965, 2009; E. Ostrom, 2003; Rosairo et al., 2012). For instance, some (M. L. Cook, 1995; P. K. Porter & Scully, 1987; Sykuta & Cook, 2001) have identified five common institutional problems in traditional co-operatives that include; free rider, horizon, portfolio, control and influence cost problems. Referring to their user-owner principle and their antecedent to the co-operatives, Rosairo et al. (2012) argues that some or all of the above institutional problems continued to be present in farmer companies in Sri Lanka.

The free-rider problem is a common property problem arising when property rights are non-tradable, ill-defined and non-enforceable. J. S. Royer (1999) identifies two reasons why the free-rider problem exists within traditional co-operatives. First are the binding rights to the residual claim of members to their level of patronage instead of their investment. Sykuta and Cook (2001) refer to this as the "internal free rider problem". Second is offering non-members the same terms of trade as members in trading with the organisation, which is called the "external free rider problem".

The horizon problem is the owner's inability to claim the full benefits of the returns generated by an asset (P. K. Porter & Scully, 1987). This arises when an owner's claim on the net cash flow generated by an asset is shorter than the productive life of the asset. The result of this problem is

under investment in assets. It shifts the preferences of owners away from retaining earnings to finance long-term assets, towards current benefits (Nilsson, 2001).

The portfolio problem arises when claims are not transferable. Firms with nontransferable assets encounter this problem such as traditional co-operatives. Owners may not be able to diversify their asset portfolios to reflect their personal risk preferences when claims are not tradable (Jensen & Meckling, 1979).

The control problem is the principal agent problem that arises in organisations in which ownership and control are separated (M. L. Cook, 1995). Separation of ownership and control results in diverging interests between the principle (owners) and the agent (managers). When there is no market for exchanging equity shares in such circumstances, equity-based management incentive mechanisms may not be available to monitor management performance. This problem has been commonly observed in traditional co-operatives (J. S. Royer, 1999) resulting in members or their board of directors having difficulty in making decisions concerning innovation, disciplining management or initiating management change.

The influence cost problem is associated with influencing activities of individuals or groups within an organisation on decisions that affect the distribution of wealth/other benefits within the organisation (J. S. Royer, 1999). M. L. Cook (1995) argues that this is high in co-operatives with a wide range of activities that could result in diverse objectives among members. Milgrom and Roberts (1990) contend that the magnitude of influence cost depends on three elements; a) the existence of a central authority, b) the procedures that govern decision making and, c) the degree of homogeneity or conflict in the interest of the individuals within the organisation.

Literature shows that the success of finding optimum outcomes collectively depends on the institutions developed to control, liberate and expand individual action (Commons, 1931; E. Ostrom, 1990). Crawford and Ostrom (1995) describe how institutions endure the regularities of human action in situations structured by rules, norms and shared strategies (institutional statements), as well as by the physical world. Many others (Agrawal, 2001; Agrawal & Ostrom, 2001; Baland & Platteau, 1996; E. Ostrom, 1990; Rasmussen & Meinzen-Dick, 1995) provide evidence on how individuals collectively solve common property problems and what factors are likely to effect on collective action particularly in natural resource management.

Building on success factors of collective action in natural resource management, Markelova et al. (2009), proposes that types of markets and products, characteristics of farmers and their organisations, institutional arrangements, leadership, and the external environment as important factors that determine the success of collective action in agriculture. Garnevska et al. (2011) also assert similar attributes to co-operatives' success. Further, success in farmer cooperation is observed in markets with long marketing channels and high quality and safety demands, because it can reduce the coordination cost. Small groups reported having more internal cohesiveness whereas large group may be preferable from the point of economies of scale (Agrawal & Ostrom, 2001; Coulter et al., 1999; Stringfellow et al., 1997).

In principle, both co-operatives and farmer companies are types of collective enterprises, are owned collectively by their patrons and pursue a common goal. Hence it is reasonable to believe that they share some or more of the fundamental properties which characterise collective action envisioned to achieve a common goal. Accordingly, Figure 1 illustrates the proposed framework that could potentially explain the success of integrating value-adding activities by these two forms of collective enterprises.

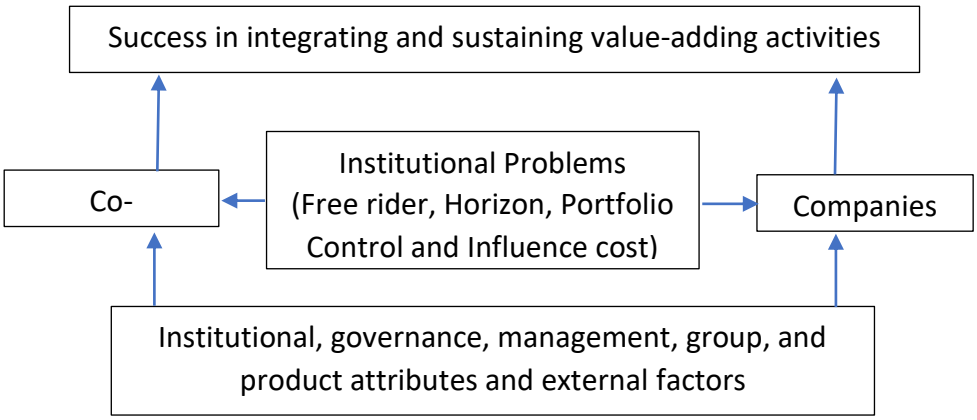

Figure 1 Model of success in integrating and sustaining value-adding activities by co-operatives and farmer companies.

The literature argues that the success of finding optimum outcomes collectively depends on how the institutions control, liberate and expand individual action. It suggests that either form of collective enterprises, because of their collective nature, could have some or all of the institutional weaknesses (problems) identified above that could potentially discourage the success of integrating value-adding activities. Those institutional weaknesses may influence the process of making efficient outcomes collectively. Those institutional weaknesses could, however, be moderated by the attributes adopted by each form of collective enterprise.

Governance, management, and group attribute also influence success in integrating value-adding activities. Governance arrangements influence how institutions are devised, reinforcing and recrafting them to impact decisions related to value-adding activities, ultimately determining their success. Management influences the execution of value adding, bringing innovations and formulating strategies that could affect its success. As discussed earlier, the success of collective action also influences the type of product. In this study, the product does not differ between two enterprises.

Similarly, there are external factors that could affect the integration of value-adding activities by the collective enterprises. That may be in the forms of support provided by the government or other non-governmental funding agencies by means of direct financial and non-financial support. Particularly the facilitation role, if any, played by those agencies might have important implications on the success of integrating value-adding activities.

10 Research methods

This study employed the qualitative research method using multiple case studies. (Yin, 2009) and Eisenhardt (1989b) discloses that multiple case studies provide theoretical replication. Qualitative investigation is considered appropriate for understanding how and what types of research questions (Yin, 2003) to ask. Farmer companies and co-operatives were treated as holistic units of analysis.

Two cases, each from successful farmer companies and co-operatives were chosen for this study. Several checks were made in selecting cases to improve the validity of pairwise comparisons. First, cases were selected from one of the main rice growing districts to ensure a sound representation in infrastructure, farming system and markets. Second, cases were selected only from a single crop sector (paddy/rice). Third, the functional stages of the organisation's rice value chain were taken into account as described by Humphrey and Memedovic (2006).

The government officials involved in establishing farmer companies were contacted to identify the locations of currently performing companies and their contacts. The records available at the provincial co-operative department's office were used to identify comparable co-operatives. Following the identification of co-operatives and farmer companies undertaking rice value chain functions, telephone conversations with their officers were had to identify the functional stages of the rice value chains. Two cases from each, co-operatives and companies, with similar value adding activities were selected for the study.

Drawing evidence from multiple sources has been a way to improve validity and reliability (Yin, 2009). A total of 28 interview were conducted. They included the chairman (01), general manager (01) and members/shareholders (05) from each case. Secondary sources of data used included organisational constitutions, annual reports, and published articles. Two separate Interview protocols, one each for chairman/general manager and members/shareholders have been used.

Following (Ritchie, Lewis, Nicholls, & Ormston, 2013), recorded interviews were transcribed and was extrapolated to the theory and not to the population of study units. The analytical techniques used in this study included "pattern matching" and "explanation building" (Yin, 2003).

Results and discussion

Following sections discuss the result of this study

Case descriptions

Farmer company 1 (FC I)

FC 1 started in 1998 aiming at commercialising smallholder agriculture by empowering farmers to operate and maintain irrigation systems. The Ministry of Irrigation and Power facilitated its establishment. FC 1 purchases agricultural inputs (fertiliser, agrochemicals, vegetable seeds, paddy seeds, and animal feeds). The company arranges contracts with its shareholder paddy/rice farmers to produce basmati type long grain paddy/rice. Processing and marketing of basmati rice are the main commercial activities of FC 1. They own a rice processing plant particularly designed to process basmati rice. The company was selling its basmati rice to a leading supermarket chain in the country. However, the supermarket stopped buying its rice due to contamination of black and brown grains and there was no colour separator to remove them. This resulted in diverting the rice from the supermarket to regional traders as the main buyer.

