LINKING SMALLHOLDER VEGETABLE FARMERS TO HIGH VALUE MARKETS IN THE MANOKWARI REGION, PAPUA BARAT PROVINCE, INDONESIA

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Abstract

The expansion of modern markets, such as supermarkets, may have critical implications for agriculture and rural development. For smallholder farmers, this phenomenon can provide opportunities to gain economic advantages by being linked into the supermarket channels. However, there are also challenges limiting the participation possibilities of smallholder farmers, since the supermarket channels require such high standards regarding the quantity and quality of agricultural produce supplied. Considering that market channels are a dichotomous choice for smallholder farmers, this study aims to identify and analyse key determinants affecting farmers' participation in the supermarket channels, using a comparison to the traditional market channels.

A structured questionnaire was designed and face-to-face interviews were conducted with a random sample of 126 smallholder vegetable farmers in the Manokwari region, Papua Barat province of Indonesia. Factors influencing the market channel decision about whether to supply to supermarkets or traditional markets were analysed using binary logistic regression. Chi square analysis was used in comparing key factors between the supermarket and traditional market channels. Furthermore, a bivariate correlation was also run to find out the impact of market channel participation on farmer household income.

The empirical results suggested that education level of farmers, vegetables cultivated area, and farmers' membership of the farmer groups were some of the key determinants that had significant and positive effects on the farmers' decision about market channel participation. The results also revealed that the supermarket channel suppliers received higher average prices and paid more for transportation costs, compared to the traditional market suppliers. In addition, the results suggested that market channel participation and the household income generated from vegetable farms were positively correlated.

The results cannot be generalised to other contexts due to the nature of the study design. However, they may contribute to some useful implications. Since farm production capacity was essential for being linked to supermarket channels, technical innovations need to be prioritised in agricultural development strategies. Also, collective actions through farmer groups should be encouraged to broaden the roles, especially in accessing new emerging markets.

Dedication

I dedicate this thesis to my beloved wife, Juanita Rosalia Horman, who has provided consistent encouragement, support and patience during my study period, and to my children, Jovita Quaneisha Maspaitella and Joachim Xaverio Maspaitella, who have been great sources of motivation and inspiration. May God’s glory continuously shine on you all.

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I would like to thank the New Zealand Government for awarding me the scholarship which enabled me to pursue my study at Massey University. I also thank the International Student Support office, especially Sylvia, Jamie and Leuaina, for their advice and support during my study period.

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My sincere thanks also go to some Indonesian families in Palmerstion North - Mr Charly Talumepa and family, Mr Deni Rangkuti and family, and Mr Tedy Sutedja and family - for their prayers, support and encouragement.

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Chapter One: Introduction

1.1. Background

Agrifood systems in developing countries, including Indonesia, are increasingly changing toward high value food markets (Reardon, Timmer, & Minten, 2012). The development of global food retailers has been taking place in this country for more than two decades. Moreover, modern food markets in Indonesia are currently not only being developed in major cities, but have been also mushrooming into provincial cities, and reaching rural and agricultural-based communities (Suryadarma et al., 2010). For agricultural producers, this phenomenon can be utilized for gaining economic advantages through improved access to markets. Participation in such modern food supply chains can provide new income opportunities for smallholder farmers. However, the increasing growth of modern food retailers is also bringing new challenges in terms of higher standard requirements that might potentially limit participation possibilities for smallholder farmers.

A number of previous studies have attempted to investigate smallholder participation in high value market channels. While some studies concluded that smallholder farmers would get obvious economic opportunities from being linked in high value market chains (Hernandez, Reardon, & Berdegue, 2007; Miyata, Minot, & Hu, 2009; Rao & Qaim, 2011), other studies found that there were challenges limiting smallholder farmers' participation possibilities (Reardon, Barrett, Berdegue, & Swinnen, 2009; Bosilie, Henson, & Weatherspoon, 2003).

There have been no clear conclusions about whether smallholder farmers can effectively participate in high value market chains. According to Reardon et al. (2009), in the dual-scale case, modern food markets are likely to source from commercial and large farmers, and exclude smallholder farmers. On the other hand, this study also reported that in some cases, modern food markets prefer to source from smallholder farmers, even when the access to larger farmers is available. Furthermore, the differences in approaches and proxies used also lead to debatable implications for the inclusion or exclusion of smallholder farmers' participation.

Linking smallholder farmers to high value markets is crucial for the Indonesian economic development agenda. This is because the majority of Indonesian people depend on agricultural activities for a living. According to the 2013 Indonesian Agriculture Census, the total agricultural households had reached 25.75 million, and from that number, 55.33% were engaged in small scale farming activities (Statistics Indonesia, 2014a). In addition, approximately 85.14% of smallholder farmers in Indonesia live in rural areas (Ministry of Agriculture, 2014a) that are mostly associated with problems such as limited access to farm assets, infrastructure, markets, and institutional support. These fundamental issues often reduce smallholder farmers' abilities to escape from poverty. Thus, considering the growth of agrifood transformation throughout the country, participation of smallholder farmers in high value markets can be a significant alternative for rural development and poverty alleviation strategies.

1.2. Problem Statement

Literature regarding smallholder farmer participation in high value markets in the Indonesian context is still limited. Previous studies have investigated the importance of smallholder farmer participation, and its implication for farmer welfare (Simmons, Winters, & Patrick, 2005), and changes and consequences of the emergence of modern food retailers for the agricultural supply chain (Chowdury, Gulati, & Gumbira-Sa'id, 2005). However, these studies have mainly taken place in West Indonesian regions that are relatively more developed in terms of accessibility of production inputs and basic infrastructures, such as transportation, information, and communication technologies.

There is very limited information available regarding the linkages between modern food markets and smallholder farmers in underdeveloped regions, especially in the eastern part of Indonesia. Therefore, capturing smallholder farmers' participation in emerging high value markets will be an important output for such stakeholders concerning the future development of agrifood systems.

This study will focus on smallholder farmer participation in the Manokwari region, Papua Barat province of Indonesia. In this region, even though traditional market channels are still dominant, modern retail store formats are also emerging. The emergence of modern food market formats in the Manokwari region has appeared since

the early 2000s, despite being dominated only by home-grown supermarkets and food stores. Since 2010, the modern food retail sector, taking the format of supermarkets, has started growing in the city of Manokwari. This situation brings opportunities for smallholder farmers to be involved in the growing modern market channels.

However, smallholder farmers' participation in modern market channels is insignificant, signalled by the fact that the majority of agricultural products, including fresh fruits and vegetables, marketed in supermarkets and food stores are regularly delivered from outside the Papua Barat province. Another challenge limiting farmers' participation possibilities is that smallholder farmers are problematic in dealing with the quality and continuity of products supplied to supermarkets or food stores. Because smallholder farmers are characterized by small farm size and low productivity, it is usually difficult to meet the basic requirements regarding quality and consistent supply. Hence, instead of participating in modern food retail and wholesale markets, smallholder farmers prefer to sell products through the traditional market channels that are considerably free of binding contracts. In addition, interventions of the supporting institutions, such as the government, non-government organisations (NGOs), cooperatives and associations, regarding agricultural development are more likely to engage with technical aspects, whereas aspects relating to value addition and marketing have very little attention.

This study will specifically focus on smallholder vegetable farmers. The vegetable sector has important implications throughout the country owing to the fact that it includes thousands of producers and traders, many agribusinesses, and marketing organizations. This sector also contributes to Indonesian agricultural exports which reached over 25 million USD in 2012 (Ministry of Agriculture, 2014b). In addition, the vegetable production is strategic as it relates to the attainment of food security and poverty reduction. Despite its significance, market participation of smallholder vegetable producers is still problematic, especially given the rising pressures from market liberalization.

1.3. Research Questions

To investigate smallholder farmers' participation in high value markets, the key research questions are:

1. What are the important factors for smallholder vegetable farmers to participate in supermarket channels in the Manokwari region, Papua Barat province of Indonesia?
2. Are supermarket channels influencing farmer household income in the Manokwari region, Papua Barat province of Indonesia?

1.4. Objectives

The main objectives of this study are:

1. To investigate factors affecting smallholder vegetable farmers' participation in supermarket channels;
2. To compare differences among determinant factors between traditional market channels and supermarket channels.
3. To analyse the impact of supermarket channels on farmer household income.

1.5. Significance of the Study

The information resulting from this study will be useful for smallholder vegetable farmers, supermarket and food store managements, retailers, wholesalers, and other players in the vegetable marketing channels. Also, the information generated by this study can help stakeholders and policy makers in capturing comprehensive problems regarding farmer participation in the modern food markets, and structuring programs that contribute toward improving smallholder farmers' welfare, as well as achieving the Indonesia's national goal of rural development and poverty reduction. In addition, the results of this study will be useful as a stepping stone for other researchers to carry out further study regarding smallholder farmers' participation in high value markets, especially in developing countries.

1.6. Thesis Outline

This thesis is organized into seven chapters. It begins with an introduction chapter, which includes the background of the study, a statement of the problem, the research questions, the objectives, and the significance of the study. The second chapter briefly introduces the study country - Indonesia -, and gives information about the country's agriculture and vegetable sector. The third chapter reviews the literature related to the subject at hand. Chapter Four presents the research methodology, including sampling

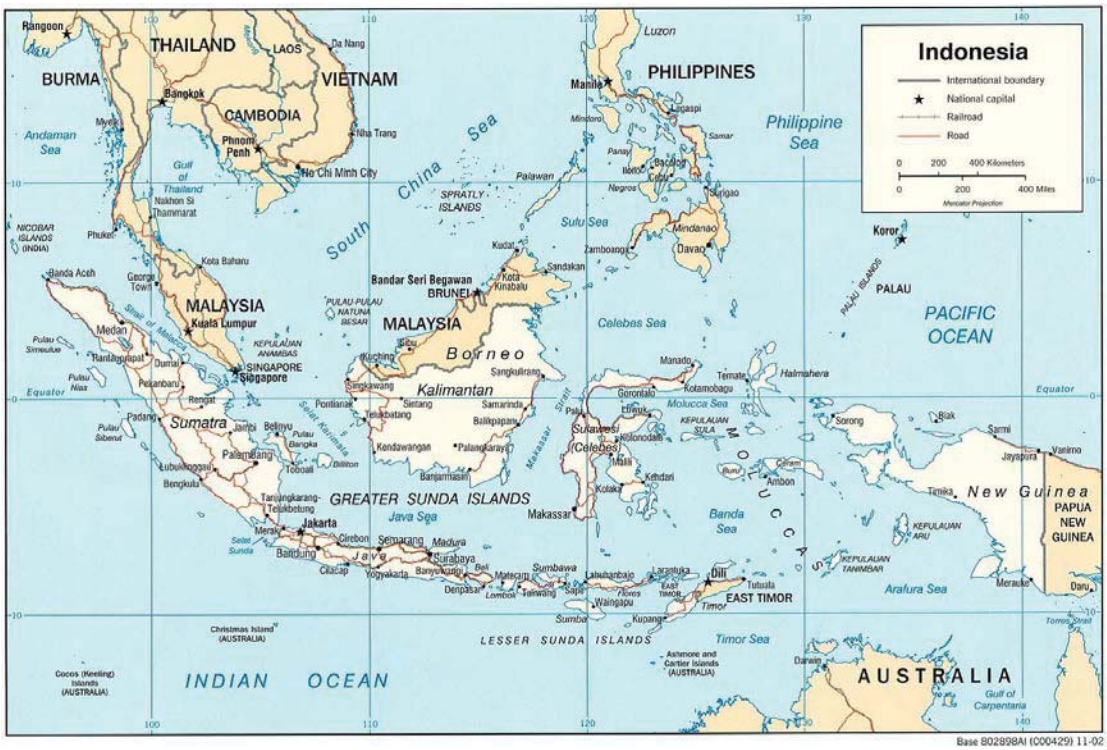
techniques, data collection methods, and tools for data analysis. The fifth chapter provides a descriptive analysis of samples of the study, followed by Chapter Six, which presents and discusses the main findings of the study. Finally, the conclusions and the discussion on possibilities for future research are highlighted in Chapter Seven.

Chapter Two: Indonesian Agriculture and Vegetable Sector

2.1. An Overview of Indonesia

Indonesia is the biggest archipelagic island country in the world, situated in the Southeast Asia region (CIA, 2014). The country lies in a strategic location between the Indian Ocean and the Pacific Ocean, and between the Asia continent and the Australia continent. The countries bordering Indonesia include Malaysia, Singapore, and the Philippines in the north, Papua New Guinea in the east, and Australia and East Timor in the South, as depicted in figure 2.1.

Figure 2. 1. Map of Indonesia



Source: http://www.lib.utexas.edu/maps/middle_east_and_asia/indonesia_pol_2002.pdf

Indonesia consists of 17,508 islands, of which about 6,000 are inhabited (CIA, 2014). It has five main islands; Kalimantan, Papua, Sumatra, Sulawesi, and Java. Also, it has other groups of islands, namely Bali, Nusa Tenggara, Maluku and the remaining 30 groups of island which are smaller in size (Statistics Indonesia, 2014b). The total area of the country is approximately 9.8 million square kilometres (km^2), which consists of 81%, or 7.9 million km^2 of sea, and about 1.9 million km^2 of land area (CCOP EPF, 2014). Indonesia has about 54,716 km length of coastline, and covers 5,120 km from west to east, and 1,760 km from north to south.

Indonesia is astronomically located between 6º 08' north latitude and 11º 15' south latitude, and between 94º 45' and 141º 05' east longitude. Crossed by the equator line, Indonesia is a tropical country with a fairly even climate all year round (CCOP EPF, 2014). There is no season such as Winter and Autumn, the year being roughly divided into two distinct seasons, 'wet' (October to March) and 'dry' (April to September). In 2011, the minimum temperature ranged from 15.6º to 24.3º Celsius, while the maximum temperature ranged from 30.4º to 36.0º Celsius. The heaviest rainfalls are usually recorded in December and January. The average humidity is generally between 74% and 86% (Statistics Indonesia, 2014b).

Based on the national population census 2010, the total population of Indonesia had by then reached about 237 million (Statistics Indonesia, 2014b). The population of Indonesia is the fourth largest in the world after China, India and the USA. The average annual growth of the Indonesian population was 1.40% during 1990-2000, and it slightly increased to 1.49% between 2000 and 2010 (Statistics Indonesia, 2014a).

Regarding age groups, the national population census reported that about 65% of the Indonesian population are in the group of 15-64 years. The group of 0-14 year was about 30%, while the population in the age group of over 65 years was about 5% (Statistics Indonesia, 2014b). Table 2.1 shows the distribution of the Indonesian population based on age group. The distribution during the 30-year period is relatively similar, despite the slight decrease in the children's age group and an increase in the adult and elderly groups.

Table 2. 1. Distribution of Indonesian population, 1990-2010 (%)

Age group (years)	1990	2000	2010
0 -14	36.0	30.8	30.0
15 - 65	60.0	64.5	65.0
> 65	4.0	4.7	5.0

Source: Statistics Indonesia, 2014b

The percentage of the urban population increased gradually during the last two decades. The proportion of the urban population was 30.6% in 1990, and rose to 40.2% in 2000. The national population census in 2010 noted that the Indonesian urban population was 49.8%. This rapid change is claimed as a consequence of changes in the Indonesian economy, signalled by the shifts of sector shares in national GDP.

Indonesia is the largest economy in the Southeast Asia region. After the recovery period due to the economic crisis in 1997, Indonesia is experiencing a fast growing economy. Indonesia's GDP increased from 160.4 billion USD in 2001 to 846.8 billion USD in 2011, while per capita GDP rose from 2,790 USD to 4,730 USD between 2004 and 2012 (World Bank, 2014).

During the past decade, the structure of the Indonesian economy has generally not changed. The manufacture sector is still the leading sector, despite having a declining share in GDP during 2004-2013. The share of agriculture sector increased slightly from 14.34% in 2004 to 14.43% in 2013. The mining sector contribution to GDP rose from 8.94% to 11.24% in the same period, and it became the third biggest contributor in 2013. The share of services sector also increased slightly to 11.02% in 2013 (see figure 2.2).

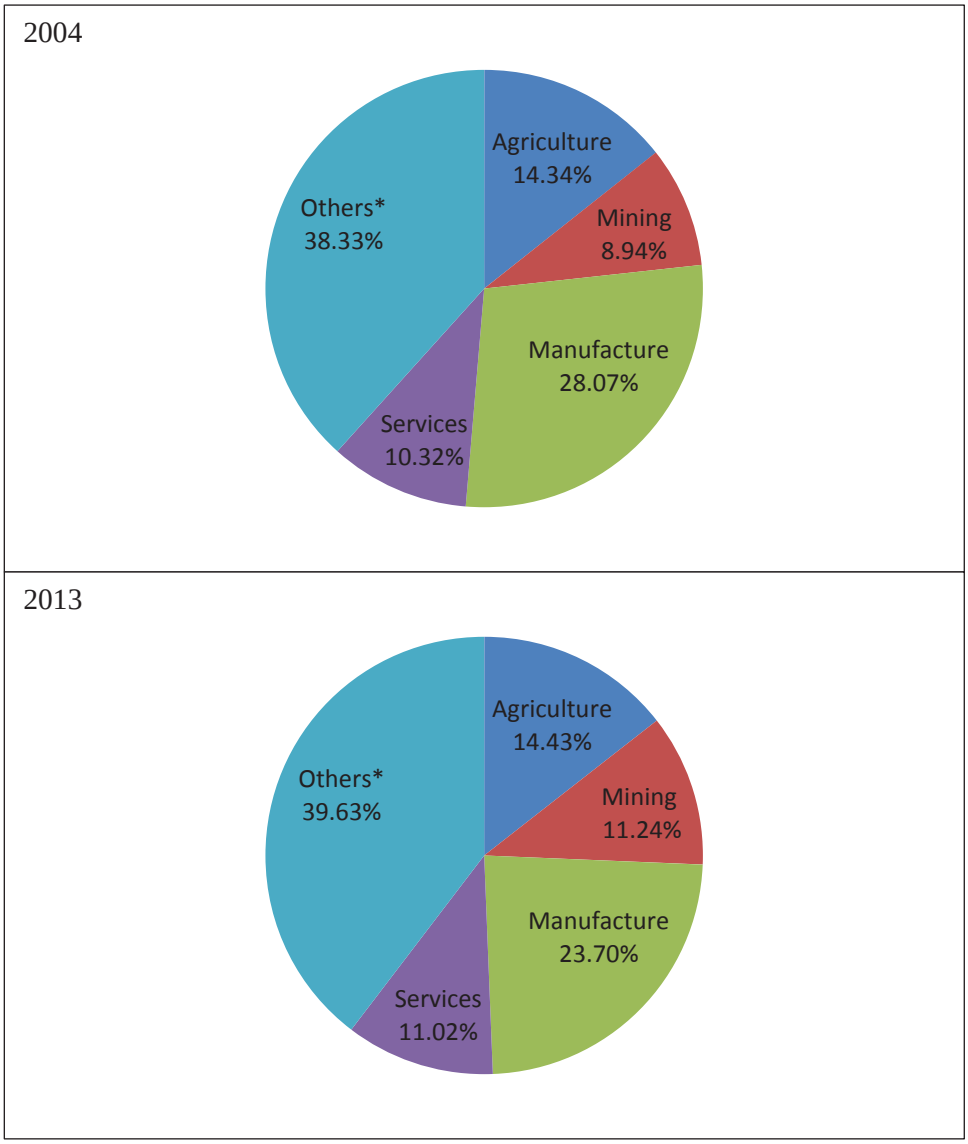
The GDP growth is consistent during the past decade, with an average of more than 5% per annum, as presented in table 2.2. This growth has been stimulated by the positive growth of major sectors, such as manufacture, services, and agriculture. As a result, the official poverty rate declined from 16.66 in 2004 to 11.37 in 2013, and unemployment rate decreased from 9.86 to 6.25 during the same period. However, the inflation rate has fluctuated during 2004-2013.

Table 2. 2. Macroeconomic indicators of Indonesia, 2004-2013 (%)

Indicators	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
GDP growth	5.97	6.57	6.11	6.95	6.47	5.00	6.60	6.98	6.85	6.25
Agriculture	*2.82*	*2.72*	*3.36*	*3.47*	*4.83*	*3.96*	*3.01*	*3.37*	*4.20*	*3.54*
Manufacture	*6.38*	*4.60*	*4.59*	*4.67*	*3.66*	*2.21*	*4.47*	*6.14*	*5.74*	*5.56*
Services	*5.38*	*5.16*	*6.16*	*6.44*	*6.24*	*6.42*	*6.04*	*6.80*	*5.25*	*5.46*
Inflation rate	6.40	17.11	6.60	6.59	11.06	2.78	6.69	3.79	4.30	8.38
Unemployment rate	9.86	11.24	10.28	9.11	8.39	7.87	7.14	6.58	6.14	6.25
Poverty rate	16.66	15.97	17.75	16.58	15.42	14.15	13.33	12.36	11.66	11.37

Source: Statistics Indonesia (2014c; 2014d; 2014e)

Figure 2. 2. Share of main sectors in the Indonesia's GDP, 2004 and 2013



* Includes constructions, trade, restaurants and hotels, transportation, communication, and finance.
Source: Statistics Indonesia, 2014c

2.2. Indonesian Agriculture Sector

Indonesia is an agriculture based country. The agriculture sector plays a significant role in the Indonesian economy. During the last decade, the share of the agriculture sector in the GDP relatively remained stable, from approximately 14.30% in 2004 to about 14.43% in 2013 (Statistics Indonesia, 2014c). The agriculture sector is the second biggest contributor to Indonesia's GDP, behind the manufacture sector. The sector's share of employment currently accounts for 35% (Statistics Indonesia, 2014b), and is the largest sector absorbing employment. Regarding share in export value, reports show

that the average share of the agricultural sector in the total export value in the period between 2009 and 2013 reached 4% (or 20% if processed foods are included) (Ministry of Trade, 2014).

With its vast and abundant fertile soils, Indonesia is also one of world's key producers of a wide variety of agricultural tropical commodities. The main agricultural products of Indonesia include palm oil, cocoa, rubber, and rice. Indonesia was ranked by the FAO as the largest producer and exporter of palm oil, the second largest producer of cassava, cocoa, and rubber, and the third largest producer of rice and coffee (FAOSTAT, 2014). Table 2.3 provides information about production and area (in hectares) of some main commodities of Indonesia. Agricultural practices in Indonesia are generally dualistic and fragmented. On the one hand, large plantations, including private and state-owned, tend to focus on commodities that are important export products such as palm oil and rubber. Smallholder farmers, on the other hand, focus on staple foods, such as corn and rice, and horticultural products, which are mainly for domestic consumption.

Table 2. 3. Production and area of main commodities of Indonesia in 2011

Commodities	Area (hectares)	Production (tonnes)
Palm oil	9,572,715	26,015,581
Rubber	3,506,201	3,012,254
Cocoa	1,774,463	740,513
Coffee	1,235,289	691,163
Rice	13,446,000	69,056,000
Maize	3,958,000	19,387,000
Cassava	1,130,000	24,177,000

Source: Agriculture Ministry of Indonesia, 2014b

Regarding food crops, rice, cassava, and maize, are the main commodities produced in Indonesia. Especially rice, because of being the staple food for Indonesian people, much attention has been paid by the Indonesian government in terms of stimulating production and productivity. Rice production increased from 64 million tonnes in 2009 to 69 million tonnes in 2012, while harvested areas increased from 12.8 million hectares to 13.8 million hectares in the same period, with an average yield of 50 tonnes per hectare (Ministry of Agriculture, 2014b). Even though Indonesia is among the top rice producers globally, the domestic consumption of rice exceeds the production. Therefore, Indonesia frequently imports this commodity from other countries such as Vietnam and Thailand.

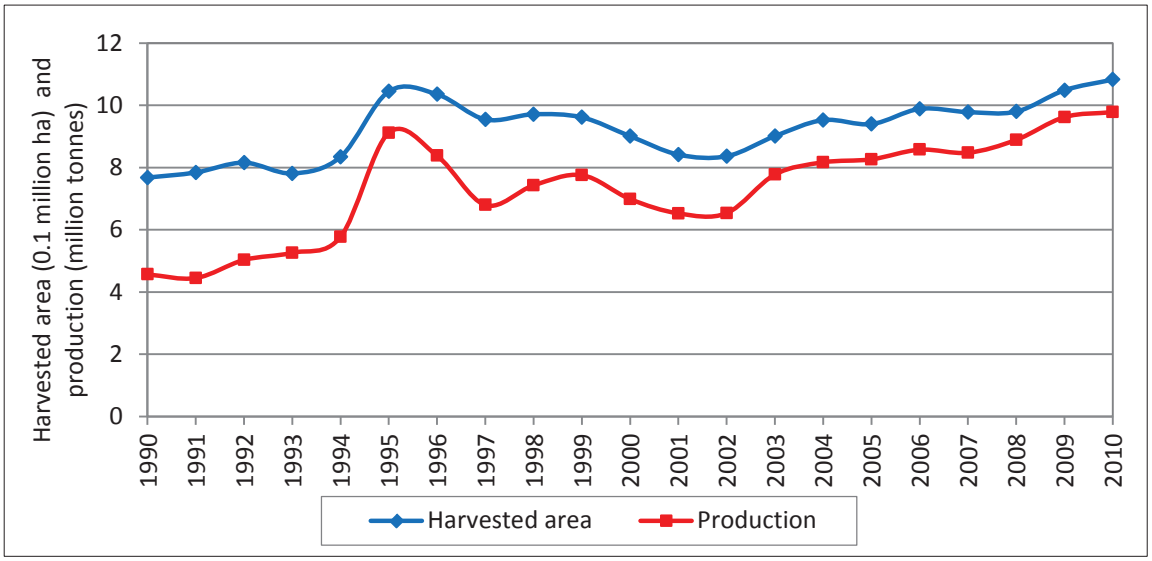
2.3. Indonesian Vegetable Sector

Apart from estate plantations and staple foods, horticultural commodities, especially the vegetable sector, is considered important in Indonesian agriculture. The importance of the vegetable sector is that it includes many smallholder farmers, agribusiness firms, and marketing organizations. This sector also contributes to Indonesian agricultural exports. In addition, the increasing number of people concerned with healthy and organic food has stimulated domestic demand for vegetables in Indonesia making this sector more important.

Figure 2.3 shows that during the period 1990-2010, Indonesia's vegetable production increased from about 4.6 million tonnes in 1990 to nearly 10 million tonnes in 2010 (FAOSTAT, 2014). The total harvested area for vegetables in 1990 was about 0.8 million hectares, and increased to be more than one million hectares in 2010. Despite the increase in production and area (in hectares), these trends actually fluctuated in the period 1995-2001. Furthermore, even though Indonesia consists of 33 provinces, the main vegetable producing regions are the Java and Sumatra islands, which produce about 80% of total vegetable production. The major vegetable producing provinces are West Java (35.6%), Central Java (13.3%), East Java (11.9%) and North Sumatra (10.3%); these four provinces account for over 70% of all vegetable production (White, 2007).

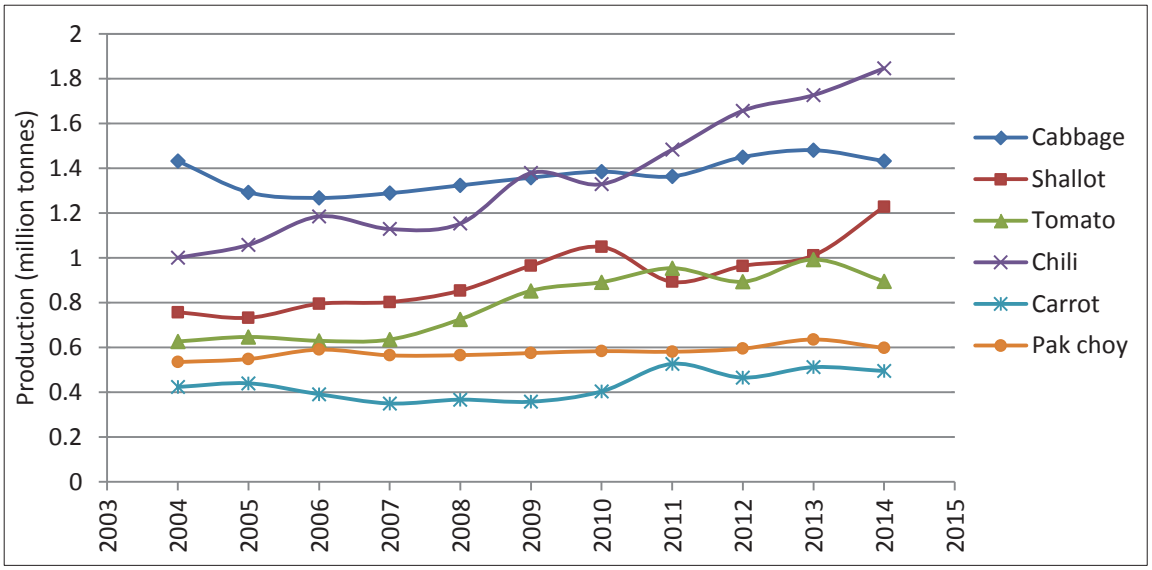
The main vegetables grown in Indonesia include chili, cabbage, shallot and tomato. On average, the trends of production of these vegetables have relatively increased over the last decade (see figure 2.4). Between the period between 2004 and 2009, cabbage became the most produced vegetable, while chili was the second. However, there was a significant increase in chili production during the last five years that posited this vegetable as the number one vegetable in Indonesia in terms of production volume. In 2014, chili production reached over 1.8 million tonnes, while cabbage production was over 1.4 million tonnes, and shallot production was about 1.2 million tonnes. Other production trends for vegetables such as tomato, carrot and pak choy showed steady increases during the same period.

Figure 2. 3. Trend of Indonesian vegetable production and harvested area, 1990-2010



Source: FAOSTAT, 2014

Figure 2. 4. Production of selected vegetables in Indonesia, 2004-2014

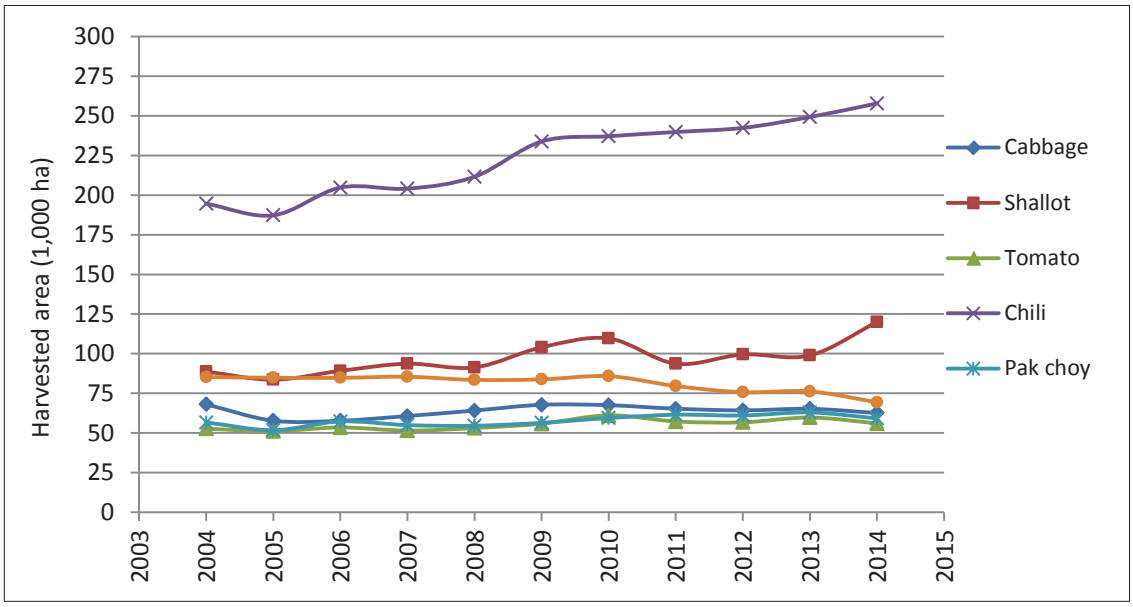


Source: Statistics Indonesia, 2013; Ministry of Agriculture, 2015

Regarding the harvested area, chili was the largest harvested area in Indonesia during the last decade, followed by shallot and the yard-long bean. As presented in figure 2.5, the harvested area of chili was approximately 200 thousand hectares in 2004, and increased gradually to be more than 250 thousand hectares in 2014. The harvested area of shallot during the period went up and down. But overall the trend increased, from about 88 thousand hectares to just under 120 thousand hectares in 2014. There was a steady decrease in the harvested area of the yard-long bean, from about 85 thousand hectares in 2004 to just under 70 thousand hectares in 2014. In addition, the trends of

harvested areas of cabbage, tomato and pak choy remained fairly static during the same period.

Figure 2. 5. Harvested area of selected vegetables in Indonesia, 2004-2014



Source: Statistics Indonesia, 2013; Ministry of Agriculture, 2015

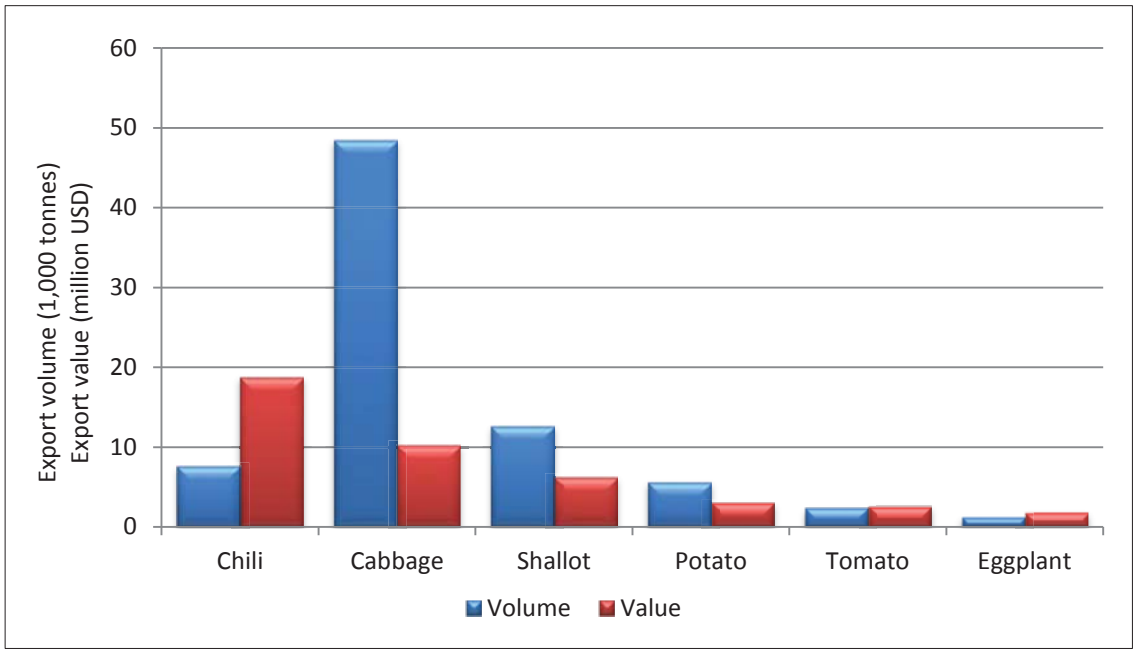
Indonesia exported 144,123 tonnes of vegetables in 2012, which was valued at about 25 million USD. However, the export volume was still a very small part of the total production. The export volume of 144,123 tonnes represented only 1.28% of the total production. Figure 2.6 compares the export volume and value of selected vegetables in Indonesia. The main vegetables exported, in terms of volume, were cabbages, shallots and chilies. The export volume of cabbages reached nearly 50 thousand tonnes in 2012, followed by shallots and chilies, with approximately of 12 thousand tonnes and 7 thousand tonnes, respectively. Other vegetables such as potatoes, tomatoes and eggplants made a small contribution to vegetable exports, with an average of export volume below five thousand tonnes.

From the export value side, on the other hand, chilies were the highest value, generating nearly 19 million USD in 2012. Moreover, despite being the highest in terms of volume, the export value of cabbages was about half of the chili export value. The third highest value of export was shallots, with just over 6 thousand USD in the same year. In addition, potatoes, tomatoes and eggplants had quite similar export values, which was below 3 thousand USD. Furthermore, the Ministry of Agriculture (2014c) reported that

the main countries for Indonesian vegetable export destination included Malaysia and Singapore.

Although Indonesia exports vegetables, the country also depends on vegetable imports due to dealing with the domestic adequacy of vegetable consumption. Figure 2.7 provided information regarding import volume and the value of selected vegetables in Indonesia. The main vegetable imported was garlic. In 2012, the import volume of garlic reached nearly 390 thousand tonnes, followed by shallots with about 120 million tonnes, and potatoes with about 100 thousand tonnes. Moreover, despite the fact that chilies were the main exported vegetable the country also imported them (a relatively small volume). Regarding import value, garlic was still the highest, at nearly 230 million USD in 2012, followed by potatoes and shallots, valued at about 81 million USD and 53 million USD, respectively. Furthermore, according to the Indonesian Ministry of Agriculture (2014c), the main countries where vegetables were imported were China and Thailand.

Figure 2. 6. Indonesia's export of selected vegetables in 2012

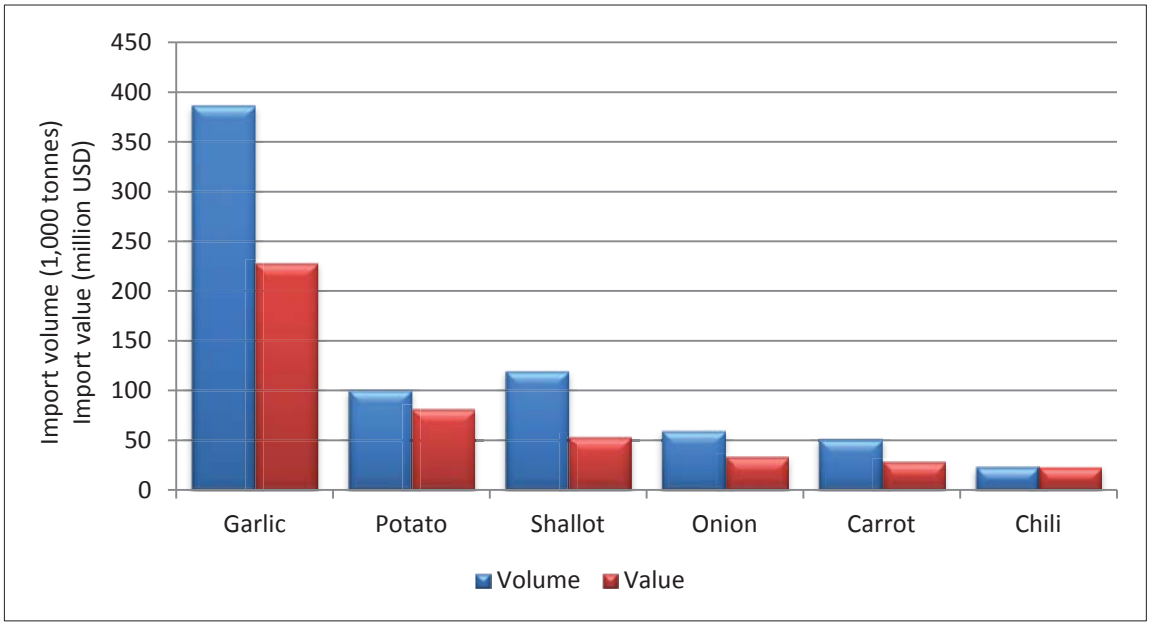


Source: Ministry of Agriculture, 2014c

Regarding vegetable consumption, although Indonesia has relatively huge potential in vegetable production, per capita consumption of vegetables is still low. In 2013, the per capita consumption rate of vegetables in Indonesia only reached 40.35 kg per annum, while the standard consumption of vegetables recommended by the FAO is about 73 kg

per annum (Abdurrahman, 2013). Moreover, from the data of Indonesian food expenditure, during the period 2007-2012, an average of 7.6% of the total household spending for food was used for vegetable consumption (Ministry of Agriculture, 2013). Information regarding food spending patterns of Indonesian households is provided in table 2.4.

Figure 2. 7. Indonesia's import of selected vegetables in 2012



Source: Ministry of Agriculture, 2014c

Table 2. 4. Food spending patterns of Indonesian households, 2007 and 2012 (%)

Food items	2007	2012
Rice	20.61	17.90
Fish	7.94	8.22
Meat	3.96	4.04
Egg and Milk	6.03	5.88
Vegetables	7.87	7.40
Fruits	5.20	4.77
Beverages	4.48	3.38
Oil and fats	3.42	3.82
Prepared foods	21.28	24.90
Tobacco and betel	10.10	12.07
Others	9.57	8.12

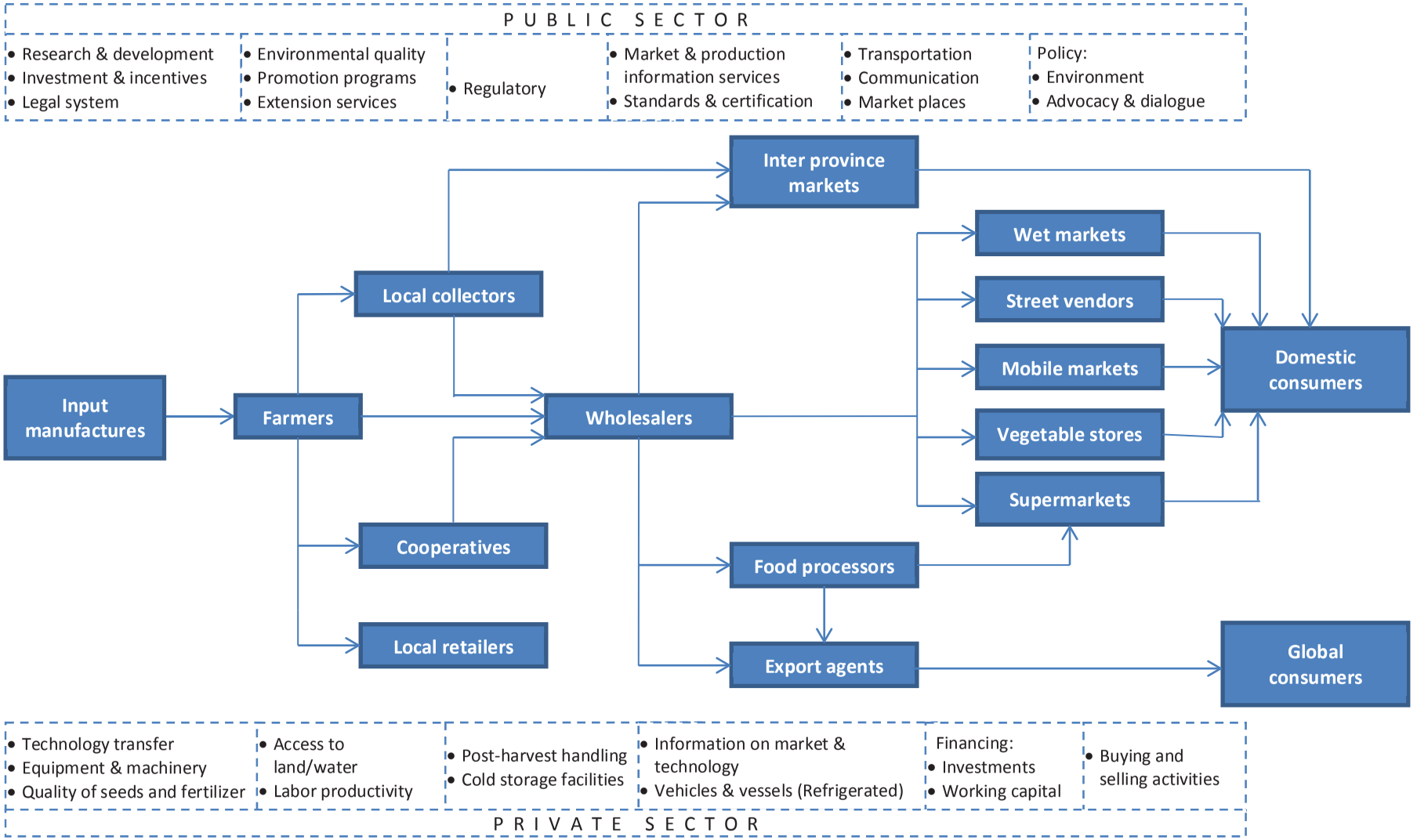
Source: Ministry of Agriculture of Indonesia, 2013

The vegetable trade and market channels in Indonesia are often commodity-specific, and vary by region. However, some characteristics are similar throughout the country. Importantly, the main features of the vegetable marketing system are the separation of the channels for local consumption from the trade and specialization of inter-village

collection, inter-regional and market retailers. These make a difference from other food crops due to the fact that vegetable products have a higher degree of perishability. Usually, perishable products pass through fewer intermediaries than non-perishable products because of the risks in repeated handling processes. Marketing channels of vegetables in a collection market might be longer in certain provinces due to scattered production areas.