Farmer company 2 (FC 2)

FC 2 was started in 1999 with the facilitation of the Department of Agriculture aiming at commercialising the smallholder agriculture sector. To be a shareholder, an individual should acquire at least 10 shares valued at LKR 10. To be qualified to being elected as a director of the company, an individual must acquire at least 300 issued shares. FC 2 purchases agricultural inputs in bulk for its shareholders, produces traditional paddy seed varieties to distribute among shareholder paddy/rice farmers, purchases traditional paddy/rice from shareholder farmers, processes it in its own rice mill, and distributes it to various private urban retailers and supermarkets. Its own retail store also sells some of the rice they produce.

Multipurpose co-operative society 1 (MPCS 1)

MPCS 1 was established in 1971 following the government's multipurpose co-operative society restructuring programme. MPCS 1 provides multiple services to its members as well as non-members. It consists of several business divisions such as transport, agriculture, retail, rural banking and funeral services. Its agriculture division provides seeds, fertiliser and agrochemicals while its banking division provides credit to paddy/rice farmers. Only members can obtain credit but all other services are available to both members and non-members. MPCS 1 also buys both long grain and short grain paddy/rice from both member and non-member paddy/rice farmers. It has several warehouses located in its service area to buy paddy and store it until processing. Paddy/rice purchased by MPCS 1 is processed in its central processing plant. Rice is sold wholesale to other co-operatives, private regional retailers and through its own network of retail shops.

Multipurpose co-operative society 2 (MPCS 2)

MPCS 2 also was established following the government's multipurpose co-operative re-structuring program in 1971. Business operations of MPCS 2 is similar to that of MPCS 1 described above. There are several business departments including agriculture, banking, retail, and transport. The agriculture division supplies fertiliser, agrochemicals, and seeds to both member and non-member rice/paddy farmers. Agricultural credit is provided only to members through the banking division and members can mortgage their movable and immovable assets with its banking division. MPCS 2 also buy both short and long grain paddy from member and non-member paddy/rice farmers. It processes paddy/rice in its processing plant for wholesaling and retailing.

Table 1 summarises the characteristics of FCs and MPCSs. Information in the table reveals that MPCSs have a long history, large membership now and had a slightly larger starting share capital compared to FCs. Both types of organisations have had low startup capital in general except FC 2 which was significantly supported by the state. Over the years, membership/shareholders have grown in both types of organisations. Both FSs and MPCSs have had financial support in varying degrees during their establishment or restructuring process from the state or state-sponsored projects.

Table 1: Characteristics of farmer companies and co-operatives

	FC 1	FC 2	MPCS 1	MPCS 2
Year of establishment	1998	1999	1971	1971
Starting shareholders/members (number)	430	154	1,450	874
Current shareholders/members (number as of 2017)	1,234	1,510	4,560	3,594
Time of existence as of 2017 (years)	19	18	46	46
Initial share capital (million LKR)	0.12	0.05	1.19	0.83
External financial assistance during start-up/re-structure (million LKR)	1.54	17.9	na	1.6
Initiated by the state/state-sponsored projects	Yes	Yes	Yes	Yes
Target product markets	Regional	Niche	Local	Local
Types of rice produce	Specific	Specific	Generic	Generic

Production and marketing arrangements have some differences between FCs and MPCSs in some aspects. FCs are involved in producing and processing of specific types of paddy/rice and in the contract production of paddy/rice. In contrast, MPCSs process generic rice (short grain and long grain) and do not organise contract production. Instead, MPCSs purchase paddy/rice from spot markets for their processing from both members and non-members.

Services offered by FCs are mainly related to agriculture whereas MPCSs offer a broad range of services including agriculture and non-agriculture such as grocery and funeral services. Services offered to paddy/rice farmers are more similar among both types of organisations. Both FCs and MPCSs supply fertiliser, agrochemicals, seed, and credits to farmers. FCs, on the other hand, have provided some training to paddy/rice farmers about the production of basmati and traditional rice.

FCs process specific types of rice (basmati and traditional) while MPCSs process more generic rice (long grain and short grain). There are differences in the markets they supply. MPCSs usually supply to local markets while FCs supply to special and niche markets.

Cross-case comparison of organisational attributes

A summary of various institutional, governance and management attributes embedded in and external factors influencing FCs and MPCSs are presented below. The relationship between the establishment of value-adding activities and embedded institutional, governance, management, group attributes and external factors are then discussed.

Institutional arrangements

Institutional factors are discussed under two main thematic categories: attributes related to use and attributes related to ownership. These institutional factors could affect members'/shareholders' incentives to use and invest in their respective organisations. Integration of value-adding activities involves varying levels of investment in acquiring related assets and refurbishing them to meet the quality demands of contemporary markets.

Table 2 presents the comparison of institutional attributes related to use. Most of the reported attributes in the table are very similar between MPCSs and FCs. Importantly, FCs limit use rights to members and they do not accept produce from or sell inputs to non-shareholders. This could exclude "external free riders" from being benefited from transactions in similar terms to that of shareholders. It is a point of difference between FCs and MPCSs. However, MPCSs, on the other hand, have been benefited from economies of scale since non-member transactions enable them to supply a large volume of paddy for processing.

Despite FCs restricting its use to shareholders, there is no assurance that shareholders have made a fair contribution to the capital since their use rights are not proportional to their investment. From this attribute, both MPCSs and FCs are similar. Both organisations allow new entrants to enjoy similar user rights upon paying the minimum capital contribution. Accordingly, none of the organisations provide incentives to new entrants to make a fair contribution to the capital.

Both organisations adopt subjective methods in determining paddy quality (such as visual inspection of chuff and mixed grains) but pay market price or above for paddy of any quality. Both organisations adopt weak traceability systems. Once an individual has sold his/her paddy, its ownership cannot be traced. Nevertheless, the quality of the final product (rice) and its output volume is affected by the quality of paddy used in processing. Subjective quality determination procedures risk the buying

of poor-quality paddy ultimately lowering the organisation's profit and its performance, presenting challenges to managers. Monitoring of such behavior could also be difficult in both organisations owing to their large membership. With respect to this attribute, FCs are in the more disadvantaged position since they produce specific types of rice (traditional and basmati).

Table 2: Institutional attributes of MPCSs and FCs related to use

Institutional attributes related to use	**MPCSs**	**FCs**
Use rights	Transactions not only limited to members in the majority of occasions. Non-members also can deliver paddy/rice to the co-operative and buy inputs and services.	Transactions are limited to shareholders. Only shareholders can sell paddy/rice to FCs and buy inputs and services.
Proportionality of use to the investment	The use is not proportional to investment.	The use is not proportional to investment.
Use rights to new members/share holders	Similar to original members	Similar to original share holders
Inputs and services accessible to users	A wide range of services including agricultural (mainly paddy) and non-agricultural (retail of grocery items and funeral services) are accessible.	Limited range of services related to agriculture including paddy farming and livestock.
Accepted product type	Buy paddy of any grain type (long and/or short) that is used to produce rice that is more generic.	Buy paddy of only specific grain types such as traditional and basmati type paddy varieties that is used to produce traditional rice and special types of rice such as basmati.
Accepted product quality	Buy paddy with 14% or below moisture. Other quality parameters are visually observed (such as chaff grains and broken grains)	Buy paddy with 14% or below moisture. Other quality parameters are visually observed (such as chaff grains and broken grains)
Preservation of the product's identity	Once paddy is sold, the identity of products cannot be traced by their owner.	Once paddy is sold, the identity of products cannot be traced by their owner.

Price paid on products	Market price or above for products and below for inputs to both members and non-members.	Market price or above for products and below for inputs to shareholders

Institutional attributes pertaining to ownership are comparatively presented in Table 3. According to the table, both similar and contrasting attributes can be found between MPCSs and FCs. Contrasting attributes between two organisations are eligibility criteria to own shares, non-member/patron investments, classes of shares issued, maximum purchasable share limit, a method of distributing profits and converting profits to capital investment. All other attributes are more similar between MPCSs and FCs.

Both organisations have allowed the trading of shares at a nominal price. This attribute could create a horizon problem in both organisations with members/shareholders not able to realise capital gains when members/shareholders leave their respective organisation. This arrangement creates disincentive investments. Even though FCs allow investments from non-patrons, lack of share tradability at a market price is more likely to discourage investment in FCs by non-patron shareholders. In order to attract non-patron investment, FCs issue non-ordinary shares, which is not a characteristic of MPCSs.

Having a maximum number of shares a member/shareholder can own, both organisations have restricted passing the ownership to few richer hands. However, this maximum is more flexible in MPCSs as they allow 20% of shares to an individual. Whereas, in FCs it is 10% for a household. Both organisations have warranted shares from being redeemed. Thereby they have reduced the redemption risk of individuals' withdrawing investments in the respective organisations.