Generally, marketing chains for vegetables in Indonesia involve traditional market chains and modern market chains. According to Chowdhury et al. (2005), traditional market chains are longer chains and involve farmers, local vendors, wholesalers, wet market, retailers, and consumers. On the other hand, modern market chains, have shorter channels and involve farmers, vendors, supermarkets, and consumers. In addition, vegetable marketing channels can be more complex when incorporating food manufacturing sector and exporting agencies. Therefore, by adapting from several sources such as Ferrari (1994), Chowdhury et al. (2005), and White (2007), the common structure of vegetable marketing channels for vegetable in Indonesia can be depicted as in figure 2.8.

Figure 2. 8. Indonesia's vegetable supply chain model



Chapter Three: Literature Review

3.1. Introduction

The purpose of this research is to analyse smallholder farmer participation in the emergence of high value markets in the Manokwari region, Papua Barat province of Indonesia. In this chapter, literature relevant to this study will be outlined. This chapter begins with providing a review of the research on smallholder farmers' participation in high value markets in Indonesia and other developing countries, some of which elaborates on the economic opportunities and challenges of market participation for smallholder farmers. The chapter then highlights empirical literature regarding the determinants affecting smallholder farmers' decisions about whether to participate in such high value markets. The chapter also reviews the vertical coordination strategies being used by smallholder vegetable farmers to engage in high value market chains. Finally, it provides an explanation about the role of key institutions and supporting organizations in enabling smallholder farmers' participation in high value markets.

3.2. Smallholder Farmer Participation in High Value Markets

The subject of smallholder farmer participation in high value agricultural markets has long been studied in many developing countries, and most results concluded that participation in such high value market channels also relates to farmer household welfare as well as rural development (Miyata et al., 2009; Qaim & Rao, 2012; Ismail, Kavoi, & Eric, 2013). Despite providing new obvious economic opportunities for farmers, the presence of high value marketing channels also brings about challenges that not all farmers are able to participate in (Neven, Odera, Reardon, & Wang, 2009; Qaim & Rao, 2012). The following sections briefly discuss economic advantages and challenges for smallholder farmers regarding their participation in high value markets.

3.2.1. Economic Opportunities of Smallholder Farmer Participation

Some empirical studies have attempted to prove that smallholder farmers can get obvious positive effects from being connected to high value agrifood marketing channels. Economic advantages that smallholder farmers can obtain from being linked

in such high value agrifood channels include increases in production and productivity, asset stocks, profit share, and welfare.

By participating in modern food markets, smallholder farmers can reach high efficiency levels regarding marketing barriers. For example, comparing variables such as marketing margins and costs, marketing efficiency and constraints, price distribution, and farmers' share, the study of Aparna and Hanumanthaiah (2012) in India found that, compared to the traditional market channel, the supermarket channel was more efficient for smallholder vegetable farmers. Vegetable producers supplying supermarket channels received a higher net price for marketed produce - and at the same time - had lower marketing costs. In addition, smallholder farmers supplying supermarkets may have the possibility to sustain their relationships with market chains. According to Ismail et al. (2013), a benefit smallholder farmers can probably have is that supermarkets often involve their suppliers as equal partners in terms of managing their buying practices.

Moreover, being linked to modern food supply chains can also provide smallholder farmers with other economic impacts in terms of production aspects. According to Qaim and Rao (2012), the involvement in supermarket channels has enabled smallholder vegetable producers to increase farm productivity. Having relationships within supermarket channels has encouraged smallholder farmers to change production technology (Minten, Randrianarison, & Swinnen, 2007), such as high quality seeds and fertilizers and advanced irrigation systems (Maertens, Dries, Dedehouanou, & Swinnen, 2007). In addition, smallholder farmers also attempted to increase economies of scale on their farms due to the reduced marketing risk arising from supermarket participation (Rao, Brummer, & Qaim, 2012). Similarly, as noted by Ismail et al. (2013), smallholder farmers' participation in supermarket supply chains can benefit in terms of farm production and productivity improvement, since supermarkets in many different ways provide financial and technical assistance for contracted producers to maintain supply sustainability.

Besides having influence on marketing features and production aspects, the involvement of smallholder farmers in modern food supply chains also has an important effect on household income (Maertens et al., 2007). For instance, the study of Rao and Qaim (2011), examining the economic impacts of supermarket supply chain participants and non-participants, also found that the average household income of vegetable producers

involved in supermarket channels was higher than those who were non-participants. Yet, there has also been research indicating that participation in high value markets does not correlate with higher household income. For instance, a study conducted by Mwambi, Oduol, Mshenga, and Saidi (2013), analysing the effect of contract farming on avocado farmers' incomes in Kenya, found that despite having a positive effect on avocado-contributed income, participation in high value supply chains through such contract farming systems had no significant impact on the total household income. This study found that participants of contract farming could not expand agricultural production. However, the results of most case studies, such as Minten et al. (2007) in Madagascar, Miyata et al. (2009) in China, and Gulati, Minot, Delgado, and Bora (2007) in several selected Asian countries, have provided convincing evidence that smallholder producers who participate in such contractual arrangements within modern food supply chains have higher household income. Even more importantly, supermarket supply chain participants can have more stable income (Minten et al., 2007; Gulati et al., 2007) compared to the traditional channel suppliers.

More broadly, farmers' participation in global supply chains, particularly in high value markets can be advocated as an important potential engine for global rural development agendas, especially poverty reduction and employment issues (Maertens et al., 2007). In association with the effect on poverty reduction, Rao and Qaim (2011) estimated that supermarket channel suppliers had approximately 20% less poverty than other producers who were not supermarket suppliers. This is also similar to the result of the Maertens and Swinnen (2009) study in Senegal, which highlighted that the involvement of smallholder farmers, directly and indirectly, in high value agricultural markets correlated significantly to higher household incomes, and furthermore increased farmers' welfare. Therefore, participation in such chains is positive for both production aspects and farmers' income. Despite having a number of potential opportunities, there are also various challenges facing smallholder farmers in being linked to high value agricultural markets.

3.2.2. Challenges of Smallholder Farmer Participation in High Value Markets

Some previous studies have attempted to identify challenges that make it difficult for smallholder farmers to enter high value market chains. Despite the fact that the barriers contributing to the exclusion of smallholder farmers can vary from case to case,

literature in the area of international and rural development has provided an 'orthodox' mainstream view (van der Heijden & Vink, 2013). Based on this viewpoint, there are some important factors creating barriers for smallholder farmer participation in high value markets in the developing world. The first factor is the limited and poor access to market information. Access to information on market requirements is one potential factor affecting smallholder producers' decisions to participate in new high value supply chains (Blandon, Henson, & Cranfield, 2009). The study of Irianto and Herwanto (2009) showed that the lack of access to market information has made it difficult for smallholder banana producers to enter high value markets in Indonesia.

The second factor is that smallholder farmers usually have a low bargaining position in marketplaces due to the low volumes of outputs supplied. Limited production assets often lead to production insufficiency that make it difficult for smallholder farmers to meet the high volume, quality, and supply consistency needs of modern food market channels (Berdegue, Balsevich, Flores, & Reardon, 2005). This is also similar to the study of Schipmann and Qaim (2011), concluding that the inability to deal with production requirements is one of the main factors causing smallholder farmers to drop out from contractual arrangements with agribusiness companies. In addition, smallholder farmers are usually inefficient in their production systems. This generally generates high production costs and leads to product rejections in the competitive entry into high value markets (Louw, Jordaan, Ndanga, & Kirsten, 2008).

Another important barrier is the poor basic infrastructure in rural areas. A number of previous researchers have provided evidence about the importance of basic infrastructure in motivating smallholder farmers to be linked up with such high value markets. For instance, poor road conditions make it difficult for smallholder banana growers in Indonesia to enter high value market chains (Irianto & Herwanto, 2009). In addition, poor access to transportation and communication in rural areas can lead to additional costs being paid by smallholder farmers, and it often become the main factor in reducing the market participation of smallholder farmers (Barrett et al., 2011).

The fourth factor is that smallholder farmers often face a lack of physical, financial and human capital. These vectors are also categorized by Reardon et al. (2009) as farmers' "capacity" that determines farmers' marketing channel choices. Moreover, the lack of physical, financial and human capital importantly results in market imperfections, by

which smallholder farmers are constrained in being linked to high value markets (Neven et al., 2009). Likewise, Shankar, Posri, and Srivong (2010) concluded that investments in financial and social capital are more important than the scale operation of farming for linking smallholder farmers to high value markets. Additionally, Schipmann and Qaim (2011) highlighted that the inability to resource input and output markets has limited sweet pepper producers in Thailand from being linked to high value market channels.

Lastly, the important challenge creating barriers for smallholder farmers to access modern supply chains is the trust between buyers and producers (Louw et al., 2008). Moreover, it is claimed that, despite the importance of farm characteristics and human capital variables, the success of farmer participation in high value supply chains depends on trust. For example, the study of Blandon et al. (2009) found that the trust variable has a positive and significant relationship with the probability of participating in the supermarket supply chain in Honduras. Furthermore, as criticized by Schipmann and Qaim (2011), the relationship between farmers and buyers, in which the issue of trust is considered, was the most important factor in explaining farmers' attitudes toward such contractual arrangements of high value market chains.

3.3. Determinants of Farmer Participation in Modern Food Market Channels

There is general evidence showing that the inclusion in such high value markets can potentially increase farmers' welfare/income (Neven et al., 2009; Miyata et al., 2009; Rao & Qaim, 2011). Yet, due to the fact that smallholder farmers also face a number of technical barriers and market imperfections, there are possibilities that smallholder farmers are being excluded from these channels (Rao & Qaim, 2011). The studies of Reardon et al. (2009) and Neven et al. (2009) have attempted to address whether the presence of high value markets, with their high standard procurements, do lead to the exclusion of smallholder producers. Thus, understanding the factors affecting smallholder farmers' abilities to deal with the procurement standards offered by high value agrifood chains is important, since it might assist smallholder farmers to obtain the economic advantages of the rapid growth of high value markets.

Various studies have been conducted in many developing regions to investigate determinants that affect smallholder farmers' decisions about whether to be involved in modern supply chains or not (Neven et al., 2009; Qaim & Rao, 2012; Schipmann &

Qaim, 2010). These studies have conceptualized the decisions of smallholder farmers to participate in modern market chains as the technology adoption of product marketing. Moreover, Reardon et al. (2009), used the term 'heuristic model' to describe the farmers' marketing decisions. The decision in favour of technology adoption, regarding supplying modern market chains, is then viewed as a binary choice decision problem for smallholder farmers. Furthermore, despite various different proxies used to determine smallholder farmers' marketing decisions, in general, determinants of their market decisions can be categorized into (1) the incentives in the modern market chains, and (2) the capacity of smallholder farmers to adopt the technology (Reardon et al., 2009).

Regarding the incentive factors, there are two aspects that should be considered by smallholder farmers. The first element relates to the net premium prices paid by high value market chains, which are relatively higher than the price paid by wholesalers in traditional market channels (Reardon et al., 2009). For example, Neven et al. (2009) found that supermarkets in Kenya paid horticultural suppliers about 10-20% higher than what they got in traditional market retailers. Likewise, nearly 60% of smallholder vegetable producers supplying supermarket chains in Honduras received a higher price than traditional market channels (Blandon et al., 2009). This is also similar to what Schipmann and Qaim (2011) found in Thailand, where agribusiness companies paid a higher price for the graded sweet pepper supplied by smallholder farmers.

The second element of incentive factors is the relative risk and cost. Reardon et al. (2009) emphasized that farmers should also consider the possibilities of risk and the cost of farm production and post-harvest handling technologies to deal with the quality and transactional requirements needed by modern market channels. Blandon et al. (2009), included the farmers' perception of risk as an independent variable in the farmers' participation model, and revealed that the perceived risk of low quality causing product rejections significantly influenced smallholder farmers' market decisions. However, the perceived risk of product losses due to bad weather or pests was found not to be an important factor. Moreover, as explained in the section of challenges of farmer participation, smallholder farmers often experience additional costs derived from interactions of barriers to enter such high value market chains. Reardon et al. (2009) highlighted that these costs reduce smallholder farmers' choice of participation in supermarket chains. In addition, transaction costs emerging from poor transportation

and communication conditions can also affect smallholder farmers' adoption of modern market chains (Rao & Qaim, 2011). Smallholder farmers living further from urban areas and cities, with poor access to transportation and communication, face high additional costs and are less likely to be offered contracts by modern food markets (Barrett et al., 2011).

The second set of determinants of farmers' marketing decision is farmers' capacity. The capacity variables refer to investments of various forms of capital by farmers to access high value markets, including physical farm assets, collective capital, and institutional capital (Reardon et al., 2009). Physical capital can include land and non-land assets, such as equipment and irrigation that need to meet quality and consistency requirements of the high value markets.

The emergence of new procurement practices of high value market chains forces actors along supply channels, including farmers, to make investments in social or collective capital. Farmers' organizations or cooperatives can play crucial roles in facilitating smallholder farmers to gain access to high value market chains by investing in collective capital such as in warehouses and vehicles (Reardon et al., 2009). Indeed, these collective investments can help smallholder farmers reduce transaction costs (Hellin, Lundy, & Meijer, 2009). Furthermore, smallholder farmers also need to invest in institutional capital. This capital is associated with the embodied relationships between farmers and institutions such as companies, non-government organizations (NGOs) and the government (Reardon et al., 2005).

In line with the incentive and capacity factors, Schipmann and Qaim (2010) identified three possible aspects that influence farmers' decision making to participate in high value market chains, including the farm and household aspect, the contextual aspect, and the personal aspect. Farm and household aspects include farm size, land ownership, and off-farm occupation, while contextual aspects relate to access to services and road conditions. These two aspects are similar to the concept of farmer capacity outlined by Reardon et al. (2009). Personal aspects relate to the demographic variables of farmers such as education, age, and farming experience (Schipmann & Qaim, 2010; Miyata et al., 2009). Furthermore, the influences of the capacity, incentive, and demographic variables on smallholder farmers' participation in high value market chains have been

found not to be uniform across industries and countries (Miyata et al., 2009; Blandon et al., 2009; Neven et al., 2009; Rao et al., 2012).

Previous studies show some similarity and differences in terms of farmers' capacity, incentive, and demographic variables between farmers supplying high value market and traditional market channels. The study of Neven et al. (2009), examining factors affecting Kenyan horticultural producers' marketing decisions, found that smallholder farmers who owned relatively large farms are likely to sell produce in a supermarket. This finding is similar to cases such as sweet peppers in Thailand (Schipmann & Qaim, 2010), vegetable growers in China (Wang, Zhang, & Wu, 2011), and vegetable farmers in Kenya (Ismail et al., 2013). Conversely, in some cases, farm size has no significant effect on the decision of smallholder farmers to participate in high value market chains, as shown in examples such as the tomato growers in Guatemala (Hernandez et al., 2007), apple growers in China (Miyata et al., 2009) and fresh fruit and vegetable farmers in Honduras (Blandon et al., 2009). Moreover, farmers who supply modern market channels tend to rent land more than traditional channel farmers (Hernandez et al., 2007). Having a larger land area allows farmers to cultivate larger crop areas for selling to modern market chains.

The influence of irrigation on the marketing decision of smallholder farmers is found to be various between cases. Hernandez et al. (2007) found that irrigation technology applied by smallholder tomato growers in Guatemala correlated to the decision to participate in modern market supply chains. This is similar to the study of vegetable farmers in Kenya (Neven et al., 2009), indicating that the irrigation infrastructure has a significant effect on market channel adoption. Conversely, studies of Miyata et al. (2009) in China, Blandon et al. (2009) in Honduras, and Rao et al. (2012) in Kenya found that irrigation technology had no influence on farmers' decisions to participate in high value market chains.

Studies on the subject of market participation of smallholder farmers often include non-land asset variables. It is generally claimed that there are significant differences with respect to some non-land assets between modern market chain suppliers and traditional market suppliers. Farmers supplying high value markets have more non-land assets than traditional market channels, particularly vehicles (Hernandez et al., 2007; Neven et al.,

2009; Schipmann & Qaim, 2010), mobile phones, storage facilities, and irrigation equipment (Neven et al., 2009), and cattle (Blandon et al., 2009).

Previous studies also provide evidence regarding the importance of farmer organizations in linking smallholder farmers to high value markets. As an example, the involvement in farmer organizations has provided a higher chance for smallholder vegetable growers to access supermarket channels in Kenya (Ismail et al., 2013). This study is in line with the case of vegetable producers in Honduras (Blandon et al., 2009). However, the case of tomato growers in Guatemala (Hernandez et al. 2007) provided an opposite finding. The effect of farmer organization was significant, but negative. The reason for that is that these organizations are not marketing organizations, but just provide technical assistance and training. Nevertheless, these studies show that the majority of modern market suppliers are more likely to be members of farmer organizations.

In the developing countries, the distance to marketplaces is also an important factor for farmers in terms of product delivery. Some studies have looked at how the distance or location of a farm can encourage the possibilities of smallholder farmers to participate in high value market chains. The study of Miyata et al. (2009) found that the distance variable is a strong explanatory variable determining smallholder farmers' decisions to participate in such contracts. Smallholder producers who live near the major village significantly tend to participate. Similarly, Rao and Qaim (2011), incorporating farmers' access to main road as a predictor in their analysis, found that it has given an advantage for vegetable producers to supply supermarkets that demand a stricter schedule of delivery.

The decision of market participation is also a function of demographic variables. Some previous research has indicated that demographic determinants, such as age, education, household size, and off-farm employment, have effects on farmers' marketing decision (Neven et al., 2009; Miyata et al., 2009). For example, while some studies show that farmers who supply high value market chains have a higher education level than traditional market suppliers (Neven et al., 2009; Schipmann & Qaim, 2010; Rao & Qaim, 2011), others found that there was no correlation between level of education and market participation (Hernandez et al., 2007; Blandon et al, 2010).

Moreover, regarding farmer age, some studies provide information that younger farmers tend to be modern market chain suppliers (Hernandez et al., 2007; Schipmann & Qaim, 2010; Blandon et al, 2010). However, Neven et al. (2009) claimed that there is no association between age and market channel choice of smallholder farmers. Another household characteristic mostly considered as a factor in determining farmer marketing decision is household size. Hernandez et al. (2007) and Rao and Qaim (2011) found that household size has a negative correlation with the farmers' adoption of modern market chains. Miyata et al. (2009) added that household size was found not be different between modern and traditional market suppliers.

Additionally, the involvement of family members in non-farm employment is also claimed as a determining factor in farmer participation in high value market chains. Hernandez et al. (2007) highlighted that this variable has a significantly negative influence on modern market channel adoption. This study indicates that the higher the share of household member in off-farm activities, the lower the market participation possibilities. On the other hand, for vegetable farmers in Kenya, Rao and Qaim (2011) found that off-farm employment has a positive effect on supermarket channel participation.

In line with the literature, this study will capture farmers' incentives, capacities, and demographic characteristics in analysing the determinants affecting smallholder vegetable farmers' participation in high value supply chains.

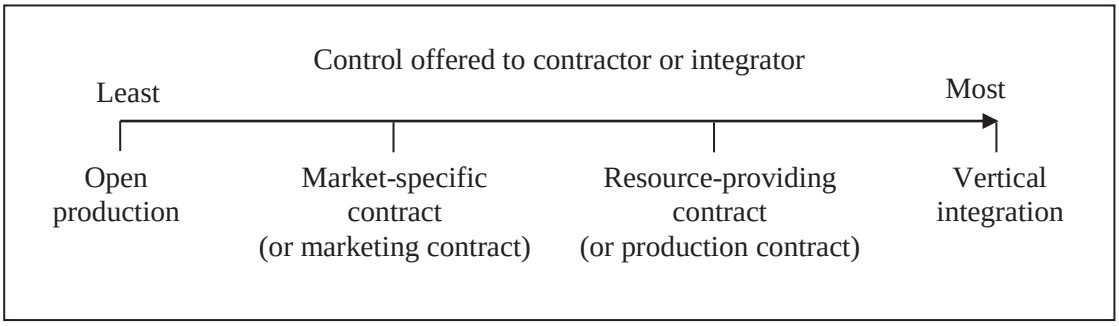
3.4. Vertical Coordination Strategies in High Value Markets in Developing Countries

3.4.1. Vertical Coordination Strategies Used by Smallholder Farmers

Vertical coordination refers to the synchronization of different stages of production and marketing and processing regarding quality, quantity, and timing of product flows (Martinez, 2002). King (1992) defined vertical coordination as "the alignment of direction and control across segments of a production/marketing system". Vertical coordination also associates with institutional arrangements that can take various forms varying between two extremes of spot market exchanges and full integrations. Each

method along the continuum range of vertical coordination shows the degree of control for the contractor or integrators (see figure 3.1).

Figure 3. 1. Methods of vertical coordination along the spectrum of control



Source: Mighell & Jones (1963, as cited in Martinez, 2002)

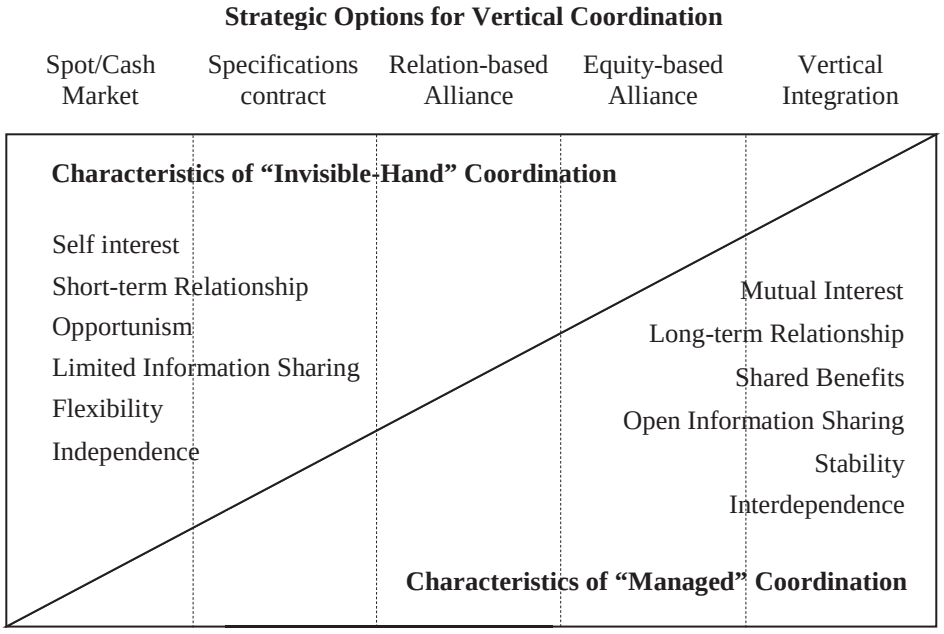
Furthermore, Peterson, Wysocki, and Harsh (2001), conceptualizing the work of Williamson (1973) and Mahoney (1992), developed a framework of strategic options for vertical coordination. This framework (also known as the vertical coordination continuum) consists of five major categories of vertical coordination strategies, including cash/spot market, specification contracts, relation-based alliances, equity-based alliances, and vertical integration (see figure 3.2).

Spot markets are simple market transactions, in which there is no prior arrangement between a buyer and a seller (Martinez, 2002). Transactions in the spot market mode usually include those that do not require investment in highly specific assets and involve many buyers and sellers. Peterson et al. (2001) highlighted that the intensity of coordination control in spot markets is low. Moreover, there is the role of the invisible-hand of the market in determining price and broadly acceptable performance standards.

The next stage is the specification contracts which are legally enforceable establishments of specific and detailed conditions of exchange. In this type of vertical coordination, the intensity of control slightly increases from that in the spot market strategy (Peterson et al., 2001). According to Hobbs (1996), specification contracts can be categorized into three general groups: market specification contracts, production-management contracts and resource providing contracts. In the literature of agricultural economics, contract farming has increasingly become an approach that agribusiness firms are using to obtain produce from their suppliers. The concept of contract farming is discussed in more detail in the separate part of this section.

The third portion of the continuum is a relation-based alliance. This strategy involves firms' share risks and benefits based on their mutually strategic objectives. The intensity of coordination in this strategy is moderate and arises from mutual interests (Peterson et al., 2001). The control intensity required for aligning and maintaining the mutual interests is higher than those for either specification contracts or spot markets.

Figure 3. 2. The vertical coordination continuum



Source: Peterson et al. (2001)

The fourth position along the continuum is an equity-based alliance. According to Peterson et al. (2001), this strategy is considered to include the mixture of organizational relationships that can involve partial ownership relationships, joint ventures, clans, and other forms. The importance of this strategy is how actors in an exchange relationship are involved through shared equity capital. The coordination intensity in an equity-based alliance is moderately high, and accomplished by a formal organizational structure.

The final portion of the continuum is vertical integration. According to Martinez (2002), vertical integration is a vertical coordination strategy in which a business unit carries out all of the different stages of production, processing, and marketing. Extending the prior strategies in the continuum, Peterson et al. (2001) added that vertical integration can result from processes of acquisition and merger. Furthermore, the control of coordination is more centralized. In addition, vertical integration protects the firm from

opportunist behaviour and it gives the firm an opportunity to be a leader in its field and create unique products that cannot be matched by its competitors (Hobbs, 1996).

3.4.2. Contract Farming

Vertical coordination strategy, under contracts, refers to transactions between a producer and a buyer, in which agreements are set before the process of production and delivery of products (Martinez, 2002). Contract farming can be defined as an agreement between two parties, one being an agro-processing firm and the other an individual producer (Glover, 1984; Patrick, 2004). In most literature, the term contract farming is sometimes interchangeable with the term “out-grower scheme” (Glover, 1984; Glover & Kusterer, 1990). The distinction between these terminologies is that contract farming is controlled by the private sector, while the out-grower scheme is run by the government (Glover & Kusterer, 1990).

The agreement often includes the provision of production support by the contractor, such as inputs and technical assistance. According to Louw et al. (2007), processing firms and retailers are increasingly using contracts as a mechanism to get high quality products, and in some cases, provide production inputs such as seeds, fertilizers, or advice about planting time to contracted producers. Moreover, contract farming can be an attractive instrument to reduce the transaction costs associated with risk of procurements. This is because supply consistency and uniform quality are importantly considered factors by firms that process agricultural products (Sartorius &Kirsten, 2007).

There are several different types of contract farming strategies. The first one is the *centralized model*. This model is also considered as the classical contract farming, where an agro-processing firm buys a commodity from many smallholder farmers (Eaton & Shepherd, 2001). The role played by the firm is to provide production inputs for producers. Also, in order to obtain product quality, the firm is responsible for ensuring that contracted farmers follow some strict agronomic practices. This model, according to Eaton and Shepherd (2001), is very common for tree crops and annual crops such as cotton, cocoa, and sugarcane.

The second model is the *nucleus estate approach*. This model is an extended model of the centralized model. Even though this model seems similar to the centralized model in many ways, the fact that the firm also grows the specific crop as its own estate, differentiates it from the centralized one (Eaton & Shepherd, 2001; Patrick, 2004). The crop grown by the firm is either for supplying the stock to a processing plant, for breeding purposes, or for research objectives. The role of the firm is to provide both production inputs and extension programs for farmers.

The third model is the *multipartite model*. This model includes various types of organizations working together with farmers to start a project. The multipartite arrangement also involves private or public providers of extension services, credit, and inputs (Eaton & Shepherd, 2001). The farmers involved in such types of schemes are usually organized into farmers' groups or cooperatives. Government departments as well as village committees are used to help select farmers, therefore ensuring that reliable farmers are chosen for engaging with such projects.

Another model is the *informal model*. This model does not include large firms, but it is characterized by individual entrepreneurs or small agro-processing companies that contract informally with farmers (Eaton & Shepherd, 2001). This model is usually on a seasonal basis, especially for crops such as fresh fruit and vegetables. Generally, the success of this model depends on the availability of supporting services, which in most cases are likely to be provided by government organizations.

The last type of contract farming is the *intermediary model*. This model involves at least three parties to the contract farming arrangement: a processor or main trader that formally contracts with a middleman who then informally contracts with farmers (Eaton & Shepherd, 2001). This model is considered as a combination of the centralized and informal models. In this model, a firm usually supports the middleman, who can be cooperatives or individuals, with training in agronomic practices and input provision. The middlemen are then responsible for delivering their knowledge and inputs to their farmers. Under this model, the firm does not have direct control of farmers' activities, nor can farmers directly negotiate with the firm.

3.5. Role of Institutions in Enabling Farmers' Participation in High Value Markets

3.5.1. Transaction Cost Economics

For firms, the decision about what format of vertical coordination strategy to engage in is an important aspect, since it can influence efficiency and the returns of the business. One important indication that is usually considered in deciding an appropriate vertical coordination strategy is the concept of transaction costs. Hobbs (1996) emphasized that transaction costs are crucial for firms because they influence the organization of vertical coordination strategy. Therefore, firms tend to choose a method of a vertical coordination based on a comparison of the net effect on transaction costs (Martinez, 2002).

The concept of transaction cost relates to the "new institutional economics" theory that focuses on institutions of governance (Hobbs, 1996; Ouma et al., 2010). Institutions of governance refer to approaches of managing transactions, whether between institutions in a marketplace or in a transfer of resources between phases in a hierarchically integrated relationship. In business, transaction costs occur in all stages of the planning, implementation and monitoring stages of an operation (Williamson, 1981).

Transaction costs can be broadly classified into three main categories: *information costs*, *negotiation costs*, and *monitoring and enforcement costs* (Hobbs, 1996; Louw et al., 2007). Individuals and businesses face such costs in gathering information about products, inputs, price offers, payment and delivery modes, and sellers or buyers. The negotiation costs appear from physical acts of transactions, such as negotiating and building consensus on the quality and quantity of products, prices, and payment and delivery approaches. The monitoring and enforcement costs appear after an exchange has been negotiated. This can include costs of monitoring the quality of products, and monitoring the behaviour of buyers and sellers to make sure that the agreed terms of the contract are adhered to.

Moreover, in transaction cost economics, firms usually consider the characteristics of transactions when making decisions about vertical coordination strategies. The key features of transactions include the degree uncertainty surrounding the transaction, the degree of asset specificity, and the frequency of the transaction (Hobbs, 1996; Sartorius

& Kirsten, 2007). The degree of uncertainty relates to unexpected circumstances that could have a bearing on the business of a firm (Sartorius & Kirsten, 2007). Transactions with a low level of uncertainty generally lead to spot market transactions, while transactions that are highly uncertain may result in more formal types of vertical coordination, such as contracts.

The degree of asset specificity relates to how an asset can be redeployed for alternative uses without losing its productive value (Mainville & Peterson, 2006). The degree of asset specificity associates with how investments are closely tied to a particular transaction and it is, therefore, no use when shifted to a different transaction (Martinez, 2002). Hobbs (1996) indicated that goods that are produced with non-specific assets may have various alternative uses, and tend to be sold in spot markets, whereas a high degree of asset specificity may result in relationships toward a more formal type of coordination. Furthermore, the frequency of transaction refers to how often transactions on a particular product occur between a buyer and a supplier (Sartorius & Kirsten, 2007). Transactions carried out frequently will provide both suppliers and buyers with information about one another. The frequently repeated transactions tend to be carried out in spot markets. However, when transactions between buyers and sellers become more infrequent, information asymmetries may increase, and this motivates firms to move toward the extreme of vertical integration (Hobbs, 1996).

In agricultural economics, a number of studies in the area of marketing behaviour of farmers have posited transaction costs as a significant feature in vertically coordinated relations. The study of Jagwe and Machethe (2011), analysing smallholder farmers' decisions on marketing points, found that the influence of transaction costs is mostly associated with searching for potential buyers and gathering information about price, payment methods, and quality requirements. Similarly, Ouma et al. (2010) highlighted that transaction costs, derived from transportation and market information costs, highly influence the decision of the high value market participation of smallholder farmers. The higher transaction costs farmers face, the lesser market participation possibilities occur. The important role of transaction costs is also highlighted in a study of cattle farmers' market choices in China (Gong, Parton, Cox, & Zhou, 2007). This study revealed that high negotiation and monitoring costs have led smallholder farmers to use

spot markets to sell their cattle. Farmers who are able to incur higher transaction costs are likely to participate in contract farming systems.

3.5.2. Roles of Farmer Organizations

Market imperfections, resulting from the lack of information and technology, financial access, and input, and high transaction costs, often make it difficult for smallholder farmers to reap the economic potentials of high value market chains (Hellin et al., 2009; Markelova, Meinzen-Dick, Hellin, & Dohrn, 2009). As a consequence, these obstacles often lead to the exclusion of market participation (Narrod et al., 2009).

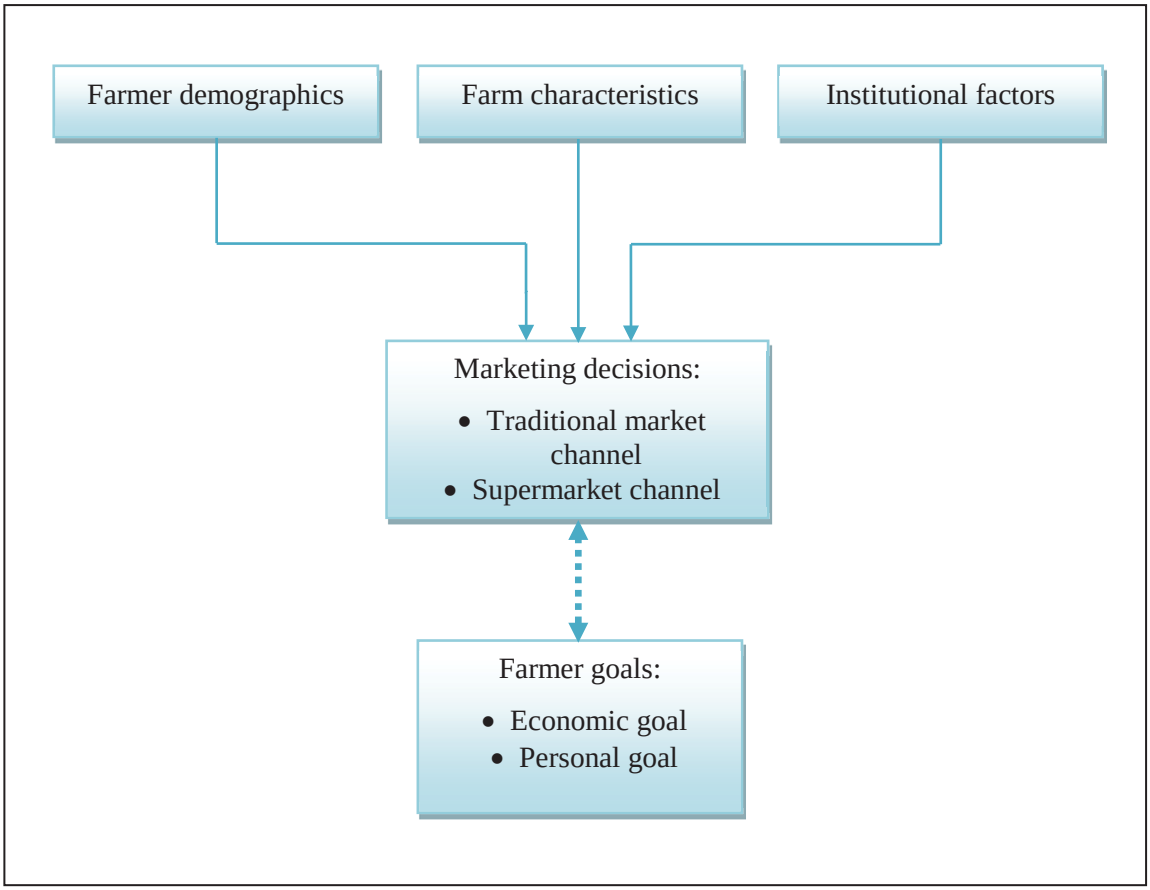
Collective action strategies through cooperatives, farmer organizations or farmer groups can enable smallholder farmers to create economies of scale in production, as well as to compete more effectively in such participation in high value markets (Louw, Vermeulen, Kirsten & Madevu, 2007; Hellin et al., 2009; Narrod et al., 2009). Moreover, important services provided by farmer organizations also include facilitation of production and marketing, financial services, technology services, education services, welfare services, policy advocacy, and common property resource management (Stockbridge et al., 2003, cited in Narrod et al., 2009).

Additionally, the presence of farmer organizations can be viewed as a significant vehicle for smallholder farmers to obtain the economic potential from being connected to high value market chains. Moustier, Tam, Anh, Binh, and Loc (2010) added that supplying high value market chains through farmer organizations can increase smallholder farmers' profit per production unit. Similarly, a study on farmer cooperatives in China highlighted some benefits such as increasing returns for growers and fostering social and economy development (Garnevska, Liu, & Shadbolt, 2011). These studies indicate that collective action strategies through farmer organizations or cooperatives also play crucial roles regarding the development and promotion of high value agricultural products.

3.6. Research Framework

The relevant information and theories derived from the literature review are then deduced into a research framework, as shown in figure 3.3.

Figure 3. 3. Research framework



Chapter Four: Research Methodology

4.1. Introduction

This purpose of this research is to analyse the market participation of smallholder vegetable farmers in the Manokwari region, Papua Barat province of Indonesia. More specifically, this research examines factors influencing the participation of smallholder farmers in supermarket channels.

The five purposes of this chapter are to (1) describe the research strategy used in this study, (2) explain the sample selection, (3) describe the procedures used in designing the instrument and collecting the data, (4) discuss the statistical procedures employed to analyse the data and variable description, and (5) discuss the ethical considerations and limitations of the study.

4.2. Research Strategy

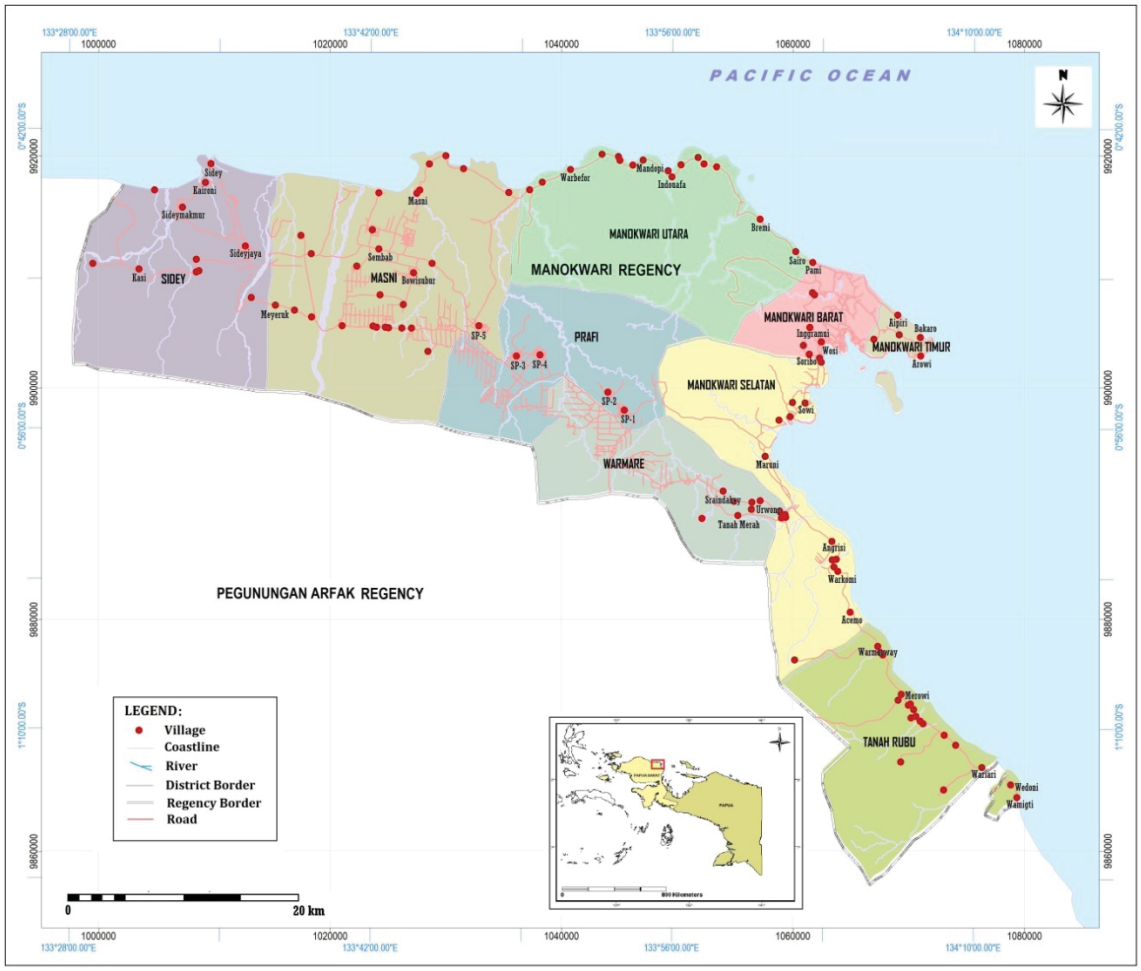
This study utilised a mixed methods strategy, a strategy of combining quantitative and qualitative approaches to achieve research aims. The importance of the mixed methods strategy is that by involving both approaches in tandem, the overall strength of a study is greater than either the quantitative or qualitative research method alone (Creswell, 2009). In this research, the quantitative approach was used as the main research strategy, while the qualitative approach was integrated to support the quantitative findings. Therefore, a survey was considerably used as the primary research method.