There is a difference in the method used to distribute profits between the two organisations. MPCSs allocate profits proportional to patronage or/and shares owned and the choice of either or both methods rely on the board of directors. On the other hand, FCs distribute profits based on shares owned. This arrangement of profit distribution in FCs could place them in a better position in attracting capital compared to MPCSs.

Irrespective of the number of shares owned, members and shareholders respectively in MPCSs and FCs exercise their control based on one member one vote method. Both are democratic. This democratic control coupled with large membership vested with heterogeneous objectives could create influence problem. This could distance members/shareholders who contributed more to the

capital in controlling their organisations. However, FCs have partially overcome this issue by making compulsory for the directors to have at least 40-300 shares (see table 3). Still, this share limit has a wide range.

It is mandatory for MPCSs to allocate at least 25% of their profits to a common fund that can be used for the organisation's development. In contrary, FCs need majority consent in converting profits to capital. This arrangement adopted by MPCSs provides a path to build up their capital over time if they perform better.

Table 3: Institutional attributes of MPCSs and FCs related to ownership obligations

Institutional attributes related to ownership	**MPCSs**	**FCs**
Minimum equity contribution to entitle a share	A single share valued at LKR 10. The total value of the shares purchased needs to be paid in a single payment.	Vary from 1-10 shares valued at LKR 10. Value of purchased shares payable in several instalments.
Tradability/transferability of shares	Shares can be tradable to those who satisfy the criterion to be a member at a nominal price.	Shares can be tradable to those who satisfy the criterion to be a shareholder at a nominal price.
Eligibility to share ownership	Any individual living within the geography of an MPCS's service area who does not own similar businesses to that of the MPCS.	Any individual or a group of individuals or a business or other farmer organisation living/exist within the geography of its service area can own share/s. However, it is not necessary to be a user of FC.
Non-member/patron investment	Not accepted	Accepted
Classes of shares	Only ordinary	There are non-ordinary shares as well
Maximum purchasable share limit	A member can buy up to 20% of the total issued shares	A shareholder's household can buy up to 10% of the total issued shares
Redemption obligation	Shares cannot be redeemed but are tradable.	Shares cannot be redeemed but are tradable.
Method of distributing profits	Only members are entitled to receive patronage rebates or/and dividends respectively proportional to patronage or shares as	Only shareholders are entitled to receive dividends proportional to shares they hold.

	decided by the board directors.	
Excise of control rights	One member one vote for a representative in the general assembly and one vote for an ordinary member in the divisional meeting.	One shareholder-one vote
Method casting vote.	Show of hands unless request a secret ballot	Show of hands unless request a secret ballot
Voting rights to new members/shareholders	Similar to original members	Similar to original shareholders
Link of control rights to investment	Not linked as voting is democratic and independent of shares owned	Not linked as voting is democratic and independent of shares owned
Converting profits to capital investment	It is compulsory by the law to allocate at least 25% of the profits to a common reserve that can be used in future developments based on general assembly approval and co-operative department's approval.	Profit can be invested in the company in whole or in part as decided by the directors. To convert profit/any reserve into the capital, the consent of 2/3 majority is needed.

Governance factors

Governance refers to the processes of interaction and decision-making among the actors involved in a collective problem that led to the creation, reinforcement, or reproduction of social norms and institutions. Table 4 compares the important governance attributes embedded in MPCSs and FCs. Some of the attributes are different between MPCSs and FCs. For example, MPCS has a federated governance structure whereas FCs are more centralised. As a percentage, MPCSs has a larger house majority compared to FCs. Thus, MPCSs allows internal dispute settlement mechanisms keeping external court procedures as the last stage which could be costly and time consuming for smallholders. FCs in contrary, use courts to settle disputes. FCs allow representatives to participate in an annual meeting on behalf of shareholders which is not seen in MPCSs. The term of office of a board director is unrestricted in MPCSs compared to a maximum 5-year period in FCs. This could raise issues of accountability and good governance in MPCSs. An important attribute in FCs is that a potential director is required to own more shares, from 40 to 300. This could be seen as an attempt to provide more control decisions to those contributing more capital. Yet, there is no assurance that

such investors take more control in decisions due to the 40 share lower boundary, together with non-proportionality of investment to use.

Table 4: Governance attributes embedded in MPCSs and FCs

Governance attributes	MPCSs	FCs
Governance structure	Consists of two levels: divisional committees and general assembly.	Consists of one level; shareholders' general meeting.
The highest-level governing body and its composition	General assembly consists of divisional level representatives.	The general meeting consists of shareholders.
House majority of a convened governing body	Whatsoever the least from 1/4 or 50 eligible general assembly representatives.	10% of shareholders. However, less than 10% attendance can be considered as a house majority in the following of a postponed AGM due to lack of majority.
Time of convening the highest governing body	Convene annually unless there is a special reason (divisional meetings are convened monthly).	Convene annually unless there is a special reason.
Settlement of disputes between members/shareholders and the organisation	Goes through several steps. Starts internally and if unresolved it passes to the Co-operative Department and finally to the court.	Court procedure unless resolved internally
Board of directors' ability to appoint and sack managers	Yes	Yes
Participation of representatives in the annual meeting	Not allowed. Member must appear in person	Allowed, the representative can vote on behalf of the shareholder but cannot comment on policy decisions.
The term of office of a board director	Three years and possible to re-elect any number of terms on a majority vote	One year and possible to re-elect on majority vote up to a maximum of 5 years
The requirement to be a board director	Any ordinary member over 21 years old with good character.	A shareholder who owns at least 40 - 300 shares and over 18 years old.

Board & management factors

Management has a great influence particularly on operationalising/implementing value-adding activities and identifying and proposing strategic directions to the organisations. A substantial

deviation in management attributes between MPCSs and FCs cannot be identified except for the composition of directors (Table 5). FCs have two advisory directors and most often they are administrators of government institutes or departments. They were overloaded with responsibilities with their own rank and have not regularly attended the meetings. Despite their administrative skills, they haven't had business experience to provide technical advice related to value adding. However, in some instances, they have helped to source government funds. Chairman of a FC says that "*we are actually thankful to divisional secretary served our board those days for drawing government's attention to our FC. Unless his support we would not have been able to get government funds to start our rice mill"*. MPCSs, on the other hand, have had a representative from the department of co-operative at their board meetings regularly. They are expected to provide both administrative and technical advice as well as coordinate between the department of co-operatives and the MPCSs. They also have played an important role in attracting government funds to MPCSs.

Both organisations have encountered problems in recruiting and retaining qualified managers and not being able to pay competitive salaries. Managers were low qualified with moderate interest in value adding. Qualified and competent managers are important in identifying future value-adding opportunities and setting strategic objectives.

Table 5: Board & Management attributes in MPCSs and FCs

Management attributes	**MPCSs**	**FCs**
Number and composition of board directors	Include 9 directors (two nominated females and 7 elected/nominated among general assembly representatives), department officer, general manager, and secretary.	Consists of 7-11 directors. (Two nominated advisory directors while others elect/nominate among shareholders), general manager and secretary.
External representatives/board directors	Yes, co-operative development officer attends the board to provide technical advice and as an observer without voting rights.	There are technical directors to provide advice on technical matters but they have no voting rights.
Board meetings	At least once a month	At least once a month
Professional managers	Low qualified managers	Low qualified managers
Have formulated goals aimed at value adding	Yes	Yes
Managements' interest on value adding	Moderate	Moderate

Group factors

This section presents the group attributes of MPCSs and FCs. Table 6 summarises and compares some of the important group attributed embraced by MPCSs and FCs. Both organisations are characteristically large. MPCSs in particular, composed of very large membership of around 5,000-7,500 compared to their counterpart, which includes less than 2,500 shareholders. However, the size of the group has increased over the past in both organisations' comparative to their starting number. This could create a high degree of heterogeneity among members/shareholders. This heterogeneity could further high in MPCSs since they accept a range of producers (farmers) producing various agricultural products and consumers belongs to various socio-economic groups. Heterogeneity is relatively lower in FCs than MPCSs since they consist of only producers (farmers). Nonetheless, those producers produce various crops and livestock products and heterogeneity remains to some extent.

Large and heterogeneous membership/shareholders combined with democratic voting rights could induce the influence problem in both organisations. Investors could exclude those with different interests/objectives. Making strategic decisions related to investment in value-adding could expect to be more challenging in both organisations and in MPCSs, in particular, with the cost of making the decision quite high. Conversely, a large membership could be an opportunity for raising equity capital required to invest in value adding assets. In particular, the federated structure adopted by MPCSs could be seen as a way to combine scattered small volumes to scale up to reach the necessary scale of economies for processing.

Table 6: Group attributes embraced by MPCSs and FCs

Membership attributes	**MPCSs**	**FCs**
Number of members/shareholders (users)	Very large. There are around 5000-7500 members. However, the number of users could be several times higher than this since services are accessible to non-members as well.	Below 2,500 shareholders.