A survey was designed and carried out to obtain a numerical description of trends, attitudes, or opinions of a population by investigating a selected sample of that population (Creswell, 2009). Dane (1990) also adds that because the contents of the survey research may include facts, opinions, and the behaviours of the research participants, the survey methods are more appropriate for descriptive and predictive research than for exploratory research. For this research, the survey was designed and used to identify potential factors determining the market channel decisions of smallholder vegetable farmers.

4.3. Target Population and Sampling Procedure

The target population of this research was all smallholder farmers growing vegetables in the Manokwari region, Papua Barat province of Indonesia (see figure 4.1)

Figure 4. 1. Map of Manokwari region



The sampling technique used in this research was convenience sampling, which is one of the nonprobability sampling methods. This technique builds a sample on the basis of finding convenient or available respondents (Ruane, 2005). Brewer and Hunter (1989) stated that the convenience sampling technique is the most widely used strategy, especially in marketing and social science. One advantage of using this technique is that the time and cost required is relatively low compared to probability sampling. However, this method also has some limitations in terms of data biases and the representative sample frame (Brewer & Hunter, 1989).The main consideration for that was the unavailability of the exact data regarding the number of vegetable farmers. Another

reason to choose this sampling technique was the limitations of time and financial resources.

In this research, some efforts were made to obtain the justifiably representative respondents. In the first step, the researcher sourced information regarding vegetable production areas from the Manokwari statistics reports. The second step was getting a confirmation regarding the survey sites by informally questioning supermarket representatives and vegetable sellers in the two traditional markets in Manokwari city. These activities resulted in an overview that there were reasonably three districts to be chosen as survey sites, namely Prafi, Manokwari Selatan, and Manokwari Barat. The convenience sampling technique was then applied within these three districts to obtain a total of 200 respondents.

4.4. Questionnaire Development

A structured questionnaire was developed in order to obtain appropriate information that can be utilized to achieve the research objectives. The information included variables affecting the marketing decisions of smallholder farmers, which were deduced from farmer demographics, farm characteristics, marketing aspects and institutional factors.

The questionnaire development consisted of three steps. They were (1) constructing a draft of the questionnaire, (2) pre-testing of the questionnaire, and (3) refining the questionnaire. Based on the existing literature of farmers' participation in high value markets (Hernandez et al., 2007; Blandon et al., 2009; Miyata et al., 2009; Neven et al., 2009; Qaim & Rao, 2012), the draft questionnaire was designed with respect to the examination of the relationship between the dependent variable and the predictors.

After the first draft of questionnaire was prepared, the pre-testing procedure was carried out twice. The aim of pre-testing activities was to evaluate whether the questionnaire was relevant and easily understood by the targeted respondents in terms of the word selection (Dane, 1990; Ruane, 2005), question sequencing, and format and layout issues (Ruane, 2005). Furthermore, pre-testing activity will also allow the researcher to assess the validity and reliability of questions (Ruane, 2005). After being translated into Indonesian, the draft of the questionnaire was pre-tested first among six Indonesian

students studying at Massey University. This activity resulted in constructive feedbacks regarding the content and layout of the questionnaire. The second pre-test was conducted before the survey started. This activity included eight vegetable farmers who would not be part of the final research samples. Based on the farmers' responses, some minor adjustments to the questionnaire were made, including reducing ambiguities and using the specific wording of questions.

The final questionnaire (see Appendix 1) was utilized in the survey, which was conducted from 16 September to 25 October 2014. The final questionnaire included the following sections: demographic information of farmers, farm characteristics, vegetable marketing aspects, institutional factors, and farmers' experience and perception of the modern market channel. Each section had specific purposes as explained below.

The purpose of demographic information section (section A) was to provide basic information of sampled farmers regarding age, gender, education background, number of household members, main occupation, and experience of doing farming. The section of farm characteristics (section B) aimed to obtain general information regarding vegetable farm size, irrigation methods applied, livestock ownership, type and production of vegetables, other food crops grown, production process, and production inputs farmers used.

Section C covered information regarding vegetable marketing aspects. This section aimed to provide the farmers' indications of main buyers, selling prices of vegetables, transportation means and costs, distance to marketplaces, and standard and grade applied before vegetables marketed. The purpose of the institutional factors section (section D) was to collect information regarding the involvement of sampled farmers in activities such as attending extension meetings, accessing to credits, searching for market information, and involving in collective actions like farmers' groups and cooperatives. The final section (section E) provided information about farmers' perception of modern market channel. This section also covered information about advantages of selling to supermarket channels, challenges that limiting farmer participation in supermarket channels, and government policies that can enable farmers to participate in supermarket channels.

4.5. Data Collection

The questionnaires were administrated by the researcher through face-to-face interviews. The face-to-face interview was chosen as a collaborative tool for the structured questionnaire, since it allowed the researcher to have a deeper understanding of the issues surrounding the research subject from the respondents' own perspective (Dane, 1990). In addition, to ignore the misunderstanding of answering questions due to the illiteracy of some farmers, face-to-face interviews also facilitated the research to deliver questions in a very simple way that farmers could understand and answer the questions.

A total of 200 copies of the questionnaire were initially prepared for interviews. However, due to the limitation of time, the researcher could obtain only 135 respondents. After all the questionnaires were collected, there were nine copies were found to be extremely incomplete and hence they were excluded from the relatively reliable data for analysis. This indicated a response rate of 93.3%.

4.6. Data Analysis

4.6.1. Data Entry and Cleaning

Data was analysed using the Statistical Package for Social Sciences (SPSS version 22). Initially a cleaning process was performed to ensure its completeness and validity. This process included checking for logical inconsistencies, outliers and missing values. In order to avoid these data problems, the values of means and standard deviations of variables were produced. Based on these values, there was no missing value found, but some outliers were identified. The outliers were treated by replacing them with the mean values of each variable. After the cleaning process, data was then given variable names and more detailed codes. For analysis purposes, some continuous data were considerably transformed into categorical bases. Finally, the data was checked for entry errors. The final data set for analysis consisted of 126 farmers, of which there were 100 traditional market farmers and 26 supermarket farmers.

4.6.2. Statistical Procedures of Data Analysis

There are two statistic methods that were performed in this study. Those methods were binary logistic regression and the chi square test for sample independence. Details of each method are described below.

4.6.2.1. Binary Logistic Regression

The decision model regarding market participation can be viewed as a choice decision problem from which smallholder farmers try to maximize utility (Rao & Qaim, 2008; Barret, 2008). The conceptual foundation behind this decision model is based on the economic theory of agricultural household's behaviour (Key, Sadoulet, & de Janvry, 2000). Utility is determined by a set of variables, which influence the ability and the cost of adjusting with new market channels or new market requirements. The probability of smallholder farmers participating in such market channels is determined by a comparison between the expected utilities gained. Smallholder farmers might participate in high value markets channels if the utility gained would outweigh the utility obtained from participating in traditional market channels.

According to the random utility models (Greene, 2008), if U^a and U^b represent the individual utility of two choices, the observed choice between the two reveals which one provides the greater utility. Therefore, the observed indicator equals 1 if $U^a > U^b$ and 0 if $U^a \leq U^b$. This assumption is commonly used to determine smallholder farmers' marketing decisions as the qualitative response model. Various econometric approaches have been developed to address farmers' marketing decision problems, such as probit models, logistic models, and tobit models, among others. The literature shows that these approaches have been employed for cases under different assumptions and contextual conditions.

This study utilized the binary logistic regression to examine potential factors affecting farmers' decisions about market channel participation. A binary logistic regression is a type of regression models in which the dependent variable is a categorical dichotomy that takes only two values; zero and one (Wooldridge, 2013). In addition, the independent variables for binary logistic regression can be continuous and categorical (Field, 2005). Unlike the linear regression model, the logistic regression model attempts

to predict the probability that a case would be classified into one as opposed to the other of the two categories of the dependent variable (Menard, 2010). The equation for the relationship between the dependent variable and the independent variables is:

$$\text{logit}(Y) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_K X_K$$

where *Y* represent the log odds of choice, *X* is the explanatory variables, and β represents the parameters to be estimated. The dependent variable in the equation above is the logarithm of the odds that a particular choice would be made. Therefore, the parameters themselves do not represent directly the change in the independent variables. In order to provide a meaningful interpretation, the logit (*Y*) can be converted to the odds by exponentiation (Menard, 2010). This results in the equation:

$$\text{odds}\,(Y = 1) = e^{\text{logit}(Y)} = e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_K X_K}$$

The odds ratio is generally used as an estimation of association because it measures how much more likely or unlikely it is for the outcome to be present among those subjects with *X=1* as compared to those subjects with *X=0* (Hosmer, Lemeshow & Sturdivant, 2013). In addition, to estimate the change in probability that *Y=1*, the odds (*Y*) can be transformed as:

$$\text{probability}\,(Y = 1) = P(Y = 1) = \frac{e^{\text{logit}(Y)}}{1 + e^{\text{logit}(Y)}} = \frac{e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_K X_K}}{1 + e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_K X_K}}$$

The criterion to assess the best fit of the logistic regression model is a maximum likelihood method. This method yields values for unknown parameters that maximize the probability of obtaining observed data sets. The log-likelihood is defined as:

$$L(\beta) = \ln\left[\ell(\beta)\right] = \sum_{\text{i=1}}^{\text{N}} \left\{ Y_i \ln(P(Y_i)) + (1 - Y_i) \ln\left[1 - P(Y_1)\right] \right\}$$

Furthermore, the significance of all or a subset of the coefficients in the logistic regression model is tested using the chi square distribution or the log-likelihood ratio test. According to Field (2005), the chi square distribution is based on comparing the log-likelihood of the new model (model with all or set of predictors) with the log-likelihood of the baseline model (model with only the intercept), and formulated as:

$$\chi^2 = 2\left[LL(new) - LL(baseline)\right] = -2\ln\left[\frac{(\text{likelihood without the variable})}{(\text{likelihood with the variable})}\right]$$

The chi square statistic (χ^2) provides a test of null hypothesis that there are no differences between parameters for the logistic regression model ($\beta_1, \beta_2, \ldots, \beta_K = 0$). Therefore, if the χ^2 is statistically significant (typically $p \leq 0.05$), then the null hypothesis is rejected, and it can be concluded that independent variables included in the model provide enough information to predict the possibility of a dependent variable, which is usually P(Y=1) (Menard, 2010).

4.6.2.2. Chi Square Tests/Cross-tabulation

Chi square (χ^2) tests are generally used to make inferences when the data collected are categorical (Dane, 1990). This test can be employed to determine whether a relationship exists between two or more categorical variables, or whether the categories of one sample of individuals are similar to the categories of another sample. Chi square tests are frequency analyses, which involve comparing the observed frequencies to the expected frequencies in certain categories of variables (Field, 2006). Therefore, the null hypothesis (H_0) to be tested using chi square analysis is that there is no statistical association between two categories (Corder & Foreman, 2014). The following equation is referred to as Pearson's χ^2 and is used to determine the χ^2 statistic:

$$\chi^2 = \sum_{i=1}^{K} \frac{(O_i - E_i)^2}{E_i}$$

Where K represents the number of categories, O_i reflects the observed frequencies in each category ($O_1, O_2, \ldots, O_K$), and E_i reflects the expected frequencies ($E_1, E_2, \ldots, E_K$). The E_i values are calculated by multiplying the row total times the column total and dividing the product by the grand total (N).

It is also important to note that Pearson's χ^2 formula returns a value that is too small when data form a 2 × 2 contingency table (also known as cross-tabulation). In such a circumstance, it is better using the Yates' continuity correction (Corder & Foreman, 2014), as shown in the following formula:

$$\chi^2 = \sum_{i=1}^{K} \frac{(O_i - E_i - 0.5)^2}{E_i}$$

In the Pearson's chi square test of sample independence, degree of freedom (*df*) can be determined from the dimension of the contingency table used to represent the data. According to this method, *df* is calculated by the formula:

$$df = (R-1)(C-1)$$

where R represents the number of rows in the contingency table, and C is the number of columns in the table.

For the hypothesis testing, the null hypothesis (H_0) is rejected if the probability p-value is equal or less than a critical value set by the researcher (e.g., $\alpha = 0.05$).

At this point, the analysis is limited to identifying an association's presence or absence. This means that the χ^2 statistic test does not show the strength of its association. To measure the degree of association, therefore, it is important to calculate the effect size of the chi square value. If the data conform to a 2 × 2 contingency table, the formula for the *phi* coefficient (ϕ) is:

$$\phi = \sqrt{\frac{\chi^2}{N}}$$

where χ^2 is the chi square test statistic and *N* is the number of the entire sample. The *phi* coefficient ranges from 0 to 1. Cohen (1988, as cited in Corder & Foreman, 2014) has suggested that *phi* coefficients 0.10, 0.30, and 0.50 correspond to effects that could be described as small, medium, and large, respectively.

When the χ^2 cross-tabulation is larger than 2 × 2, Cramer's *V* statistic may be used to interpret effect size of categorical relationships. The mathematical equation for Cramer's *V* coefficient is shown as:

$$V = \sqrt{\frac{\chi^2}{(N)(L-1)}}$$

where χ^2 is the chi square test statistic, N is the total number of the sample, and L is the minimum value of the row totals and column totals from the contingency table (Corder & Foreman, 2014).

In this study, independent variables, deduced from farmer demographics, farm characteristics, marketing and institutional aspects, were included in the chi square tests to estimate their relationships with the dependent variable, which was market channel participation. Therefore, the null hypothesis (H_0) developed for all variables to be tested was that there were no significant differences between expected and observed frequencies within each independent variable tested with respect to market channel participation.

4.7. Model Specification, Variable Description and Expected Signs

The logistic regression model was used for the analysis since the probability of farmer responses were assumed as a binary choice. The dependent variable measured the choice of market channels (either modern markets or traditional markets), while a set of independent variables derived from farmer demographics, farm characteristics, marketing aspects and institutional factors. Thus, the empirical model for analysis in this research can be expressed as:

$$\begin{aligned} \text{Prob}(MC = 1 \mid \text{x}) = {} & \beta_0 + \beta_1 AGE + \beta_2 EDU + \beta_3 EXPRNCE + \beta_4 FMLY\_SZ + \beta_5 VEG\_AREA \\ & + \beta_6 IRR + \beta_7 LVSTOCK + \beta_8 DIST\_SM + \beta_9 TRNS\_COST + \beta_{10} AV\_PRICE \\ & + \beta_{11} EXTN + \beta_{12} CREDIT + \beta_{13} MKT\_INFO + \beta_{14} FARMER\_GR + \mu \end{aligned}$$

Farmers' demographic variables included age of the farmers, education level, farming experiences, and number of family members. Farm characteristic variables included vegetable farm size, irrigation system and livestock ownership. Marketing aspects included in the model were distance from vegetable farms to supermarkets, estimated transportation cost, and average price received by farmers. Institutional factors included farmers' attendance of farming extension service, access to credit, access to market information, membership of farmer groups (see table 4.1).

Age of the farmer represented the age of the vegetable farmer in years. It was claimed that younger farmers were expected to be more adventurous and less risk takers than older farmers. Thus it was expected to be negatively correlated with market channel

participation. *Education* of the farmer that was measured in years of schooling was expected to have a positive effect on market channel participation (Gong et al., 2007). *Farming experience* was predicted to have a positive influence on market channel participation (Ouma et al., 2010; Shiimi, Taljaard, & Jordaan, 2012). *Family size* was predicted to be negatively associated with market channel participation (Balint & Wobst, 2006; Hernandez et al., 2007; Rao & Qaim, 2011). These studies argued that larger households tended to have more dependents and their production activities might be more subsistence oriented.

Table 4. 1. Variable definition, unit of measurement and expected signs

Variable codes	Definition	Measurement	Signs
***Dependent variable*:**			
MC	Market participation (dummy)	1 = Supermarket 0 = Traditional market	
***Independent variables*:**			
Farmer demographics:			
AGE	Age of farmer	Number of years	-
EDU	Education of farmer	Years of schooling	+
EXPRNCE	Farming experience	Number of years	+
FMLY_SZ	Family size	Numbers	-
Farm characteristics:			
VEG_AREA	Vegetable cultivated area	Hectares	+
IRR	Irrigation (dummy)	1 = yes 0 = otherwise	+
LVSTOCK	Livestock ownership (dummy)	1 = yes 0 = otherwise	-
Marketing aspects:			
DIST_SM	Distance to supermarket	Kilometres	-
TRNS_COST	Transportation cost	IDR	-
AV_PRICE	Average price received by farmers	IDR	+
Institutional factors:			
EXTN	Attendance of extension meetings (dummy)	1 = yes 0 = otherwise	+
CREDIT	Access to credit (dummy)	1 = yes 0 = otherwise	+
MKT_INFO	Access to market information (dummy)	1 = yes 0 = otherwise	+
FARMER_GR	Membership of farmer groups (dummy)	1 = yes 0 = otherwise	+

Vegetable area was hypothesized to have a positive influence on the marketing decision. Having larger cultivated areas could allow the household to have a surplus in production and be in position to sell (Balint & Wobst, 2006). *Irrigation* was essential for commercial agriculture. Having irrigated area could increase farmers' possibility to participate in high value markets. This variable was set as a dummy variable taking the value one if the farmer had irrigation system and zero otherwise. It was expected that irrigation has a positive effect on the dependent variable (Hernandez et al., 2008; Neven et al., 2009). *Livestock ownership* was set as a dummy variable which took the value one if the household owned livestock, or zero otherwise. It was predicted to have a negative correlation with market channel participation (Hernandez et al., 2008).

Distance to supermarkets was expected to exert a negative effect on market channel participation since it related to transaction costs that farmers would pay (Hernandez et al., 2007; Miyata et al., 2009). Another variable relating to distance from farm to marketplace was t*ransportation cost.* This variable was expected to have a negative effect on market channel decision (Shiimi et al., 2012). *Average price* of vegetable received by farmers was hypothesized to influence market channel positively (Balint & Wobst, 2006; Alene et al., 2008).

Attendance of extension meetings was set as a dummy that took the value one and zero otherwise. The expected influence of this variable on market channel participation was positive (Jari & Fraser, 2009). *Access to market information* was measured through the ability of the farmer to access market information and to comprehend it. This variable was allocated dummy values taking the value one if a farmer had access to market information and zero otherwise, and was expected to be positively associated with the dependent variable (Jari & Fraser, 2009; Ouma et al., 2010; Panda & Sreekumar, 2012). *Access to credit* may provide financial capital that encourages farmers to participate in the sustainable vegetable market channels. This variable was set as a dummy variable taking the value one if the farmer had access to credit and zero otherwise. Access to credit was hypothesized to have a positive effect on market channel participation (Shiimi et al., 2012). *Membership of farmer groups* was set as a dummy variable taking the value one if the farmer was a member of farmer groups and zero otherwise. Membership of a farmer group can enable farmers to create economies of scale in

production and to compete effectively in markets. This variable was hypothesised to influence market participation positively (Alene et al., 2008; Shiimi et al., 2012).

4.8. Ethical Considerations and Limitations of the Study

4.8.1. Ethical Considerations

This research was assessed and approved by the Massey University Human Ethics Committee as a low-risk research with no potential harm to the participants (see Appendix 2). This study was also conducted in accordance with "the Code of Ethical Conduct for Research, Teaching and Evaluations Involving Human Participants" applied at Massey University[1]. The participants were informed about the purposes, significance, methods and anticipated benefits of the research before the interviews were undertaken. Participation of respondents was voluntary and based on an understanding of adequate and appropriate information of what would be involved. Interview consents were sought orally and by written, and signed by the participants. The participants were accorded the freedom to participate, or not, without being forced. The participants were also assured of the confidentiality of the information provided, and their privacy was respected.

4.8.2. Limitations of the Study

There were several limitations of this research. Firstly, the exact data of smallholder vegetable farmers was unavailable. Therefore, sampling procedures applied in this research might be less adequate in reflecting the real population. Secondly, sample size of smallholder farmers was relatively small, particularly for supermarket channel suppliers. This would have implications for less accurate interpretation of statistical results. Lastly, due to the limitations of financial and time frame for the completion of study, deeper information during data collection process could not be obtained by the researcher.

[1] Retrieved online on 23 April 2015 from http://www.massey.ac.nz/massey/fms/Human%20Ethics/Documents/MUHEC%20 Code%202015.pdf?25E570E23E14511DBD28E4A35C2BC2DE

4.8. Summary

This chapter highlighted the methodological approaches employed to achieve the research objectives. This study used a mixed method design, with the quantitative design was the primary approach, and the qualitative approach was included to support the findings. The convenience sampling technique was employed due to unavailability of the exact number of population. The structured questionnaires and face-to-face interviews were collaborated as tools in the data collection process. The chapter also highlighted the data analysis procedures, which included binary logistic regression and chi square test analysis. The chapter finally provided a discussion of ethics considerations and the limitations of the study.

Chapter Five: Descriptive Analysis of the Samples

5.1. Introduction

This chapter aims to give a description of the samples of this research. A total of 126 smallholder vegetable farmers in the Manokwari region, Papua Barat province of Indonesia, have been involved as respondents during the data collection process. This chapter highlights farmer demographics, farm characteristics, marketing aspects, and institutional factors regarding vegetable production and marketing.