Number of members/shareholders during formation	1,000-2,000	Below 500
The diversity of members/shareholders	Very high. (Members can be producers of different crops and animals and retail consumers of various income groups)	High (farmers of various crops and livestock and fisherman)

External factors

Organisations' relationships with the external environment, including markets, state or other non-state organisations could have important implications for both establishing their value adding activities and their sustainable performance. An account of external factors that effect on value-adding activities is presented in Table 7. MPCSs have continuously been supported by the government in a number of ways compared to FCs. In particular, the government has financed MPCSs during the phase of establishing value-adding assets and their upgrading as well. Interviewed respondents said "*it would have been difficult for us to establish our rice mills and warehouses unless government supports us. We don't have much money to do large investments. Sometimes we get bank loans when we need to renovate our facilities*". Apart from that, the government has supported their recovery of financial losses too.

Government support to FSs has been limited compared to that of MPCSs. Government involvement in MPCSs through capacity building, exempting taxes, monitoring and evaluation and development has been significant compared to FSs. Beyond them, the government also exercise some control on MPCSs requiring the respective department's approval on their development projects. "*The long decision-making process has caused significant delays in implementing our development projects. We cannot spend our money on projects unless the department approves it even though general assembly permit to do,"* says interviewees of two MPCSs. Although such involvements could expect to increase transparency and accountability, they can degrade the autonomy of the MPCSs. Such degree of outside control is not seen in FCs and they seem to be operating more independently.

However, respondents in FCs also declared occasions when they got government grants. A chairman of one of the FCs in his interview mentioned: "*the minister in our electorate was interested in our seed paddy production programme and he helped to obtain machines to process seed paddy through a project grant at the time he was in power*". The chairman of the other FCs referring back to around 2000 stated that "*president (country's president) visited our company and she was impressed about*

how we worked that time and she promised to grant us some money. She gave about LKR 20 million to our company to establish our rice processing plant". *We borrowed some amount from a government bank as well*.

Evidence given above suggests that irrespective of the type of organisation, most of the value-adding assets were funded by the government in various degrees. Partly they were financed through borrowed money and retained profits. Markedly, the government support on MPCSs continuously through tax exemptions, monitoring and evaluation, and capacity building has been significant relative to the FCs. Over and above, state departments exert a high level of control on MPCSs as well as requiring projects to be passed through it.

Table 7: External factors and MPCSs and FCs

External factors	**MPCSs**	**FCs**
Respective act	Co-operative Societies act	Companies Act (No 17 of 1982) (as peoples' companies)
Capacity building (Technical support, training, and education) and monitoring)	The department of co-operatives and its institutions (ex; co-operative training schools) provide technical training to board directors, managers and staff and provide technical advice regularly.	The board directors and the staff were trained and had technical advice provided during the establishment.
Tax exemptions	Profit is exempted from taxing as they registered under co-operative societies act	Tax is not excepted as they are registered as peoples' companies under companies act.
External monitoring and evaluation	Co-operative department audits accounts and provides recommendations.	FCs themselves audit accounts through an independent auditor.
External control	Need approval for development projects from the department of co-operative	Do not need approval from external authorities
Financial support from the government	Government has provided several blocks of financial support during the establishment of value-adding assets as well as to compensate financial losses occurred in some occasions.	Starting capital and management expenses have been granted by the project. Post-establishment financial support from the government or other external party was minimal.

External debt capital	Borrowed capital from state banks to build or upgrade value-adding assets.	Borrowed capital from state banks to build or upgrade value-adding assets.
Influence on establishment	Promoted by the department of co-operatives, development building on pre-existed and voluntarily evolved village level societies.	Promoted by a project collaborating several government institutes relevant to agriculture sector upgrading pre-existed farmer organisations. (EX: Department of agriculture, Mahaweli Development Authority, and Irrigation Department)

Conclusion and recommendations

The study reveals that FCs have developed relatively better institutional attributes compared to MPCSs that are more likely to attract the capital required to invest in value adding assets. However, such advanced attributes alone have not been enough to attract patrons' capital in their FCs because they still include constraints discouraging institutional arrangements. On this perspective, none of the organisations is significantly different from each other.

Institutional attributes related to use rights have weaknesses in both organisations. Non-proportionality of use rights to investment in equity has been observed in both organisations. Members/shareholders in both organisations can have the right to use by paying just the value of the minimum share requirement. Therefore, members/shareholders have no incentive to make a fair contribution to the equity capital that reflects their use leading to the free-rider problem. Both organisations offer better than market-related prices for products and inputs for non-members/shareholders as well. Thereby a part of the organisations' potential profits subsidises non-members/shareholders, which could have been invested in value adding. Some of the monitoring arrangements such as visual observation of product quality could affect organisations' performance.

Introduction of non-ordinary shares in FCs could be considered as an effort to attract non-patron capital. This is not an attribute of MPCSs. However, lack of share trading platforms has hindered incentives for the non-patrons to invest in FCs since they cannot monitor the performance or benefit from changes in share values. The inability of monitoring the performance, on the other hand, contributes to control problem. FCs distribute residual profits to shareholders based on their investment so have overcome the horizon problem. Whereas MPCSs distribute profits based on

either or both criteria; proportional to investment or patronage as decided by the board directors. Democratic control through one member one vote does not honor the right of those who contributed more capital to have more power and hence control problems are still embedded in both organisations. They typify more traditional co-operatives.

Governance arrangements have structural differences between the two forms of enterprises. MPCSs have a federated structure whereas FCs are not federated. This could result in inefficient decision-making process in MPCSs compared to FCs with regard to value adding. Both have granted powers to the board of directors to hire and sack managers. In MPCSs directors are elected for a tenure of three years with the possibility to re-elect for any terms whereas, in FCs, it is for one year but can be re-elected for a maximum of five terms. Management attributes are almost alike in both organisations and external representatives have been an important bridge between those organisations and the government in obtaining government financial support to develop their value-adding assets. Requiring and retaining qualified managers has been a challenge for both organisations due to low payments. This could adversely affect formulating strategies related to value adding and operationalising them.

Group size is significantly high in MPCSs relative to FCs. It has benefited MPCSs in economies of scale and raising equity capital compared to FCs. Conversely, MPCSs had a high degree of heterogeneity compared to FCs, which could possibly lead to costly decisions in MPCSs due to influence activities.

The role of the government was noteworthy in both cases and in MPCSs in particular. Governments' technical and financial support has greatly contributed to establishing capital demanding value-adding activities. Government has either fully or partly funded both organisations in establishing value-adding assets. None of the organisations has failed to fully self-finance their value-adding assets from equity capital and have at least used debt capital to build them. Government involvement, particularly on MPCSs, goes beyond providing technical and financial assistance to an authoritative control role degrading their autonomy to take and implement investment decisions. FCs, on the other hand, have not had such an outside control.

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Appendix B

Interview protocol for Interviewing Chairman/General Manager of Co-operatives

For the use of the researcher	
Name of the coop	
Address	
Telephone number	
E-mail address if any	
Officer interviewed	

Respondent's information
How long have you been working in the current position?
What is the highest qualification you obtained?
If you have obtained any professional trainings, what are they?

General information about co-operative
When did this MPCS start?
How many business divisions?
Name the business divisions in order of revenue they generate
How many regional branches are there in the MPCS?
What is the annual business turnover of the MPCS?
How many managers are there in the MPCS?
What is the number of employees in the MPCS?

Trainings and incentives for employees
Do MPCS organise trainings to employees and what are they?
What is the entertainment /welfare activities provided to employees by the coop
Do employees pay any incentive payments?

Membership information
Number of total members
Number of inactive members if any
Number of paddy/rice cultivating members
Number of members who sold paddy to the MPCS during last two seasons

Rice value chain operations
Volume of dry and moist paddy rice purchased during last two seasons

If bought mist paddy rice, how did they dry?

If there is a mechanical dryer, what is the capacity?

Price paid to farmers (LKR/kg): Long grain: -……Short grain: -…….

” Keeri samba”: -…… Other varieties (name): -……..

Does coop process rice

If yes what is the volume of rice produced during last two seasons

Do MPCS own trucks and other vehicles?

What is the volume of rice sold in wholesale?

What is the volume of rice sold in retail during last

Appendix C

Interview Guide for Interviewing Chairman/General Manager

For the use of the researcher	
Co-operative's name	
Address	
Telephone number	
E-mail address if any	
Officer interviewed	

Respondent's information
How long have you been working in the current position?
What is the highest qualification you obtained?
If you have obtained any professional trainings, what are they?