5.2. Farmer Demographics

This section summarizes the demographic characteristics of the respondents, in which factors such as the age of farmers, education background, farming experience, household size, and off-farm employment are descriptively presented.

5.2.1. Age of Farmer

The average age of the respondents in this research was 44 years old. Based on the age groups, about 44% of farmers were classified into the age group of 35-55 years old, while approximately 25% of farmers were aged over 56 years old, and 31% of farmers were aged below 35 years old (see table 5.1). According to the Indonesian Ministry of Employment and Transmigration, the work force is classified as a population group who are in the age group of 15-55. Thus, this indicates that the majority of samples were in the productive ages to run their vegetable farms.

Table 5. 1. Age of farmers

Age of farmer (years)	Frequency	Percentage (%)
< 35	39	31.0
35 - 55	56	44.4
> 55	31	24.6
Total	126	100.0

5.2.2. Education

Regarding educational background, the samples of this research were categorised into a low education level. Calculated by years of schooling, the average was about six years,

which indicated that the majority of farmers in this research have only ever attended primary education. Based on the education level, as presented in table 5.2, there were about half of the total respondents who had graduated from the elementary education institutions, while about 26% had never completed any basic formal education. Moreover, it was also observed that 23% of respondents graduated from high school institutions.

Table 5. 2. Educational background of farmers

Education level of farmer	Frequency	Percentage (%)
Not completed elementary school	33	26.2
Completed elementary school	64	50.8
Completed high school	29	23.0
Total	126	100.0

5.2.3. Farming Experience

Despite having relatively low educational background, the samples in this research were experienced in general farming. The average years of doing farming was about 13 years, indicating that the respondents were mostly experienced in agricultural production, including vegetables. Table 5.3 showed that there were approximately 61% of the respondents whose farming experiences were below ten years, while the respondents who have experience in farming between 10-25 years were about 15%, and farmers with more than 15 years of farming experience were nearly 24%.

Table 5. 3. Farming experience of farmers

Farming experience (years)	Frequency	Percentage (%)
<10	77	61.1
10-25	19	15.1
>25	30	23.8
Total	126	100.0

5.2.4. Family Size

The majority of farmers in this research were characterised as having a small household size. It was also found that, in some cases, the households were not only structured with the nucleus family members, but also included the extended family members such as grandparents. Table 5.4 showed that about 84% of the respondents had four people or

less in the household, while nearly 16% farmers had more than four people in the household.

Table 5. 4. Family size of farmers

Household size (persons)	Frequency	Percentage (%)
1 - 4	106	84.1
> 4	20	15.9
Total	126	100.0

5.2.5. Off-farm Employment

Smallholder farmers sometimes worked in off-farm employment in order to have additional income. In this research, nearly 90% of respondents were not involved in off-farm employment (table 5.5). This implied that the majority of the respondents were more focused on their vegetable farms as the main occupation. In addition, about 10% of the sampled farmers participated in off-farm areas. Job areas that some farmers got involved in included temporary construction work.

Table 5. 5. Off-farm employment of farmers

Off-farm employment	Frequency	Percentage (%)
Yes	13	10.3
No	113	89.7
Total	126	100.0

5.3. Farm Characteristics

Besides the demographic aspects of farmers, farm characteristics were also an important aspects with regard to marketing channels that farmers might participate in. Some farm characteristic factors that were outlined in this section included farm size, types and production of main vegetables, and irrigation methods applied.

5.3.1. Farm Size

It was generally acknowledged that having larger cultivated areas could allow farmers to have a surplus in production and be in a position to sell. In this research, the average vegetable cultivated area was about 0.43 hectares, indicating that most sampled farmers operated on a small scale. According to the Ministry of Agriculture (2014a), agricultural producers who owned 0.5 hectares or less cultivated areas were classified as

smallholder farmers. About 61% of vegetable farmers included in this research were smallholder farmers (table 5.6). The percentage of farmers having more than one hectare of cultivated area was only about 19%, while the percentage of the sampled farmers whose farm size was between 0.5 and 1.0 hectare was nearly 20%.

Table 5. 6. Vegetable farm size

Farm size (hectares)	Frequency	Percentage (%)
< 0.50	77	61.1
0.50 – 1.00	25	19.8
> 1.00	24	19.1
Total	126	100.0

5.3.2. Types of Vegetables

Vegetable farms in the Manokwari region were characterised with mixed cultivation, of which some vegetables were cultivated as the main production and others as a complimentary crop. The main vegetables in this research included water spinach, long yard beans, vegetable amaranth, tomatoes, and chilies. Mixed cultivation systems applied by smallholder vegetable farmers were mostly due to the flexibility of selling prices received, as stated by one smallholder farmer:

> *"I grow several vegetables to anticipate the changes of prices in markets. I cannot focus only on water spinach, but I also grow eggplant, tomato, and long yard bean to gain additional income, especially when the price of water spinach drops."*

Over 60% of the respondents grew water spinach as the main vegetable, followed by the farmers growing long yard beans and vegetable amaranth, with 45.2% and 44.7%, respectively (table 5.7). Moreover, the percentage of farmers who grew cabbages was only about 10%. Some farmers stated that the selection of cultivated vegetables was influenced by price stimulation and land suitability.

Furthermore, although cabbages were cultivated by about 10% of the respondents, this vegetable, however, was the highest in terms of yield. The average production of cabbages was approximately 808 kg per year. Conversely, in spite of being one of the key vegetables regarding the number of growers, the average production of water spinach was relatively low, which was about 232.5 kg per year (table 5.8).

Table 5. 7. Percentage of farmers based on types of vegetables grown

Type of vegetable	Percent of total respondent (%)
Water spinach	60.3
Long yard bean	45.2
Vegetable amaranth	44.7
Tomato	42.1
Chili	35.7
Eggplant	30.2
Pak choy	25.4
Bean	17.5
Cabbage	10.3

Table 5. 8. Average production of vegetables grown

Type of vegetable	Average production (kg/year)
Cabbage	807.7
Eggplant	588.9
Chili	464.1
Tomato	447.9
Pak choy	436.9
Long yard bean	316.5
Water spinach	232.4
Vegetable amaranth	195.6
Bean	154.3

5.3.3. Other Food Crops

Besides vegetables, smallholder farmers also grew other food crops on their farms. The main food crops cultivated included rice, cassava, and corn. Table 5.9 showed that there were about 31% of the respondents who grew rice, while respondents growing cassava and corn were about 9% and 5.6% respectively. In addition, rice was mostly produced for commercial purposes, while cassava and corn were produced on a small scale and mainly for household consumption.

Table 5. 9. Other food crops grown by farmers

Food crops	Percent of total respondent (%)
Rice	31.0
Cassava	8.7
Corn	5.6

5.3.4. Irrigation Methods

The use of advanced irrigation systems for vegetable farms in the Manokwari region was very limited. Most vegetable farmers relied on rains for their vegetable production. This might be linked to the fact that most vegetable farms in this region were small-scale farms. Advanced irrigation systems are costly for farmers, as explained by one farmer who applied a very traditional irrigation system for his vegetable farm:

> *"Our vegetable farm is located in hilly areas which is difficult to have water supply for, even if we try to dig a well. We just rely on rain, and water the farm with conventional methods, such as using buckets, during the dry seasons."*

The distribution of the sampled farmers based on irrigation methods applied is presented in table 5.10. It showed that nearly 86% of respondents had rain-fed farms, while approximately 8% of respondents irrigated their vegetable farms manually (using buckets and simple water bailers), and 6% farmers used water sprayers for irrigating their vegetable farms

Table 5. 10. Irrigation methods applied by farmers

Irrigation method	Frequency	Percentage (%)
Rain-fed	108	85.7
Manual	10	7.9
Water sprayer	8	6.3
Total	126	100.0

5.4. Marketing Aspects

This section highlights some important aspects relating to marketing vegetable produce. Issues such as price received by farmers, distance and transportation costs, and marketing channels are descriptively presented.

5.4.1. Average Price of Vegetables

As highlighted before in the section of farm characteristics, vegetable farms in the Manokwari region were characterised by mixed cultivation, in which some vegetables were grown as the main production, while others were a complimentary crop.

Moreover, it was assumed that the variation in prices received by farmers for every kilogram of their vegetables depended on the types of vegetables and location of selling.

In this study, chilies were grown by about 36% of the total respondents, and were found to have the highest selling price. The average price of chilies received by farmers was about 18,406 IDR[2] (≈ 2 NZD), which was considerably high. Other vegetables, on the other hand, had relatively low prices, with less than 10,000 IDR per kilogram, as presented in table 5.11.

Table 5. 11. Average selling price of vegetables

Type of vegetable	Average selling price (IDR per kg)
Chili	18,406.9
Cabbage	8,192.3
Beans	7,357.1
Pak choy	6,515.6
Vegetable amaranth	5,683.6
Long yard beans	5,451.7
Tomato	5,278.8
Water spinach	5,273.3
Eggplant	4,361.1

Furthermore, it was observed that the average price that farmers received from selling vegetables was approximately 6,500 IDR per kilogram. This value was derived from the multiplication between every type of vegetables farmers sold and its price per kilogram. Table 5.12 presented the distribution of sampled farmers based on the average selling prices of vegetables sold. It can be seen that about 57% of farmers received less than the average price of vegetables sold, while about 43% of farmers earned above 6,500 IDR per kilogram for their vegetables sold. Factors that might contribute to the differences in prices received by farmers included the selection of vegetables cultivated and market channels farmers participated.

Table 5. 12. Average price received by farmers

Average price (IDR per kg)	Frequency	Percentage (%)
< 6,500	72	57.1
≥ 6,500	54	42.9
Total	126	100.0

[2] IDR = Indonesian Rupiah (1 New Zealand Dollar equaled approximately 9,480 IDR in October 2014), retrieved online from http://www.bi.go.id/en/moneter/ informasi-kurs/transaksi-bi/Default.aspx

5.4.2. Income Generated from Vegetables

It was an undeniable issue that economic purpose becomes an essential element of doing farming. For producers, vegetables were marketed, in certain marketplaces and in certain price levels, to gain an amount of income. In this research, the average income generated from vegetable farms was about 7,853,836 IDR (≈ 828.5 NZD) per year or about 654,486 IDR per month. This number was relatively low compared to *Upah Minimum Provinsi* (Provincial Minimum Wage) regulated in the Papua Barat province in 2014, which was 1,870,000 IDR per month. Furthermore, as presented in table 5.13, more than 57% of the respondents earned below 5,000,000 IDR per year from their vegetable farms, while 23% respondents generated above 10,000,000 IDR per year.

Table 5. 13. Vegetable-generated income

Income generated from vegetables (IDR per year)	Frequency	Percentage (%)
< 5,000,000	72	57.1
5,000,000 - 10,000,000	25	19.8
> 10,000,000	29	23.0
Total	126	100.0

More specifically, comparing the potential income between types of vegetables would also provide meaningful information to assess key vegetables produced by smallholder farmers. Table 5.14 provided information regarding average productions, average prices and income of every single type of vegetable.

Table 5. 14. Average income of vegetables grown

Type of vegetable	Average production (Kg per year)	Average selling price (IDR per Kg)	Average income (IDR per year)
Chili	464.1	18,406.9	8,506,575.4
Cabbage	807.7	8,192.3	6,616,863.9
Beans	154.3	7,357.1	1,182,857.1
Pak choy	436.9	6,515.6	2,846,513.7
Vegetable amaranth	195.6	5,683.6	1,111,926.0
Long yard beans	316.5	5,451.7	1,725,432.4
Tomato	447.9	5,278.8	2,394,665.7
Water spinach	232.4	5,273.3	1,238,154.1
Eggplant	588.9	4,361.1	2,756,327.2

It was observed that chilies had the highest price per kilogram among other vegetable types. This led to the high potential income generated from chili farming. The estimated

average income generated from chili farming per annum per was 8,506,575 IDR (≈ 897.3 NZD), followed by cabbages with an estimated income of 6,616,863.9 IDR (≈ 689.0 NZD). Other types of vegetable in this research had estimated incomes of less than 3,000,000 IDR. For instance, water spinach, the vegetable that was mostly grown by farmers (60.3%), was the second lowest in terms of estimated income, at 1,238,154.2 IDR (≈ 130.6 NZD).

5.4.3. Marketing Channels of Vegetables

Marketing channels where farmers sold their vegetable produce can be divided into two categories; modern market channels and traditional market channels. In this research, modern market channels were represented by supermarket chains, while traditional market channels indicated marketplaces such as village markets and the traditional markets in the city of Manokwari.

Distribution of sampled farmers based on market channels was highlighted in table 5.15. Participation of vegetable farmers in supermarket channels was considerably low, which was only about 21%. In contrast, the majority of farmers (79.4%) marketed their vegetable produce through traditional market channels. This indicated that vegetable marketing in the Manokwari region was still dominated by traditional market channels.

Table 5. 15. Marketing channels used by farmers

Marketing channel	Frequency	Percentage (%)
Supermarket channels:		
via traders	*14*	*11.1*
directly	*12*	*9.5*
Sub total	26	20.6
Traditional market channels:		
village markets	*12*	*9.5*
markets in city directly	*23*	*18.3*
markets in city via traders	*65*	*51.6*
Sub total	100	79.4
Total	126	100.0

From the field observation, there were only two supermarkets in the Manokwari city that sell agricultural products, including vegetables; named Hadi Supermarket and Fresco. These two supermarkets, besides selling vegetables produced by local farmers, also sell vegetables sourced from other islands in Indonesia, particularly types of

vegetable that are not much produced in the Manokwari region such as carrots, cabbages and onions. The participation of smallholder vegetable farmers in supermarket channels was both through intermediate traders (11.1%) and direct to supermarkets (9.5%). Mechanisms that existed between supermarkets and farmers and traders were informal, with oral agreements mostly used for transactions.

Furthermore, information about supermarket channels was also limited among such traders and farmers. Most vegetables farmers did not know how to deliver their products through the supermarket channels. Information of prices, type of vegetables, and mechanism of transactions in supermarket channels were not freely disseminated to farmers. At this point, some farmers decided to sell their products to local traders because they assumed that the traders had links to supermarkets and understood the methods of transactions supermarkets required. Notwithstanding, some vegetable farmers in this region had a positive opinion of selling to supermarkets, and presumed that selling vegetables through supermarket channels might result in higher profits, as the following opinion stated by one farmer:

> *"Currently, I just sell (vegetables) to local traders because they know how to link to Hadi (supermarket). I heard that the prices (of vegetables) in Hadi are higher. If I have a car and know the prices of vegetables required, I might drop my vegetables to Hadi too."*

In relation to farmers selling vegetables through traditional market channels, as shown in table 5.15, there were respondents who marketed to village markets (9.5%); respondents who sold directly to traditional markets in Manokwari city (18.3%); and respondents who delivered their vegetables to markets in the city through local traders (51.6%). In Manokwari city, there were two main traditional markets, namely, *Pasar Sanggeng* and *Pasar Wosi*. These marketplaces were managed by local government, and used as trading centres for general goods, including agriculture products. For those farmers selling directly to these markets, despite paying an amount for transportation, delivering vegetables to these marketplaces brought some advantages. The fact that *Pasar Sanggeng* and *Pasar Wosi* were interconnected with bus and cab terminals allowed farmers to meet more buyers, which was more profitable.

Importantly, the role of local traders was also significant, because of the fact that many vegetable farmers were facilitated to sell their vegetable produce in marketplaces in the city through these intermediating actors. According to farmers, these local assemblers were usually based in the villages, and had recognised vegetable producers around their village. Moreover, the relationship between farmers and the local traders was informal, and mostly built on a social trust that existed between them, as stated by one farmer:

> *"During the harvesting time, sometimes through informal conversations, the local trader informs us about the prices (of vegetables), as well as the time of delivering vegetables to the city (Manokwari). About the price, it is relatively low but I never negotiate it, because we all (farmers) have known him."*

5.4.4. Distance to Supermarkets

The location of farms from marketplaces was assumed to affect the decision of marketing channels that farmers might participate. Because the focus of this research was to analyse participation of smallholder vegetable farmers in modern markets, the distance variable used measured the average distance between vegetable farms and supermarkets in Manokwari city. Considering transportation costs, it was assumed that the further the farm locations from supermarkets, the smaller the possibilities of vegetable producers to participate in supermarket channels.

The average distance was about 37 kilometres, which indicated that majority of vegetable farms were located relatively far from Manokwari city. As highlighted in table 5.16, about 44.5% of vegetable farms were situated more than 40 km from supermarkets, while about 21.4% were located within a radius of 25 km from the supermarkets.

Table 5. 16. Distance to supermarket in Manokwari city

Distance to supermarket (km)	Frequency	Percentage (%)
< 25	27	21.4
25 - 40	43	34.1
> 40	56	44.5
Total	126	100.0

5.4.5. Means of Transportation

The means of transportation mostly used by vegetable producers included their own motorcycles and mini-buses. As shown in table 5.17, nearly 39% of the farmers used their own motorcycles to reach marketplaces, while 24% farmers utilised public transport, such as the minibus, for transporting their vegetable produce. Some farmers used bicycles or just walked to reach their buyers due to the short distance to village markets.

Table 5. 17. Means of transportation used to get marketplaces

Means of transportation	Frequency	Percentage (%)
Own motorcycle	49	38.9
Minibus	30	23.8
Bicycle	18	14.3
On foot	16	12.7
Rented motorcycle	12	9.5
Own Car	1	0.8
Total	126	100.0

5.4.6. Transportation Costs

As a consequence of distance to marketplaces and transportation means used, there would be some transportation costs vegetable producers should pay. Farmers using their own means of transportation should purchase the petrol, while those who utilised public transports, such as minibus and rented motorcycle, should pay for the fee applied. Excluding those who transport their vegetable produce by walking, the estimated average transportation cost paid in one year was about 428,450 IDR (≈ 45.2 NZD).

The majority of sampled farmers (76.4%) spent less than 500,000 IDR for the transportation cost per year, while those who spent more than 1,000,000 IDR for transporting vegetables was only 14.3%. The fact that most producers sold their vegetable produce to local traders and local consumers through village markets might contribute to the relatively low transportation costs.

Table 5. 18. Transportation cost paid by vegetable farmers

Transportation cost (IDR per year)	Frequency	Percentage (%)
< 500,000	95	75.4
500,000 - 1,000,000	13	10.3
> 1,000,000	18	14.3
Total	126	100.0

5.5. Institutional Factors

This section highlights the importance of institutional factors regarding supporting vegetable producers in marketing their vegetables. In this study, institutional roles were reflected by the involvement of farmers in accessing additional resources, such as extension services, credit, and market information, as well as participating in farmer organisations or cooperatives.

5.5.1. Access to Extension Services

It was generally acknowledged that extension services might positively associate with market participation (Jari & Fraser, 2009). Therefore, attending extension meetings would be expected to increase farm production as well as to enhance farmers' participation in marketplaces, including high value markets.

In this research, the attendance of vegetable farmers in extension meetings was considerably low, of which only about 26% of the respondents attending extension meetings in the last one year (table 5.19). This indicated that most vegetable farmers in Manokwari region had not been equipped with adequate information regarding vegetable production and marketing, especially delivered by extension agents. Accordingly, the low level of extension attendance might contribute to the low participation of farmers in marketplaces, in particular high value markets.

Table 5. 19. Attendance of extension meetings

Attending extension meetings	Frequency	Percentage (%)
Yes	33	26.2
No	93	73.8
Total	126	100.0

Furthermore, the extension services were mainly provided by local government through its agents based in district areas. The involvement of NGOs and research centres, on the other hand, was very rare, and limited to specific projects set by the central government. In addition, topics related to vegetable production and marketing were rarely discussed in extension meetings. According to farmers, issues that were mostly discussed in extension meetings included agronomical techniques, and especially subjected to rice production. One farmer stated:

> *"It is about one or two years ago that an extension meeting was conducted here. However, the topic was not about crops or vegetables, but only about rice production."*

5.5.2. Access to Credits

Access to credits might provide smallholder farmers with financial capital that could encourage their participation in marketplaces (Shiimi et al., 2012). Indeed, low access to credit might affect capital availability that farmers might invest in their farms.

In this study, the number of vegetable farmers who had accessed to credit in the last year was very small, with only 5.5% of the total respondents (table 5.20). This implied that the majority of vegetable farmers in the Manokwari region relied on their own financial capacity to invest in farm development.

Table 5. 20. Access to credit

Access to credit	Frequency	Percentage (%)
Yes	7	5.5
No	119	94.5
Total	126	100.0

According to farmers who had already received credits during the last one year, other farmers and banks were the sources of borrowing money. Farmers added that banks usually required tight requirements and formal procedures. This was challenging for vegetable growers, since they were smallholder farmers, and did not have necessarily formal records of farm production, inventories and assets that were required within credit proposals.

Besides banks, neighbours and other farmers were also alternative sources for borrowing additional money. Some vegetable farmers claimed that borrowing money from their neighbours was usually based on existing social trusts between farmers. Therefore, informal agreements were mostly used in the loan processes. In addition, borrowing money from neighbours or other farmers was more advantageous due to the relatively low interests required, or even without interests.

5.5.3. Access to Market Information

Access to market information could have a positive correlation with the market participation of farmers. Market information mostly included information about prevailing prices, new marketplaces, types of vegetables required in markets and alternative markets (Jari & Fraser, 2009). Thus, accessing market information could contribute to an increase in smallholder farmers' participation in marketplaces.

It was found in this research that there were only 10% of farmers who had accessed to market information during the last one year (table 5.21). Farmers explained that market information they had accessed to was mostly about prices. The main sources for market information were neighbours, other farmers, and rural traders. Some farmers argued that sometimes the information they got from either other farmers or local traders was unreliable, but they did not have any opinion about prices, since the only source they had was from other farmers as well as local traders. However, some farmers explained that they would choose to go to marketplaces without any price information, and apply the same price as other people selling in the selling points.

Table 5. 21. Access to market information

Access to market information	Frequency	Percentage (%)
Yes	12	10
No	114	90
Total	126	100.0

It was also important to highlight that the role played by the local government regarding providing market information was very limited. According to farmers, there was no available information on types of vegetables, standards and grades, and new marketplaces, provided by the government. Farmers might be able to reach other

marketplaces, including modern markets if they were facilitated to have accesses to appropriate market information.

5.5.4. Collective Actions

It was generally claimed that market imperfections often made it difficult for smallholder farmers to gain economic potentials in high value markets (Hellin et al., 2009). As a result, smallholder farmers sometimes faced the exclusion of market participation. The strategies that were generally applied to reduce the risks of market exclusions include acting collectively (Louw et al., 2007).

In this research, collective actions were reflected by farmer membership of farmer groups or cooperatives. Table 5.22 presented the information regarding vegetable farmer participation in farmer organisations. There were about 46% of sampled farmers participating in farmer organisations or farmer groups, while nearly 54% did not involve in any farmer groups. This implied that almost half of the respondents have realized the importance of collective actions for their farms.

Table 5. 22. Membership of farmer groups

Membership of farmer groups	Frequency	Percentage (%)
Yes	58	46.1
No	68	53.9
Total	126	100.0

However, it was also found that the roles of farmer groups were mainly to support the production process. In fact, none of the respondents expressed the actual role played by farmer groups regarding vegetable marketing. Farmers explained that the benefits they got from being a member of farmer groups mostly included agronomical practices and trainings. For instance, one farmer, who was currently attending an informal agriculture training set up by the farmer group he being a member, emphasised that his knowledge about fertilisation and plan protection was enriched through agriculture training and practices together with other farmers within the group. At this point, in relation to reaching high value markets for vegetable producers in the Manokwari region, the roles of farmer groups should be broadened, not only focusing on farm production, but also facilitating smallholder farmers to emerging markets, including supermarkets channels.

Furthermore, the membership of the farmer groups was characterized as open memberships, meaning that farmers had no obligation to pay for any fee to be a member. A plausible explanation for this could be the fact that most farmer groups were established and facilitated by the local government through its agricultural agency. Therefore, the involvement of farmers might be expected to be the subject of planned agricultural development programs.

In contrast to farmer groups, the participation of vegetable farmers in cooperatives was very low. Table 5.23 showed that there were nearly 98% of the sampled farmers who did not participate as a member in any cooperatives, while only about 2% farmers participated in cooperatives. An important factor that might contribute to the low participation of farmers in cooperatives could be the fact that the presence of agricultural cooperatives was very rare in the surveyed villages. Farmers explained that the existing cooperatives were either not producer cooperatives or retail cooperatives. Also, the cooperatives were mostly perceived as financial service cooperatives owned and governed by such rich people based in urban areas. In addition, the general perspective that appeared among smallholder farmers that was cooperatives usually related to unorganised management and failures could also be a particular challenge for smallholder farmers to utilise these collective institutions regarding participation in high value markets. Therefore, regarding supporting smallholder farmers to reach high value markets, it seemed that there were not many roles played by institutions taking the formats of cooperatives.

Table 5. 23. Membership of cooperatives

Membership of a cooperative	Frequency	Percentage (%)
Yes	3	2.4
No	123	97.6
Total	126	100.0

5.6. Farmers' Perception of Supermarket Channels

Even though the majority of sampled farmers in this research were involved in the traditional market channels, their perception of supermarket channels, however, was considerably positive (see table 5.24). About 46% of respondents perceived positively the supermarket channels, while 23% respondents had a negative perception, and 31% had no opinion about the supermarket channels.

Table 5. 24. Perception of supermarket channels

Perception of supermarket channels	Frequency	Percentage (%)
Negative	29	23.0
Do not know	39	31.0
Positive	58	46.0
Total	126	100.0

Furthermore, respondents were also asked about their opinion on the main advantages and challenges of selling to supermarket channels. These results were highlighted in table 5.25. Higher price was identified as the most advantageous aspect of selling to supermarket channels mentioned among respondents, which was 52.4%. This was similar to the result reported by Swinnen (2007), revealing that price was the main motivation for farmers to participate in modern market channels. However, it was also found that there were 37% of the respondents who had no any opinion about the beneficial aspect of selling to supermarkets. This may be related to the unavailability of information regarding supermarket channels among smallholder farmers. In addition, the percentage of farmers who stated that the advantages of selling to supermarket channels were associated with getting on time payments and accessing other production inputs, at 10.0% and 1.6%, respectively.

Table 5. 25. Advantages of selling to supermarket channels

Description	Frequency	Percentage (%)
Higher price	66	52.4
Payment on time	12	10.0
Access to input	2	1.6
Do not know	46	37.0
Total	126	100.0

Despite being perceived positively by most respondents, there were also some constraints of selling to supermarket channels perceived by sampled farmers, as presented in table 5.26. The most mentioned constraint was small farm size (31.7%). Farmers perceived that having a small size of vegetable farms made it difficult to deal with the quantity of supply required by supermarkets. Some farmers mentioned that the far location from supermarkets could be a particular challenge to become involved in supermarket channels if there was no presence of intermediate traders. Moreover, other constraints perceived to limit farmers from selling to supermarket channels included the low quality of produce (8.7%), inability to supply continuously (4%), expensive

production inputs (2.4%), and no information about selling to supermarket channels (2.4%).

Table 5. 26. Constraints of selling to supermarket channels

Description	Frequency	Percentage (%)
Small farm size	40	31.7
Far location	27	21.4
Low quality of produce	11	8.7
Cannot supply all year	5	4.0
Expensive inputs	3	2.4
No adequate information	3	2.4
Do not know	37	29.4
Total	126	100.0

Likewise, previous studies also reported that smallholder farmers often faced several challenges in terms of accessing modern market channels. Factors such as farm size, farm inputs, access capital, and quality of product were critically affecting farmers' opportunities to sell through supermarket channels (Bosilie et al., 2003; Reardon et al., 2009). In addition, it was also found in this study that 29.4% of respondents had no any idea of the challenges of selling to supermarket channels.

Besides giving an opinion regarding the advantages and challenges of selling to supermarket channels, sampled farmers were also asked about their perception regarding government policies that should be done to enable smallholder farmers to access supermarket channels. Table 5.27 highlighted farmers' perceptions about what kind of government roles can improve supermarket participation of smallholder farmers. A total of 40.5% respondents mentioned that training in production methods was a critical role that the government should play to help farmers deal with supermarkets requirements.

It was also observed that about 15% of sampled farmers perceived that the government should assist farmers by providing good quality seeds, followed by nearly 8% of farmers who needed the government to provide information regarding prices and markets for vegetables. In addition, the percentage of farmers who perceived that empowering farmer groups was critical was only 1.6%. The finding also showed that there were 21.4% of respondents who did not give an opinion about any government roles.

Table 5. 27. Perceptions about government roles to improve supermarket participation

Description	Frequency	Percentage (%)
Providing training in production methods	51	40.5
Improving supply of seeds	19	15.1
Providing market information	10	7.9
Providing credits	9	7.1
Assisting with chemicals/fertilizers	8	6.4
Empowering farmer groups	2	1.6
Do not know	27	21.4
Total	126	100.0

5.6. Summary

There were 126 smallholder vegetable farmers who had participated as respondents in this research. The respondents were characterised as being relatively young, with low education, and were considerably experienced farmers. Regarding vegetable farms, they were mostly small sized farms, mixed cultivation, and conventionally irrigated. The main vegetables produced were chilies, tomatoes, water spinach, long yard beans, and vegetable amaranth. Chili had the highest potential vegetable produced due to the highest average price per kilogram. Furthermore, the average revenue derived from vegetable farms was relatively low.

Marketing channels used by the respondents included village markets, local traders, traditional markets in Manokwari city, and supermarkets. Vegetable marketing in this region was still dominated by traditional market channels. On the other hand, farmer participation in supermarket channels was still low. Moreover, the mechanism of transactions that has been in existence was informal through oral agreements between the supermarkets, traders, and farmers. In addition, the roles played by supporting institutions such as extension agents, financial services institutions, and farmers' groups have not been optimal yet in terms of supporting market participation of smallholder farmers.

Furthermore, most respondents perceived positively about the supermarket channels. Respondents also posited the attribute of higher price as the main advantage of selling to supermarket channels. On the other hand, the small size of farms was perceived to be the most important constraint limiting farmer participation. In addition, most respondents remarked that the key role the government should play to enable

smallholder farmers to participate in supermarket participation was providing training in vegetables production techniques.

Chapter Six: Data Analysis and Discussion

6.1. Introduction

This chapter provides the econometric results of data analysis regarding factors affecting market channel participation of smallholder vegetable farmers in the Manokwari region, Papua Barat province of Indonesia. This chapter begins with the binary logistic regression model that illustrates how different factors influence the market participation of smallholder vegetable farmers. The chapter then presents chi square analysis, which provides the significance of associations between dependent variable and every single explanatory variable. Finally, the chapter also presents the correlation analysis to evaluate the impact of market channel participation on farmer household income from vegetable farms.

6.2. Factors Affecting Market Channel Participation: Binary Logistic Regression Analysis

As already explained, the decision of smallholder farmers regarding marketing channels can be viewed as a binary choice, for which supermarket channels and traditional market channels were used as the dichotomous responses. Therefore, the appropriate model to analyse this decision problem was binary logistic regression.

Binary logistic regression gives each explanatory variable a coefficient which measures its contribution to the variation in the dependent variable. In this analysis, independent variables derived from farmer demographics, farm characteristics, marketing and institutional aspects were analysed to estimate their effects on the dependent variable, the market channel participation. Table 6.1 presents the detailed description of independent variables.

Table 6.2 presents the results of the binary logistic regression estimating the factors that influence the marketing channel participation of smallholder farmers. The table showed the estimated coefficients (B), standard error (S.E.), significance value (sig.) and odds ratios of the explanatory variables in the model. According to Gujarati (2004), the coefficients (B values) estimate the change probability of the dependent variable for a unit change in the corresponding predictor, other predictors being equal. The sign of the

coefficient values indicates the direction of influence of the explanatory variable. A positive sign, therefore, implies an increase in the likelihood of changing from selling through the traditional marketing channel to selling through the supermarket channel.

Table 6. 1. Description of independent variables included in the logistic regression model

Variable code	Variable name	Measurement	Expected signs
AGE	Age of farmer	Number of years	-
EDU	Education of farmer	Years of schooling	+
EXPRNCE	Farming experience	Number of years	+
FMLY_SZ	Family size	Numbers	-
VEG_AREA	Vegetable cultivated area	Hectares	+
IRR	Irrigation	1 if yes, 0 otherwise	+
LVSTOCK	Livestock ownership	1 if yes, 0 otherwise	-
DIST_SM	Distance to supermarket	Kilometres	-
TRNS_COST	Transportation cost	IDR	-
AV_PRICE	Average price received by farmers	IDR	+
EXTN	Attendance of extension meetings	1 if yes, 0 otherwise	+
CREDIT	Access to credit	1 if yes, 0 otherwise	+
MKT_INFO	Access to market information	1 if yes, 0 otherwise	+
FARMER_GR	Membership of farmer groups	1 if yes, 0 otherwise	+

The results showed that the model was highly significant in estimating the factors influencing farmers' choice of vegetable marketing channels (see appendix 5 for the detail outcomes). The chi square value with 14 degree of freedom was 46.079, which was highly significant with a related p-value of 0.000. The *log likelihood* statistic was 82.209, which was relatively large in estimating how much unexplained information after the model has been fitted (Field, 2005). Moreover, the Nagelkerke R-square value was 0.480, indicating a moderate relationship of 48% between predictors and the dependent variable. In addition, the overall percentage of correct prediction was 84.1%. This value was a considerable improvement on the 79.4% correct classification with the constant model. The model was also free of the multicollinearity issue (see Appendix 6). The highest correlation occurred between age of farmer and farming experience, which was 0.53. However, this value was considerably medium, therefore, these two variables can be included in the model. These indicators implied that overall the model identified the factors affecting smallholder farmers' decisions about vegetable marketing channels.

Among the explanatory variables, education level, vegetable farm area and farmer group participation were statistically significant in determining market channel participation at 5% significance level, while age of farmers was found significant at 10% significance level. However, farming experience, family size, irrigation methods, livestock ownership, distance to supermarket, transportation cost, average price, attendance of extension meetings, access to credit, and access to market information were not statistically significant. Furthermore, the signs of the estimated coefficients of some independent variables were consistent with the *a priori* expectations whereas others were contrary to expectations.

Table 6. 2. Binary logistic regression results on market channel participation

Variables	B	S.E.	Sig.	Exp(B)
AGE	.059	.032	.064*	1.061
EDU	.239	.116	.039**	1.270
EXPRNCE	.014	.035	.684	1.014
FMLY_SZ	-.288	.230	.211	.750
VEG_AREA	2.429	1.227	.048**	11.351
IRR	-.152	.937	.871	.859
LVSTOCK	.344	.701	.624	1.410
DIST_SM	.036	.036	.308	1.037
TRNS_COST	.000	.000	.273	1.000
AV_PRICE	.000	.000	.183	1.000
EXTN_SERV	-.279	.729	.702	.756
CREDIT	1.556	1.134	.170	4.741
MKT_INFO	.097	1.131	.931	1.102
FARMER_GR	2.289	.748	.002***	9.865
Constant	-10.417	2.771	.000	.000
Number of observations	126			
Log likelihood	82.209			
Chi square (14)	46.079			
Sig. chi square	0.000			
Nagelkerke R^2	0.480			
% correct predictions	84.1			

* Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1% level

The variable ‘age of farmer’ was found significantly influencing market channel participation. The beta coefficient of this variable was 0.059, with an associated p-value of 0.064. Unexpectedly, the effect of age on market channel participation was positive. This positive relationship was contradictive with the studies done by Hernandez et al. (2007) and Alene et al. (2008). These studies reported that due to the reluctance of older farmers in adopting new technologies, younger farmers were more likely to participate

in supermarket channels. The odds ratio of 1.061 supported that when farmers turned to be more matured, the possibility of participation in supermarket channels was quite higher than in traditional market channels. This may correlate with how long farmers involve in marketing relationships. Older farmers may have repeated contacts gained through long-term marketing relationships, which can enhance trust between farmers and their main buyers including supermarkets.

The level of education of sampled farmers had a positive effect on marketing channel participation. The beta coefficient of this variable was 0.239, with a significance p-value of 0.039. This explained that more education for smallholder farmers may result in households shifting from selling through traditional market channels to selling through supermarket channels. This result was in line with the previous studies conducted by Neven et al. (2009), Rao and Qaim (2011), and Ismael et al. (2013) which concluded that farmers who supply high value markets have a higher education level than traditional market suppliers. The result, however, did not coincide with the findings of Hernandez et al. (2007) who reported that no significant effect on supermarket channel participation was made by the education background of the farmers in Guatemala. Although most vegetable farmers in the Manokwari region were categorised with a low level education as presented in the descriptive analysis, the odds ratio value (Exp(B) = 1.270), however, showed that vegetable farmers were likely to choose supermarket channels with an increased level of education. More educated farmers were expected to have a better understanding not only of the production process, but also of marketing and business aspects, such as supply requirements and price negotiations.

Another variable that significantly affected marketing channel participation was vegetable farm area (hectares). The outcome showed that the coefficient of this variable (2.429) had a significance p-value of 0.048. The positive sign on its coefficient indicated that an increase of farm size may result in a higher probability for smallholder farmers to participate in supermarket channels. This positive relationship was consistent with the *a priori* expectations, which also confirmed the results of various studies done in other countries by researchers such as Balint and Wobst (2006), Neven et al. (2009), Schipmann and Qaim (2011) and Wang, Zhang, and Wu (2011). Furthermore, despite the fact that the average vegetable farm size in the Manokwari region was relatively small, the larger odds ratio of 11.351 indicated that when there was a unit (hectare)

increase of land area under vegetables, the probability of participation in supermarket channels would increase about 11.2 times greater than in traditional market channels.

The results also showed that the farmer group participation had a significant influence on vegetable marketing channels. The coefficient value of this variable was 2.289, with the significance level (p-value) of 0.002. The positive relationship between farmer group membership and market channel participation was consistent with the *a priori* expectations, and supported previous studies (Jari & Fraser, 2009; Blandon et al., 2009; Panda & Sreekumar, 2012). The larger value of odds ratio (9.865) provided enough evidence that when farmers participated in farmer groups as members, there was a higher possibility to participate in supermarket channels. The plausible explanation to this was that through the farmer groups, individual farmers were facilitated with technical assistance and trainings that may meet production threshold for market participation and increased marketed supply.

The variable 'farming experience' had a non-significant effect on market channel participation. This explained that farmers who had longer experience in dong farming did not necessarily have a higher possibility to sell through supermarket channels. This result did not supported the previous studies such as Gong et al. (2007), Ouma et al. (2010) and Shiimi et al. (2012) who concluded that experience of doing farming was a strong explanatory variable in determining farmers' participation in high value markets. Moreover, this study also found that the effect of family size on market channel participation was statistically not significant. This confirmed the findings of Gong et al. (2007), Hernandez et al. (2007) and Neven et al. (2009) that the number of family members had no relationship with what market channel farmers participated in.

'Irrigation methods applied' demonstrated a negative and statistically non-significant effect on marketing channel participation. This finding did not support the previous results reported by Hernandez et al. (2007) and Neven et al. (2009). This can be explained that most sampled farmers run their vegetable farms on a small scale. Therefore, it would be costly for smallholder farmers to apply advanced irrigation systems. The effect of livestock ownership on market channel participation was found positive, but not significant. The explanation to this may be associated with the fact that most sampled farmers run their livestock farms in a relatively small scale, with the

purpose of household consumption. Therefore, whether smallholder farmers had livestock or not, it would not affect their participation in vegetable market channels.

All marketing aspects included in the logistic regression model demonstrated insignificant effects. Distance to supermarkets had a positive, but not significant influence on market channel participation. This explained that the location of vegetable farms was not an important factor determining market channel participation, despite some respondents expressing the far location of farms as a problem limiting supermarket channel participation. The result was contradictory to the study of Miyata et al. (2009) emphasising that the distance variable was a strong explanatory variable affecting farmers' decisions to participate in high value markets. Similarly, transportation costs had a positive but not significant effect on marketing channel participation. This finding did not confirm the result of the study done by Shiimi et al. (2012) who concluded that transportation costs had a negative influence on market channel decision. This was probably because the sampled areas had been connected with the relatively good condition of roads and adequate public transport that facilitated farmers to have contact with marketplaces in the city of Manokwari including supermarkets. This study also found that the average prices of vegetables received by farmers had a positive, but not significant, influence on market channel participation. This relationship did not coincide with the previous studies conducted by Balint and Wobst (2006) and Alene et al. (2008). These studies concluded that the relative prices that farmers received for the agricultural produce they sold could motivate them to increase their participation in supermarket channels.

Institutional factors included in the model demonstrated non-significant effects on market channel participation, except the variable 'membership of farmer groups'. The results showed that attendance of extension meetings had a negative and non-significant effect on market channel participation. This variable was found to be inconsistent with the study by Alene et al. (2008), who found that extension services played an important role in encouraging smallholder farmers to participate in the supermarket channels.

Access to credits had a similar effect on market channel participation, which was positive and non-significant. The plausible reason to this relationship was that most smallholder farmers did not have access to financial institutions such as banks. Some respondents borrowed some amount of money from other farmers or family, but not for

specific investment in farming. This result was also similar to the studies of Rao and Qaim (2011) and Ismail et al. (2013). These studies found that access to credits had a non-significant effect on market channel participation.

The variable access to market information had a positive and non-significant effect on market channel participation. This finding was contradictory to the studies of Jari and Fraser (2009), and Panda and Sreekumar (2012), who found that access to market information increased the possibility of smallholder farmers participating in high value markets. The plausible reason for this was probably because there was no viable market information service in the research area. In some cases, farmers had to find information regarding prices and new marketplaces by asking the local traders or going physically to local assembly markets. In the Manokwari region, food price information was often published by the local government through the radio and newspapers, and only for major items such as rice, sugar, and some vegetables such as cabbages and chilies.

Overall, the binary logistic regression has provided information regarding key variables that significantly influenced smallholder farmers' decisions about vegetable market channel participation. Of the farmers' demographics, education level was the most important factor affecting their decision to sell to supermarket channels. The variable 'farm size', representing farm characteristics, also became an important predictor explaining market channel participation. Moreover, all marketing-related variables included in the logistic regression model showed non-significant effects on market channel participation. Most importantly, participation in farmers' groups was a strong predictor determining their participation in the supermarket channels. This also indicated that acting collectively can enable smallholder farmers to reach the high value markets.

6.3. Relationship between Variables: Chi Square Analysis

In order to show the relationships between categorical variables, the chi square test was employed. The chi square test was run to measure the associations between market channel participation, as the dependent variable, and every single explanatory variable derived from farmers' demographics, farm characteristics, marketing and institutional factors. In addition, the cross-tabulations were also used to indicate the relationship probability between the factors.

6.3.1. Relationship between Farmer Demographics and Market Channel Participation

In this sub section, the results of chi square tests are presented to estimate the significance of the independent relationships between farmers' demographics and the dependent variable, which was market channel participation. Variables included in the chi square tests were age of farmers, education level, number of family members, and years of farming

The distribution of sampled respondents based on the age categories and the market channel participation was presented in table 6.3. Age groups were classified into three groups; <35 years, 35-55 years, and >55 years. The outcome of chi square test of independence indicated that age group was significantly related to market channel participation. The chi square value (χ^2) was 6.215, with an associated p-value of 0.045, and a *phi* coefficient (ϕ) of 0.222. The *phi* coefficient of 0.222 indicated a medium level of association between these two variables. Furthermore, this result also supported the logistic regression that was modelled in the previous section.