General information and business operations
Co-operative's establishment
Business divisions, functions their significance in terms of revenue
Regional branches and their business performance
What is the annual business turnover?
Number of managers and staff

Governance and management
Initial and active village level divisions, their meetings
Initial and present membership, their participation and contribution
General assembly, its composition, and convene of meetings
Appointment of directors, number, procedure, directors' meetings
Annual plans, financial reports and auditing

Co-operative's rice value chain
Number of rice growing members and their supply to co-operatives
Volume of dry and moist paddy rice purchased during last two seasons
If bought moist paddy rice, how did they dry?
If there is a mechanical dryer, what is the capacity?
Price paid to farmers (LKR/kg): Long grain: -……Short grain: -…….
" Keeri samba":-…… Other varieties (name): -……..
Does coop process rice?
If yes what is the volume of rice produced during last two seasons

Does co-operative own trucks, other transportation vehicles and farm machinery? What is the volume of rice sold in wholesale? What is the volume of rice sold in retail during last

Other services and benefits of the co-operative
Trainings to director, managers, members and employees What is the entertainment /welfare activities organised by the co-operative Benefits provided to employees Social and community programmes and sponsorships provided

General comments

Appendix D

Survey - Part I

1. How long have you been involved in agriculture?…….years

2. How long have you been involved in paddy/rice farming?……years

3. How old are you?.....years

4. What is your level of education?.....years

5. How many family members are there in your household? Adults ☐ Children ☐

6. How many family members work on the paddy/rice farm? Fulltime ☐ Part time ☐

7. When did you join the MPCS?..... (year)

8. What are the 3 main reasons for you to join the MPCS?
   .....
   .....

9. Do you have other sources of income? ☐ Yes ☐ No

If yes, what are they	Contribution to annual income (%)

10. What assets and how much of them do you own?

Asset type	Type	Quantity	Market value (LKR)
Lands			
Farm animals			
Farm machines/equipment			
Passenger/utility vehicles			
Consumer durables (Gold)			
Buildings and services			

11. What is the availability of irrigation water to your cultivated lands in general?

Own lands: ☐ Good ☐ Average ☐ Bad Leased land: ☐ Good ☐ Average ☐ Bad

12. How many hectares of lands did you cultivate before you joined the MPCS? Ow☐ Leased☐

13. How many hectares of lands did you cultivate and harvest during last *Yala* and *Maha* seasons?

Season	Own		Leased		If any difference, reasons?
	Cultivate	Harvest	Cultivate	Harvest	
Yala					
Maha					

14. Provide following marketing and post-harvest information on rice verities you cultivated during last ***Yala*** and ***Maha*** seasons

Season	Variety	Quantity (kg)						Weeks sold since harvesting	Buyer you sold to	Price (LKR/kg)	Place you sold[b]	If sold at buyer's place	
		sold immediately after harvesting	practiced post-harvest activities										
			Dried[a]	cleaned	stored for seed	stored for consumption	sold after storing					How did you transport[c]	Cost, if hired (LKR)
Yala													
Maha													

15. Why did you select to grow different rice varieties?

Variety	Reason/s

16. If you sold to different buyers, explain why?

Buyer	Reason/s

17. Explain why did you choose to sell immediately after harvesting and/or later

18. Please provide the following information on farm inputs and cost of production in last ***Yala*** and ***Maha*** seasons considering total amount of land you cultivated.

Inputs (bought/own)			Total quantity used (trailer loads/kgs/bags/litres)		Total cost (LKR)	
	Type	Supplier	*Yala*	*Maha*	*Yala*	*Maha*
Chem./org. fertiliser						
Seeds						
Pesticide						
Weedicide						

Labour	Total man days		Wage rate (LKR or kg of rice/man day)	
	Yala	*Maha*	*Yala*	*Maha*
Family & exchange				
Hired				

Source of credit	Amount (LKR)		Interest rate (%)	If you face any difficulties in accessing credit, what are they?
	Yala	*Maha*		
…… ……				

Type of machineries used	Own (yes/no)		Total payment if hired (LKR)	
	Yala	*Maha*	*Yala*	*Maha*
Sprayers				
Land prep.				
Harvesting				
Threshing				
Combined harvesting				
Transport to store				

19. Do you wish to continue your MPCS membership for next 5 years? ☐ Yes ☐ No
Explain whay

……

……

20. Do you wish to continue paddy/rice farming for next 5 years? ☐ Yes ☐ No
Explain why

……

……

21. Any other commnets

……

Survey No: -

Survey – Part II

This part of the questionnaire surveys benefits you perceive being a member of the MPCS. There are 62 perceived benefit statements given in the table. Mark your level of agreement or disagreement against each statement using the Yale scale given.

			Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Private benefits Related to production and marketing	**Do you believe that due to MPCS membership, your…….**		**1**	**2**	**3**	**4**	**5**
	01	income has increased?					
	02	paddy/rice yield has increased?					
	03	paddy/rice production has increased?					
	04	cultivated extent of paddy lands has increased?					
	05	value of assets has increased?					
	06	paddy/rice got better prices?					
	07	paddy/rice quality has increased?					
Private benefits related to purchasing inputs and receiving services	**Do you believe that due to MPCS membership your cost of…..**						
	08	transporting paddy/rice products has decreased?					
	09	marketing paddy/rice has decreased?					
	10	buying fertiliser has reduced?					
	11	buying seeds has reduced?					
	12	buying farm machinery has reduced?					
	13	buying fuel has decreased?					
	14	buying pesticide has decreased?					
	15	buying weedicide has decreased?					
	Do you believe that due to MPCS membership you have been able to….						
	16	get high interest on savings?					
	17	get credit at low interest?					
	18	get credit easily?					
	19	get information on paddy/rice price					
	20	get monitored the farm					
	21	get seeds of high value rice varieties (e.g., Keeri samba)?					
	22	get agronomic recommendations					
	23	get information about new market opportunities					
	24	get crop production trainings					
	25	buy high quality fertiliser?					
	26	buy high quality seeds?					
	27	find labour during labour scare seasons					

	28	buy high quality agro-chemicals						
	29	buy high yielding seeds?						
	30	buy seeds on credit?						
	31	buy agrochemicals on credit?						
	32	buy fertiliser on credit?						
Community benefits	**Rice growing members of the co-operative have been able to……**							
	33	share experience in rice farming						
	34	get financial support in the event of crop failure						
	35	get access government sponsored programmes or funding						
	36	get health services at subsidised rates						
	37	have financial support in the event of death						
	38	get funeral services (huts, chairs, meals)						
	39	have financial/material support rebuild assets damaged from natural hazards						
	40	have financial support for ceremonies (e.g., weddings)						
	41	have financial support for sudden illnesses						
	42	get co-operative trainings						
Social benefits	**Have you been heard that your co-operative….?**							
	43	promotes women leaders in the region						
	44	promotes leaders in the region						
	45	promotes education among children in the region						
	46	supports schools in the region						
	47	supports religious institutes in the region						
	48	provides employments to people in the region						
	49	promotes democratic principles among people in the region						
Ownership and control benefits	**Have you been ……**							
	50	paid rebates						
	51	paid dividends						
	52	able to influence on business strategies related to rice						
	53	raise your voice and give opinions						
Environmental benefits	**Do your co-operative help in…….**							
	54	using irrigation water efficiently						
	55	using organic fertiliser						
	56	reducing soil fertility degradation in paddy/rice lands						
	57	reducing soil erosion in paddy/rice lads						
	58	reducing pesticide use in paddy/rice farming						
	59	reducing herbicide use in paddy/rice farming						
	60	reducing water contamination from fertiliser and agrochemicals						
	61	promoting personnel safety of paddy/rice farmers						
	62	educating about health hazards of working in farm						

Survey No:

Supplementary Form

This form includes selected questions that can be answered by the researcher and instructions to complete Part-I and Part-II of the survey questionnaire. Researcher can use his own observations, GPS locations maps and records at co-operatives in answering questions in this form. Researcher can also refer to the information given here in filling the survey questionnaire and must attach to part I and part II of the survey questionnaire.

Household's information:

1. Date of survey: -……..
2. Member's co-operative: -…….
3. Member's address: -……
4. GPS locations: -Farm:……..House:……Coop:……Selling place:……..
5. Respondent's gender: - Male ☐ Female ☐

INSTRUCTION: Household and farm characteristics

Question 11: assets own and their quantities

Table below provides some examples of assets belongs to different categories

Asset category	**Names**
Passenger/utility vehicles	Motor bike, three-wheeler, car, van, double cab, truck
Farm machines /equipment	Four-wheel tractor, two-wheel tractor, combined harvester, threshing machine, reaper, power sprayer, knapsack sprayer
Lands	Paddy/rice lands, other uplands, residential plots
Farm animals	Cows, poultry, goats
Consumer durables	Gold, refrigerator, oven, television, mobile phone, sewing machine Furniture (wardrobe, dining table set, sofa set, beds), gas cocker and cylinder
Buildings and services	Fully completed Rock/cement house, partially completed rock/cement house, connection to national electricity grid, connection to domestic water supply, cable TV connection, land phone connection, internet connection, paddy/rice store
Distance to following locations from the farm need to estimate using GPS locations, maps and observations in kilometres 1) Coop, 2) PMB purchasing centre, 3) nearest township and 4) house	

INSTRUCTIONS: Q14

Question 3: Use following codes

[an] Indicate the method of drying; 1=drying floor, 2=on mats, 3=mechanical dryer

[b] Sold at farm=1, Sold at farmer's store = 2, Sold at buyer's place = 3

[c] Own vehicle = 1, Hired vehicle = 2

Final version of the questionnaire

Appendix E

Survey No:

Survey - Part I

1. How long have you been involved in agriculture?…….years
2. How long have you been involved in paddy/rice farming?……years
3. When did you join the coop?..... (year)
4. How many family members are there in your household? Adults ☐ Children ☐
5. How many family members work on the paddy/rice farm? Fulltime ☐ Part time ☐
6. How old are you?.....years
7. What is your level of education?.....years
8. What are the 3 main reasons for you to join the coop?
   .....
   .....
9. How many hectares of lands did you cultivate before you join the coop? Own ☐ Leased ☐
10. How many hectares of lands did you cultivate and harvest during last *Yala* and *Maha* seasons?

Season	Own		Leased		If any difference, reasons?
	Cultivate	Harvest	Cultivate	Harvest	
Yala					
Maha					

11. What is the availability of irrigation water to your cultivated lands in general?

☐ Good (3) ☐ Average (2) ☐ Bad (1)

12. Do you have other sources of income ☐ Yes ☐ no

I yes, what are they	Contribution to annual income (%)

13. What assets and how much of them do you own?

Asset type	Type	Quantity	Market value (LKR)
Lands			
Farm animals			
Farm machines/equipment			
Passenger/utility vehicles			
Consumer durables (Gold)			
Buildings and services			

14. Provide following marketing and post-harvest information on rice verities you cultivated during last ***Yala*** and ***Maha*** seasons

Season	Variety	Quantity (kg)							Weeks sold since harvesting	Buyer you sold to	Price (LKR/kg)	Place you sold[b]	If sold at buyer's place	
		sold immediately after harvesting	practiced post-harvest activities											
			Dried[a]	cleaned	stored for seed	stored for consumption	sold after storing	Paid for rent					How did you transport[c]	Cost, if hired (LKR)
Yala														
Maha														

15. Why did you select to grow different rice varieties?

Variety	Reason/s

16. If you sold to different buyers, explain why?

Buyer	Reason/s

17. Explain why did you choose to sell immediately after harvesting and/or later

18. Please provide the following information on farm inputs and cost of production in last ***Yala*** and ***Maha*** seasons considering total amount of land you cultivated.

Inputs (bought/own)			Total quantity used (trailer loads/kgs/bags/litres)		Total cost (LKR)	
	Type	Supplier	*Yala*	*Maha*	*Yala*	*Maha*
Chem./org. fertiliser						
Seeds						
Pesticide						
Weedicide						

Labour	Total man days		Wage rate (LKR or kg of rice/man day)	
	Yala	*Maha*	*Yala*	*Maha*
Family & exchange				
Hired				

Source of credit	Amount (LKR)		Interest rate (%)	If you face any difficulties in accessing credit, what are they?
	Yala	*Maha*		
…… ……				

Type of machineries/services used	Own (yes/no)		Total payment if hired (LKR)	
	Yala	*Maha*	*Yala*	*Maha*
Sprayers				
Land prep.				
Harvesting				
Threshing				
Combined harvesting				
Transport to store				
Drying floor				

19. Do you wish to continue your coop membership for next 5 years? ☐ Yes☐ No
Explain whay

……
……

20. Do you wish to continue paddy/rice farming for next 5 years? ☐ Yes☐ No
Explain why

……
……

21. Any other commnets

……

Survey No: -

Survey – Part II

This part of the questionnaire surveys benefits you perceive being a member of the coop. There are 62 perceived benefit statements given in the table. Mark your level of agreement or disagreement against each statement using the statement scale given.

			Strongly agree	Agree	Moderately Agree	Marginally agree	Not agree
Private benefits Related to production and marketing	**Do you believe that due to co-operative membership, your…….**		**1**	**2**	**3**	**4**	**5**
	01	income has increased?					
	02	paddy/rice yield has increased?					
	03	paddy/rice production has increased?					
	04	cultivated extent of paddy lands has increased?					
	05	value of assets has increased?					
	06	paddy/rice got better prices?					
	07	paddy/rice quality has increased?					
Private benefits in supplying inputs and services	**Do you believe that due to co-operative membership your cost of?**						
	08	transporting paddy/rice products has decreased?					
	09	marketing paddy/rice has decreased?					
	10	buying fertiliser has reduced?					
	11	buying seeds has reduced?					
	12	buying pesticide has decreased?					
	13	buying weedicide has decreased?					
	14	buying fuel has decreased?					
	15	hiring cost of farm machinery has decreased?					
	Do you believe that due to co-operative membership you **have been able to….**						
	16	get high interest on savings?					
	17	get credit at low interest?					
	18	get credit easily?					
	19	get information on paddy/rice price					
	20	get monitored the farm					
	21	get seeds of high value rice varieties (e.g., Keeri samba)?					
	22	get information on production technology					
	23	get information about new market opportunities					
	24	get crop production trainings					
	25	get high quality fertiliser?					
	26	get high quality seeds?					

	27	get high quality agro-chemicals					
	28	get high yielding seeds?					
	29	get seeds on credit?					
	30	get agrochemicals on credit?					
	31	get fertiliser on credit?					
	32	get consumer goods at low price?					
Community benefits	**Rice growing farmers in the area have been able to……**						
	33	share experience in rice farming					
	34	get financial support in the event of crop failure					
	35	get access to government sponsored programmes or funding					
	36	get access to subsidised health services					
	37	get financial support in the event of death					
	38	get funeral services (huts, chairs, meals)					
	39	have financial/material support rebuild assets damaged from natural hazards					
	40	have financial support for ceremonies (e.g., weddings)					
	41	have financial support for sudden illnesses					
Social and cultural benefits	**Have you been heard that your co-operative…..**						
	42	promotes women leaders in the region					
	43	promotes leaders in the region					
	44	promotes education among children in the region					
	45	supports schools in the region					
	46	supports religious institutes in the region					
	47	provides employments to people in the region					
	48	promotes democratic principles among people in the region					
Ownership and control benefits	**Have you been ……**						
	49	paid rebates					
	50	paid dividends					
	51	able to influence on rice business strategies					
	52	raise your voice and give opinions					
	53	get co-operative trainings					
	54	Being able to vote in electing board					
Environmental benefits	**Your co-operative help in…….**						
	55	using irrigation water efficiently					
	56	using organic fertiliser					
	57	reducing soil fertility degradation in paddy/rice lands					
	58	reducing soil erosion in paddy/rice lads					
	59	reducing pesticide use in paddy/rice farming					
	60	reducing herbicide use in paddy/rice farming					
	61	reducing water contamination from fertiliser and agrochemicals					

Survey No:

Supplementary Form

This form includes selected questions that can be answered by the researcher and instructions to complete Part-I and Part-II of the survey questionnaire. Researcher can use his own observations, GPS locations maps and records at s in answering questions in this form. Researcher can also refer to the information given here in filling the survey questionnaire and must attach to part I and part II of the survey questionnaire.

Household's contact and location information:

6. Date of survey: -……..

7. Member's co-operative: -…….

8. Member's address:-……

9. GPS locations: -Farm:……..House:……Coop:……Selling place:……..

10. Respondent's gender: - Male ☐ Female ☐

INSTRUCTION: Household and farm characteristics

Question 11: assets own and their quantities

Table below provides some examples of assets belongs to different categories

Asset category	**Names**
Passenger/utility vehicles	Motor bike, three-wheeler, car, van, double cab, truck
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Lands	Paddy/rice lands, other uplands, residential plots
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Consumer durables	Gold, refrigerator, oven, television, mobile phone, sewing machine Furniture (wardrobe, dining table set, sofa set, beds), gas cocker and cylinder
Buildings and services	Fully completed Rock/cement house, partially completed rock/cement house, connection to national electricity grid, connection to domestic water supply, cable TV connection, land phone connection, internet connection, paddy/rice store
Distance to following locations from the farm need to estimate using GPS locations, maps and observations in kilometres 2) Coop, 2) PMB purchasing centre, 3) nearest township and 4) house	

INSTRUCTIONS: Q14

Question 3: Use following codes

[an] Indicate the method of drying; 1=drying floor, 2=on mats, 3=mechanical dryer

[b] Sold at farm=1, Sold at farmer's store = 2, Sold at buyer's place = 3

[c] Own vehicle = 1, Hired vehicle = 2

Appendix F

Properties, advantages and disadvantages of three data reduction methods

Principle component analysis (PCA)	**Exploratory factor analysis (EFA)**	**Confirmatory factor analysis (CFA)**
	Properties	
Reduce items to subset	Reduce items to subset	Reduce items to subset
Descriptive technique	Modeling technique	Modelling technique
Exploratory approach	Exploratory approach/theory building	Conformity approach/theory testing
Analysis based on variance and maximises the total variance	Analysis based on covariance and maximises the common variance	Analysis based on covariance and maximises the common variance
The component is a linear combination of items that maximise the total variance	Extracted factors – explain relationships/common variance (common factor theory)	Extracted factors – Explain relationships/common variance (Common factor theory)
Lets observed data determine the components a *posteriori*	Lets observed data determine the underlying factor structure *a posteriori*	Factor structure is pre-derived *a priori*
Discover pattern in data/components	Discover factor structure/latent variable	Simplify, refine and confirm the factor structure
The underlying reasoning is inductive and no hypothesised structure beforehand.	The underlying reasoning is inductive and no hypothesised structure beforehand.	The underlying reasoning is deductive and factor structure hypothesised beforehand.
Do not assume the existence of common factors/latent variables	Assume the existence of few common factors/latent variables	Assume the existence of few common factors
	Advantages	
Reduces Overfitting	Best for analysing the structure of a measurement tool.	researchers can specify the number of factors required in the data and which measured variable is related to which latent variable.
Works well on interval/ratio data, and ordinal data at a push	Works well on interval/ratio data, and ordinal data at a push	Works well on interval/ratio data, and ordinal data at a push
reduce computational complexity	Take advantage of all the information in the interrelationships between variables	More appropriate for measurement error (Latent construct)
	Less dependent on the assumption of independence among variables	
	Causality is not necessary	
	Disadvantages	

Independent variables become less interpretable Data standardisation is must before PCA Linearity Less appropriate for measurement error Information Loss	Based solely on correlations among variables Temperamental regression coefficients obtained by factor analysis are biased (Green, 1997). More appropriate for measurement error Reducing the original variables into a smaller number of factors, some information is lost	Answer depend on the questions asked Hard to decide how many factors to include
Applications in agriculture/agribusiness	**Applications in agriculture/agribusiness**	**Applications in agriculture/agribusiness**
(S. Henson, Jaffee, Cranfield, Blandon, & Siegel, 2008), (Bulluck Iii, Brosius, Evanylo, & Ristaino, 2002), (D. Herath & Henson, 2010) (Kalogeras et al., 2013) (Luckow & Delahunty, 2004) (Hou, Grazia, & Malorgio, 2015) (Lambert, Paudel, & Larson, 2015)	(Inderhees & Theuvsen, 2009) (McLeay & Martin, 1996) (Tsourgiannis, Eddison, & Warren, 2008) (McGehee & Kim, 2004) (Wesley, LeHew, & Woodside, 2006) (Sharfman, Shaft, & Anex Jr, 2009) (Kader et al., 2009)	(Chryssochoidis, Krystallis, & Perreas, 2007; Gyau & Spiller, 2008; A. J. Johnson, Dibrell, & Hansen, 2009)

Source: Based on literature review (Bollen, 1989, 2002; Hayduk, 1987; Long, 1983; Long and Perkins, 2003; Moore and Neimeyer, 1991; Fabrigar, Wegener, MacCallum and Strahan 1999; Fabrigar et al 2012; Hair et al 2014; Bartholomew, Steele, Moustaki and Galbraith 2008, Green , 2003)

Appendix G

Checking the data suitability for factor analysis/data preparation

This step involves assessing the sample size; a number of variables and correlations exist among variables to proceed EFA. Nonetheless, there is no common consensus about the sample size important in EFA; the literature suggests several rules of thumb (Gorsuch, 2015; Hair et al., 2014). As a rule of thumb, Tabachnick and Fidell (2007) suggests having at least 300 cases, whereas, Hair et al. (2014) suggest a sample size of over 100. Thus, in their guide to sample size, Comrey and Lee (2013) advise 100 as poor, 200 as fair, 300 as good, 500 as very good, and 1000 or more, as excellent. Looking into other dynamics of EFA, others (MacCallum, Widaman, Zhang, & Hong, 1999) found no harm of using small samples if each factor is defined by several items and have high (>0.60) commonalities. As can be seen, the suggested sample size can vary greatly depending on the situation to complete a factor analysis of a group of items.

Despite these various opinions about sample size, the ratio of Sample to Variable (*N:p* ratio where *N* and *p* refers to the number of participants and variables respectively) has also been used as a preliminary check of sample size. As a rule of thumb, *N:p* could range anywhere from 3:1, 6:1, 10:1, 15:1, or 20:1 (Everitt & Dunn, 2001; Gorsuch, 2015; Hair et al., 2014).

In checking the suitability of data to proceed with EFA, researchers suggest examining the correlation matrix. It has been widely used by investigators (R. K. Henson & Roberts, 2006) and Tabachnick and Fidell (2007) recommend examining the correlation matrix for correlation coefficients over 0.30. Hair et al. (2014) also suggest another rule of thumb as +/-0.30 = minimal, +/-0.40 = important, and +/-0.50 = practically significant and recommends EFA if the data meet this prerequisite.

In addition to the aforesaid preliminary checks and rules of thumb, two formal tests used to assess the factorability of respondent data are: 1) Kaiser-Meyer-Olkin (KMO) measure of sample adequacy (also abbreviated as MSA), and 2) Bartlett's Test of Sphericity (Bartlett, 1950; H. F. Kaiser, 1970). The KMO is an index range from 0 to 1 and some (Hair et al., 2014; Tabachnick & Fidell, 2007) recommend an index with 0.5 suitable for EFA. Further, Bartlett's Test of Sphericity should also be significant ($p<0.05$) for a given data set to proceed with EFA

Determining the method of extracting factors

There are a number of ways to extract factors. They are: 1) Principal components analysis (PCA), 2) Principal axis factoring (PAF), 3) Maximum likelihood, 4) Unweighted least squares, 5) Generalised least squares, 6) Alpha factoring, and 7) Image factoring. Of them, PCA and PAF have been used most commonly in the published literature (R. K. Henson & Roberts, 2006; Tabachnick & Fidell, 2007). There is no significant practical difference between these two common extraction methods when variables have a high reliability, or there are more than 30 variables (Gorsuch, 2015; Thompson, 2007). The PCA method of extraction has often been used in EFA (Thompson, 2007) and Pett, Lackey, and Sullivan (2003) suggest using this method in establishing preliminary solutions in EFA, although it is recommended for situations in absence of a priori theory.

Determining the criteria of extracting number of factors

The third important step in the EFA process is to choose criteria to assist in determining the number of factors. Any chosen criteria should lead to deciding on some factors that retain as much data as possible represented by a large number of items/variables. The literature suggests four commonly used criteria such as; Cumulative percentage of variance, The rule of 1< Eigenvalue or Kaiser's criteria, Scree test and Parallel analysis

Despite there being disagreements in using the first criterion (cumulative percentage of variance and an Eigenvalue greater than one), various suggested thresholds can be found in different disciplines. Hair et al. (2014) suggest stopping factors once 95% of the total variance is explained in natural sciences while setting this threshold to 50-60% in humanities and social sciences. Nevertheless, some empirical research has used below 40% of the total explained variance as a cut-off to stop factors (for example; McGehee & Kim, 2004).

The second criterion named above (rule of 1< Eigenvalue or Kaiser's criteria) suggests to retain the factors of which the Eigenvalue (the proportion of variance explained by each factor) is greater than one (H. F. Kaiser, 1960).

The third criterion is the Scree test that involves the Scree plot. Discovering this criterion, Cattell (1966) suggests retaining the factors lie above where the break occurs once a straight line draws through the smaller Eigenvalues. Many have argued that the interpretation of the Scree plot is subjective and needs researcher judgment (Gorsuch, 2015; Tabachnick & Fidell, 2007).

The fourth criterion is the parallel analysis which has not been used much in the literature (R. K. Henson & Roberts, 2006). The main reason for its limited use accrues to its unavailability in conventional software such as SPSS and SAS (Thompson & Daniel, 1996). However, these methods have been acknowledged to have merits over other methods (R. K. Henson & Roberts, 2006; Thompson, 2007). In this method, actual Eigenvalues are compared with random order Eigenvalues. Moreover, factors are retained when actual Eigenvalues surpass random ordered Eigenvalues.

As discussed above, there are a number of criteria available to determine factor extraction. However, none of the criterion is perfect. Each has its own merits and demerits. Thompson and Daniel (1996) state that the simultaneous use of multiple criteria is appropriate and desirable.

Selection of the rotational method

Choosing a rotational method is important in producing more interpretable and simplified solutions. In situations where an item/variable is related to more than one factor, interpretation becomes complicated. Rotation maximises high item loadings and minimises low item loadings leading to more interpretable solutions (Norman & Streiner, 2008). There are two main rotation options; orthogonal and oblique. Basically, orthogonal rotation works on the assumption that factors are uncorrelated, while oblique option allows factors to be correlated. Each option consists of different methods from which to choose. Orthogonal option has varimax/quartimax whereas oblique option consists of oblimin/promax. Out of orthogonal and oblique rotation options, the two most commonly used techniques are varimax and oblimin (Bryant & Yarnold, 1995; Tabachnick & Fidell, 2007). Tabachnick and Fidell (2007) state that results generated from orthogonal methods of rotation are much simpler to interpret and understand. They also suggest to command oblique rotation first and warrant doing it only if there are correlations above 0.32 and 10% overlap in variance among factors. A simple factor structure results following the execution of a rotation method consisting of items/variables loaded strongly on factors. A number of strongly loaded items/variables represent each factor. Hair et al. (2014) suggest a way towards identifying items/variables that are significantly loaded on factors based on the sample size and at 95% confidence interval as presented in the table below.

Relationship between sample size and significant factor loadings

Sample size		50	60	70	85	100	120	150	200	250	350
Significant loading	factor	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30

Source Hair et al. 2014

Some suggest to (for example; Kieffer, 1999; Pett et al., 2003) carefully examine and assess the rotated factor outputs for best fit and use the solution intuitively and conceptually. Following this assessment, it is upon the researcher to decide on whether to keep or discard the items loaded on the factors without a conceptual fit. According to those referred above, discarding items/variables is logical if they are; 1) loaded on several factors, 2) not loaded on any factor, 3) not conceptually fit any logical factor structure.

Interpretation

The EFA procedure completes following the interpretation of results. This involves the examination of items/variables grouped into the factors and labeling the factors. The researcher is involved in naming/labelling factors; hence, it is a subjective but theoretical and inductive process as well (Pett et al., 2003). There must be at least two or three items/variables to be loaded on factors to propose an important theme which can be meaningfully interpreted. The meaningfulness of latent factors also depends on how the researcher defines them (R. K. Henson & Roberts, 2006; S. Isaac & Michael, 1995).

Appendix H

Theoretical foundation for treatment effect models

Therefore, establishing a cause-and–effect relationship is essential to see if there is any difference in the financial performance of members' farm which can be attributed to the differences in level of integration. One of the analytical challenges encountered in achieving this objective is lack of a counterfactual. With regard to this study, it can be defined as the financial performance of members before being a co-operative is fully integrated from the state of partial integration. Accordingly,

Causality and validity

Selection bias is a fundamental threat to internal validity in observational studies (Caliendo & Kopeinig, 2008) and it is the most common problem in these studies. In most observational studies, the outcome cannot be observed for the same individual at the same time. Unlike in experimental settings, in observational studies, no systematic methods of experimental design are used to maintain a control group. Comparison of a treatment group with a non-experimental comparison group is often used in estimating casual effects as an alternative. It is well recognised that such methods could be biased because of problems such as self-selection or some systematic judgment by the researcher in selecting units to be assigned to the treatment (Dehejia & Wahba, 2002) and the groups could differ, even in the absence of treatment (Caliendo & Kopeinig, 2008). The following sections discusses the framework's principles and assumptions.

Counterfactual framework

Counterfactuals are at the core of any scientific enquiry of investigating causality. It is the potential outcome, or the state of affairs that would have happened in the absence of the cause T. D. Cook, Campbell, and Shadish (2002). Basing causality on counterfactual in observational studies coined from the work of Neyman (1923); Rubin (1974, 1978). The framework argues that, individuals selected into either treatment or non-treatment groups have potential outcomes in both states. For example, assuming that each person i under evaluation would have two potential outcomes (Y_{0i}, Y_{1i}) corresponding respectively to untreated and treated states. Let, $W_i = 0$ denote the non-receipt of treatment, $W_i = 1$ denote the receipt of treatment, and Y_i indicate the measured outcome variable. Accordingly, Neyman-Rubin counterfactual framework can be expressed as;

$$Y_i = W_i Y_{1i} + (1 - W_i) Y_{0i}$$

Where; W_i is a dichotomous variable. Therefore, both the terms W_i and $(1 - W_i)$ serve as a switcher. The equation shows the causal relationship between W_i (the cause) and Y_i (the outcome). Accordingly, it is irrational to directly link Y_{1i} to W_i under the condition$W_i = 1$. Instead Y_{0i} under the condition of $(W_i = 0)$ and compare Y_{0i} with Y_{1i}

However, the issue is that, in most of the cases, Y_{0i} is unobservable. This issue was referred to as the fundamental problem of causal inference by Holland (1986). Neyman-Rubin counterfactual framework, however, holds that a researcher can estimate the counterfactual by examining the average outcome of the treatment participants and the average outcome of the non-treatment participants in the population. Specifically, let $E(Y_0|W = 0)$ denote the mean outcome of individuals who compose the non-treatment group, and $E(Y_1|W = 1)$ denote the outcome who compose the treatment group. Since both of the above outcomes are observable, the treatment effect can be given as a mean difference:

$$\tau = E(Y_1|W = 1) - E(Y_0|W = 0),$$

Where τ denotes treatment effect. Under this framework, the evaluation of $E(Y_1|W = 1) - E(Y_0|W = 0)$ can be understood as an effort that uses $E(Y_0|W = 0)$ to estimate the counterfactual $E(Y_0|W = 1)$. The main interest of the evaluation is not in $E(Y_0|W = 0)$ but in $E(Y_0|W = 1)$.

In summary, this framework offers a practical way to evaluate the counterfactuals. Using data from a sample that represents the population, the standard estimator for the average treatment effect can be defined. It can be identified as the difference between two estimated means of the sample data

$$\hat{\tau} = E(\hat{y}_1|w = 1) - E(\hat{y}_0|w = 0),$$

Where $\hat{\tau}$ is the estimator for the population average treatment effect, y_1, y_0 and w respectively denotes sample variables of Y_0, Y_1 and W. This framework provides a useful tool in estimating potential outcomes and testing plausibility of randomised experiments (Guo & Fraser, 2014).

Limitations of the framework

However, several limitations in the framework have been identified when it is applied to testing plausibility of randomised experiments. The framework is based on ignorable treatment assignment assumptions. That is, except for the treatment, no other factors affect the outcome. Thus, the framework defines $E(Y_1|W=0)$ and $E(Y_0|W=1)$ analogously to $E(Y_1|W=1)$ and$E(Y_0|W=0)$. However, the quantities $E(Y_1|W=0)$ and $E(Y_0|W=1)$ cannot be directly calculated because they are unobservable values of Y. Thus, the definition of the counterfactual model assumes that $E(Y_1|W=1) = E(Y_1|W=0)$ and $E(Y_0|W=0) = E(Y_0|W=1)$. Therefore, the standard estimator consistently estimates the true average treatment effect only if this condition is met. Statisticians (D. R. Cox, 1992; Hinkelmann & Kempthorne, 1994) have shown that above condition remain true in the classical randomised experiments. Randomisation works in the way that makes the assumption about $E(Y_1|W=1) = E(Y_1|W=0)$ and $E(Y_0|W=0) = E(Y_0|W=1)$ plausible. Moreover, $(Y_0|W=1) = E(Y_0|W=0)$ remains true since there is no section bias.

However, Heckman and Smith (1995) have challenged the validity of the assumption $E(Y_1|W=1) = E(Y_1|W=0)$ and $E(Y_0|W=0) = E(Y_0|W=1)$ in observational studies and showed $E(Y_0|W=1) \neq E(Y_0|W=0)$, because of the selection bias. Further, many sources of error contribute to the bias of the standard estimator of the average treatment effect: $\tau = E(Y_1|W=1) - E(Y_0|W=0)$.

Identifying this limitation, Rubin (1974, 1977, 1978) and Rosenbaum and Rubin (1983) extended the framework to be applicable to observational studies based on a new assumption (ignorable treatment assignment assumption). They considered un-observability of the quantities $E(Y_1|W=0)$ and $E(Y_0|W=1)$ as a missing data problem in observational studies.

The authors assumed that $(Y_0, Y_1) \perp W : \mathrm{X}$.

That is, conditional on covariates X, the assignment of study participants to binary treatment conditions (i.e., treatment vs. non-treatment) is independent of the outcome of non-treatment (Y_0) and the outcome of treatment (Y_1). Putting it in a different way, assignment to one condition or another is independent of the potential outcomes if observable covariates are held constant.

However, (Heckman, 1979; Heckman et al., 1998; Maddala, 1986) showed that this assumption is often violated in quasi-experimental designs and in observational studies. This is because, in such studies, the comparison group is created following a natural process that compounds group assignment with outcomes. They have demonstrated the presence of endogeneity bias when the treatment assignment is not ignorable using an ordinary least squares (OLS) regression model.

$$Y_i = \alpha + \tau W_i + X_i\beta + e_i$$

Where W_i is a dichotomous variable indicating treatment, and X_i is the vector of independent variables for case i. In observational data, since the researcher has no control over the assignment of treatment conditions, W is highly correlated with Y. Thus, when the ignorable treatment assumption is violated, the correlation between W and *e* is not equal to 0. Therefore, OLS estimation of τ is bias and inconsistent. There are other factors determining W and it is merely an observed variable that is determined by a latent visible W^* in which way that $W = 1$, if $W^* > C$, and $W = 0$, otherwise, where C is a constant. Building on this, Heckman (1979); Heckman et al. (1998) developed the sample section model and Maddala (1986) developed the treatment effect model aimed at correcting endogeneity bias.