Table 6. 3. Age groups by market channel participation

Age group		Market channel	
		Traditional market	Supermarket
<35 years	Count	36	3
	% within Age group	92.3%	7.7%
	% within Market channel	36.0%	11.5%
35-55 years	Count	40	16
	% within Age group	71.4%	28.6%
	% within Market channel	40.0%	61.5%
>55 years	Count	24	7
	% within Age group	77.4%	22.6%
	% within Market channel	24.0%	26.9%

Pearson chi square = 6.215, sig. = 0.045, ϕ = 0.222

There was a slightly different pattern regarding market participation. In the age group of <35 years, there was about 92% respondents selling through the traditional market channels, while nearly 8% of the respondents selling to supermarkets. The relationship pattern slightly changed in the group of age 35-55 years. In this group, the percentage of respondents supplying to supermarkets was nearly 29%, while the percentage of the traditional market suppliers was about 71%. Similarly, among the older farmer category

(>55 years), there was about 77% of the respondents supplying to traditional markets, and nearly 23% of those selling to supermarkets. Furthermore, the cross-tabulation also showed that within the traditional market channel, the proportions between farmers who were classified into age groups of <35 years and between 35-55 years were quite similar, with 36% and 40% respectively. In addition, there was 24% of traditional market suppliers were older farmers (>55years). In comparison, within the supermarket channel farmers, 61.5% of respondents were aged between 35 and 55 years. The proportion of older farmers supplying to supermarket channels was nearly 30%, while the percentage of younger farmers involved in this channel was only 11.5%.

The relationship between education levels and market channel was presented in table 6.4. The chi square value was 3.380, with a related p-value of 0.185. This result implied that the relationship between education levels and market channel participation was not significant. Interestingly, this finding was not in line with the logistic regression model obtained before, which suggested that education level of farmers significantly influenced market channel participation when it included as a predictor together with other independent variables.

Table 6. 4. Education levels by market channel participation

Education level		Market channel	
		Traditional market	Supermarket
Not school attended	Count	29	4
	% within Education level	87.9%	12.1%
	% within Market channel	29.0%	15.4%
Completed elementary school	Count	51	13
	% within Education level	79.7%	20.3%
	% within Market channel	51.0%	50.0%
Completed high school	Count	20	9
	% within Education level	69.0%	31.0%
	% within Market channel	20.0%	34.6%

Pearson chi square = 3.380, sig. = 0.18

Within the group of respondents without any formal education, the percentage of the respondents selling to traditional market channels was nearly 88%, while supermarket channel suppliers were about 12%. The pattern slightly changed in the group of respondents who had completed elementary school. In this group, approximately 80% of the respondents participated in traditional market channels, and about 20% participated in supermarket channels. Among those who had completed high school

level, the percentage of supermarket channel supplier was 31%, while the proportion of traditional market suppliers was 69%. The table also showed that out of the traditional market suppliers, there were 51% of farmers who had graduated from elementary school, while 29% had never completed any formal education and 20% had graduated high school. Likewise, of the supermarket channel suppliers, the proportion of farmers with basic formal education was 50%, while nearly 35% had completed high school, and about 15.4% had never completed any formal education level.

Table 6.5 presented the detailed market channel participation of the respondents based on the years of doing farming. The chi square value was 0.791 (p-value = 0.673), indicating that this independent relationship was not significant. This meant that how long farming experience farmers had was not significantly related to which market channel they may participate in.

Table 6. 5. Farming experience by market channel participation

Farming experience		Market channel	
		Traditional market	Supermarket
<10 years	Count	63	14
	% within Farming experience	81.8%	18.2%
	% within Market channel	63.0%	53.8%
10-25 years	Count	14	5
	% within Farming experience	73.7%	26.3%
	% within Market channel	14.0%	19.2%
>25 years	Count	23	7
	% within Farming experience	76.7%	23.3%
	% within Market channel	23.0%	26.9%

Pearson chi square = 0.791, sig. = 0.673

The majority of the respondents who had less than ten years of farming experience participated in the traditional market channels (81.8%), while about 18% participated in the supermarket channel. The similar patterns were also observed among the respondents who had a longer farming experience. There were nearly 77% of those who had more than 25 year farming experience that participated in traditional market channels, while the supermarket channel suppliers were about 23%. Furthermore, among the traditional market suppliers, farmers with less than ten year experience were 63%, followed by 23% of those who had farming experience more than 25 years, and 14% of respondents who had 10-25 year farming experience. The similar pattern also occurred within supermarket channel, in which the proportion of farmers with less than

10 year farming experience was nearly 54%, followed by the respondents who had more than 20 years of doing farming (26.9%) and those who had 10-25 years of farming experience (19.2%).

Table 6.6 showed the relationship between family size and market channel participation. The chi square value of 0.684, with a p-value of 0.408 indicated that the association between family size and market channel participation was not significant. Within the two classifications of family size, traditional market channel was mostly chosen as the main channel for selling vegetable. There were approximately 81% of the respondents who had relatively small family size selling to the traditional market channel, while about 19% others participated in supermarket channels. Similarly, about 70% of the respondents who had a relatively large family size participated in traditional market channels, while 30% respondents in this category sold their vegetables through supermarket channel.

From the market channel perspective, the majority of traditional market suppliers (86%) had a relatively small number of family members, while only 14% respondents had more four family members. Similar pattern was observed within supermarket channel suppliers, in which nearly 77% were the respondents who had 1-4 family members, while about 23% were the respondents with relatively larger family.

Table 6. 6. Family size by market channel participation

Family size		Market channel	
		Traditional market	Supermarket
1-4 people	Count	86	20
	% within Family size	81.1%	18.9%
	% within Market channel	86.0%	76.9%
>4 people	Count	14	6
	% within Family size	70.0%	30.0%
	% within Market channel	14.0%	23.1%

Pearson chi square = 0.684, sig. = 0.408

6.3.2. Relationship between Farm Characteristics and Market Channel Participation

This sub section presents the chi square analysis between the independent variables derived from farm characteristics and the dependent variable ‘market channel

participation'. The independent variables tested included vegetable cultivated area, irrigation systems, and livestock ownership.

The distribution of sampled respondents based on the vegetable cultivated area and market channel participation was presented in table 6.7. The chi square value was 9.405, with an associated p-value of 0.009. In addition, the effect size of this relationship was 0.237, showing that the association between these two variables was categorised as a medium level. These results indicated that there was a significant difference regarding market channel participation between the respondents with a relatively large vegetable farm size and those who had small vegetable cultivated area. This significant relationship also confirmed the result of logistic regression that was previously modelled.

Among the respondents who had less than 0.5 hectares of vegetable cultivated area, 87% of farmers participated in traditional market channel, while 13% of farmers sold to supermarket channels. The relationship pattern was quite similar within the category of respondents who had more than one hectares of vegetable area. In this group, the percentage of supermarket suppliers was nearly 42%, while those who participated in traditional market channel were approximately 58%.

Table 6. 7. Vegetable cultivated area by market channel participation

Vegetable area		Market channel	
		Traditional market	Supermarket
<0.5 hectares	Count	67	10
	% within Vegetable area	87.0%	13.0%
	% within Market channel	67.0%	38.5%
0.5-1.0 hectares	Count	19	6
	% within Vegetable area	76.0%	24.0%
	% within Market channel	19.0%	23.1%
>1.0 hectares	Count	14	7
	% within Vegetable area	58.3%	41.7%
	% within Market channel	14.0%	38.5%

Pearson chi square = 9.405, sig. = 0.009, ϕ = 0.237

Furthermore, by comparing market channels, it can be seen that 67% respondents within traditional market category were the farmers who owned relatively small area under vegetables. It was also observed in this category that 19% respondents owned between 0.5-1.0 hectares of vegetable area, and only 14% respondents owned more than one

hectares of vegetable area. In contrast, the patterns were quite different in the supermarket channel. The percentages of the supermarket suppliers who had <0.5 hectares and those who had >1.0 hectares of vegetable area were similar, which was 38.5%. In addition, the supermarket suppliers with 0.5-1.0 hectares of vegetable area were about 23%. Therefore, it seemed that the larger vegetable farm size, the more likely farmers would select the supermarket channels as the market point for their vegetable produce.

The cross-tabulation between irrigation methods applied and market channel participation was highlighted in table 6.8. The chi square value was 0.244 and an associated p-value of 0.419 indicated that the different irrigation methods that farmers applied were not significantly associated with market channels farmers may participated in.

The majority of the sampled farmers had no adequate irrigation systems and only relied on rainfall for irrigating their vegetable farms. Among the farmers who relied on rain-fed system, nearly 81% were the traditional market suppliers, and about 19% were supermarket channel suppliers. Likewise, within the group of the respondents who applied irrigation systems, about 72% of farmers participated in the traditional market channel, and approximately 28% respondents were the supermarket channel suppliers. Furthermore, from market channel classification, within the traditional market category, 87% suppliers were rein-fed farmers, and 13% suppliers were farmers who applied irrigation systems for their vegetable farms. This pattern was also found within the supermarket channel classification, in which nearly 81% were farmers without any advanced irrigation system, and about 19% were the farmers whose vegetable farms were better irrigated.

Table 6. 8. Irrigation by market channel participation

Irrigation		Market channel	
		Traditional market	Supermarket
No	Count	87	21
	% within Irrigation	80.6%	19.4%
	% within Market channel	87.0%	80.8%
Yes	Count	13	5
	% within Irrigation	72.2%	27.8%
	% within Market channel	13.0%	19.2%

Pearson chi square = 0.244, sig. = 0.419

The distribution of sampled respondents based on livestock ownership and market channel participation was presented in table 6.9. The chi square (χ^2) result was 0.074, with an associated p-value of 0.785, confirmed that the association between livestock ownership and market channel participation was not significant. The table shows that the relationship patterns within livestock ownership categories were quite similar. In the group of the respondents without any livestock, the percentage of traditional market suppliers was about 78%, while those who supplied supermarkets were nearly 22%. Similarly, among the respondents who had livestock farms, it was observed that about 80% respondents supplied to traditional market channels, and nearly 20% participated in the supermarket channel.

Viewed from the market channel classifications, within the supermarket channel category, the proportions between farmers with and without any livestock were similar, which was 50% each of them. The similar proportions was also observed in the traditional market category, in which 47% suppliers had no any livestock, while 53% suppliers owning livestock on their farms. Therefore, it seemed that livestock ownership had no effect on whether respondents participated in the traditional market channel or in the supermarket channel.

Table 6. 9. Livestock ownership by market channel participation

Livestock ownership		Market channel	
		Traditional market	Supermarket
No	Count	47	13
	% within Livestock ownership	78.3%	21.7%
	% within Market channel	47.0%	50.0%
Yes	Count	53	13
	% within Livestock ownership	80.3%	19.7%
	% within Market channel	53.0%	50.0%

Pearson chi square = 0.074, sig. = 0.785

6.3.3. Relationship between Marketing Aspects and Market Channel Participation

In this sub section, the results of chi square tests are presented to estimate the significance of the independent relationships between marketing aspects and the dependent variable. Aspects such as distance to supermarkets, average price received by farmers and estimated annual transportation cost were tested to indicate their independent relationships with market channel participation.

The cross-tabulation between distance to supermarket and market channel participation is summarized in table 6.10. The result of chi square test of independence was 1.071, and the p-value was 0.301. These outcomes expressed that distance to supermarkets in the city of Manokwari was not significantly related to market channel participation. It was observed that the majority of the respondents (70%), whose vegetable farms were within a radius of 25 km, were the traditional market suppliers, while the rest supplied through the supermarket channels. The percentages were quite distinct among the sampled farmers whose vegetable farms were located in the range of 25-40 km. In this category, about 79% were the traditional market suppliers, while 21% were supermarket suppliers.

Table 6. 10. Distance to supermarket by market channel participation

Distance to supermarket		Market channel	
		Traditional market	Supermarket
<25 km	Count	19	8
	% within Distance	70.4%	29.6%
	% within Market channel	19.0%	30.8%
25-40 km	Count	34	9
	% within Distance	79.1%	20.9%
	% within Market channel	34.0%	34.6%
>40 km	Count	47	9
	% within Distance	83.9%	16.1%
	% within Market channel	47.0%	34.6%

Pearson chi square = 2.084, sig. = 0.359

Furthermore, among farmers whose farms were located more than 40 km from the supermarkets, the percentage of supermarket channel suppliers was about 16%, while the percentage of traditional market suppliers was nearly 84%. Table 6.10 also showed that within the traditional market category, nearly half of the respondents were vegetable growers who were located relatively far from supermarkets. The percentage of the traditional market suppliers whose farms were situated closely to supermarkets was only 19%. The composition was quite different within the group of supermarket channel. The proportion of farmers whose vegetable farms were within a radius of 25 km was nearly 31%, and those who were classified into two others categories had similar percentages, which were 34.6% for each of them.

Table 6.11 presented the relationship between transportation costs and market channel participation. The chi square value (χ^2) was 18.182, with a significance level (p-value)

of 0.000. These results suggested that the transportation cost that farmers spent was significantly associated with market channel participation. The effect size of the relationship was 0.380, indicating that the association between transportation cost and market channel participation was categorised as a medium level.

Within the group of respondents who spent less than 500,000 IDR on transportation, 88% were traditional market suppliers, while 12% supplied to supermarket channels. The percentages were quite different in the other groups. Among farmers spending between 500,000 IDR and 1,000,000 IDR for transportation costs, it was observed that half of them supplied to supermarket channels. In the group of respondents with the transportation costs above 1,000,000 IDR, the supermarket channel suppliers were 44%, while the traditional market suppliers were 56%.

Table 6. 11. Transportation costs by market channel participation

Transportation costs		Market channel	
		Traditional market	Supermarket
<500,000 IDR	Count	83	11
	% within Transportation costs	88.3%	11.7%
	% within Market channel	83.0%	42.3%
500,000 – 1,000,000 IDR	Count	7	7
	% within Transportation costs	50.0%	50.0%
	% within Market channel	7.0%	26.9%
>1,000,000 IDR	Count	10	8
	% within Transportation costs	55.6%	44.4%
	% within Market channel	10.0%	30.8%

Pearson chi square = 18.182, sig. = 0.000, ϕ = 0.380

2 cells (33.3%) have expected count less than 5. Therefore the validity of the results can be questioned.

By comparing the two market channels, it can be seen that the traditional market channel was dominated by farmers who paid a relatively small amount of transportation cost, which was 83%. The percentage of farmers who spent more than one million IDR was 10%, while those who spent transportation cost within the range of 500,000 – 1,000,000 IDR was only 7%. Furthermore, in the supermarket channel category, it was found that about 42% respondents were farmers who paid less than 500,000 IDR for transportation cost. The percentage of those who paid between 500,000 and 1,000,000 IDR was about 27%, while the rest (nearly 31%) were farmers spending more than one million IDR for transportation cost.

Table 6.12 highlighted the average price received by respondents for every kilogram of their vegetables sold. The chi square value was 10.771, with an associated significance level of 0.001. These results suggested that the relationship between average price farmers received and market channel participation was significant. The *phi* coefficient was 0.311, showing that this association was classified as a medium level. Interestingly, this significant association was contradictive with the outcome of the logistic regression output showing that the average price of vegetable received by farmers had a non-significant effect on market channel participation.

Respondents who selected the traditional market channels were more likely to receive a relatively lower price compared to those who were the supermarket channel suppliers. It was observed that 90% of the farmers receiving an average price of below 6,500 IDR were the traditional market suppliers, while only 10% were the supermarket suppliers. Within the group of the respondents who received a relatively higher average price for their vegetables, 65% participated in the traditional market channels, and 35% participated in the supermarket channels.

Table 6. 12. Average price by market channel participation

Average price		Market channel	
		Traditional market	Supermarket
<6,500 IDR	Count	65	7
	% within Average price	90.3%	9.7%
	% within Market channel	65.0%	26.9%
≥6,500 IDR	Count	35	19
	% within Average price	64.8%	35.2%
	% within Market channel	35.0%	73.1%

Pearson chi square = 10.771, sig. = 0.001, ϕ = 0.311

It was also important to highlight that the different proportion patterns were observed between the two market channel categories. Within the traditional market channel, there were 65% farmers who received a relatively low average price for each kilogram of vegetable sold, while 35% of those were classified as farmers who received an average price of 6,500 IDR or more. The relationship pattern was different among the suppliers of the supermarket channel. There was about 73% of farmers in this category received a relatively higher price for the every kilogram of vegetable sold, while 27% others received an average price of less than 6,500 IDR.

6.3.4. Relationship between Institutional Factors and Market Channel Participation

This sub section highlights the results of chi square analysis regarding association between institutional factors and market channel participation. Independent variables analysed in this analysis included attendance of extension meetings, access to credits, access to market information, and membership of farmer groups.

Table 6.13 presented the cross-tabulation between farmers' attendance of extension meetings and what market channel they participated in. The chi square value (χ^2) of 1.815, with a p-value of 0.178, indicated that attendance of extension meetings was not significantly related to market channel participation.

Table 6. 13. Attendance of extension meetings by market channel participation

Attendance of extension meetings		Market channel	
		Traditional market	Supermarket
No	Count	77	16
	% within Extension attendance	82.8%	17.2%
	% within Market channel	77.0%	61.5%
Yes	Count	23	10
	% within Extension attendance	69.7%	30.3%
	% within Market channel	23.0%	38.5%

Pearson chi square = 1.815, sig. = 0.178

It was found that within the group of respondents who did not attend any extension meetings in the last one year, the majority of farmers (82.8%) participated in the traditional market channels, while 17.2% supplied to supermarket channels. Among the respondents who attended the extension meetings in the last one year, about 70% farmers were traditional market suppliers, and nearly 30% were supermarket channel suppliers. Furthermore, there was not a significant difference observed between traditional market and supermarket channels. Among traditional market channel suppliers, 77% were farmers who did not attend any extension meetings in the last one year, while 23% farmers did attend the extension meetings. Similarly, 61.5% of the farmers in the supermarket channel did not attend any extension services during the last year, while 38.5% farmers mentioned that they attended extension meeting in the last one year.

The relationship between access to credit and market channel participation was summarized in table 6.14. The result of chi square test (χ^2 = 1.029, p-value = 0.310) concluded that the relationship between farmers' access to credits and market channel participation was not significant.

It was observed that most sampled farmers were classified into the group of not accessing any credits. Within this group, the percentage of farmers who supplied traditional market channels was approximately 81%, while supermarket channel suppliers were about 19%. Similarly, among the respondents who access credits in the last one year, 43% were the supermarket channel suppliers, and 57% were the traditional market suppliers. Moreover, the table also showed that in the traditional market channel category, majority of the respondents (96%) did not access any credits during the last one year, while only 4% farmers who had access for some additional money. It was similar with the supermarket channel, in which 88.5% respondents did not access to any credits, while only 11.5% farmers accessed to credits.

Table 6. 14. Access to credits by market channel participation

Access to credits		Market channel	
		Traditional market	Supermarket
No	Count	96	23
	% within Access to credits	80.7%	19.3%
	% within Market channel	96.0%	88.5%
Yes	Count	4	3
	% within Access to credits	57.1%	42.9%
	% within Market channel	4.0%	11.5%

Pearson chi square = 1.029, sig. = 0.310
1 cell (25.0%) has expected count less than 5. Therefore the validity of the results can be questioned

The distribution of respondents based on access to market information and market channel participation was presented in table 6.15. The chi square value (χ^2) was 0.000, with an associated p-value of 0.986. These results indicated that access to market information was not significantly related to market channel participation.

Among the respondents who did not access any market information in the last one year, nearly 80% participated in traditional market channel, while about 20% of farmers sold their vegetables through supermarket channels. Similar trend was observed among the respondents who actually accessed some market information in the last one year. There

was three-quarters of the farmers selling to traditional market channels, while only one-quarters of them participated in supermarket channels.

Moreover, it was found that within the traditional market channel suppliers, 91% respondents were farmers who did not access to any information regarding vegetable marketplace and prices, while only 9% of the respondents had the access to market information. The similar percentages were found among the supermarket suppliers. There were 88.5% farmers did not access to any market information, while 11.5% had accessed vegetable marketplaces and price information.

Table 6. 15. Access to market information by market channel participation

Access to market information		Market channel	
		Traditional market	Supermarket
No	Count	91	23
	% within Access to market information	79.8%	20.2%
	% within Market channel	91.0%	88.5%
Yes	Count	9	3
	% within Access to market information	75.0%	25.0%
	% within Market channel	9.0%	11.5%

Pearson chi square = 0.000, sig. = 0.986
1 cell (25.0%) has expected count less than 5. Therefore the validity of the results can be questioned

The cross-tabulation presenting the relationship between farmers' group membership and market channel participation was highlighted in table 6.16. The outcomes of the chi square test confirmed that membership of farmer groups was significantly related to market channels that farmers selected. The chi square value (χ^2) was 14.200, with an associated p-value of 0.000. The *phi* coefficient was 0.355, indicating that the effect size of this association was in a medium level. Furthermore, these outcomes also supported the logistic regression model suggesting that membership of farmer group was a strong predictor on market channel participation by smallholder farmers.

It was observed that within the category of respondents who were not a member of any farmer groups, most farmers (92.6%) participated in traditional market channels, while only 7.4% participated in supermarket channels. In contrast, among the respondents who joined the farmer groups as members, the supermarket channel suppliers reached to about 36%, and the traditional market channel suppliers were nearly 64%. This distinct

pattern indicated that the respondents involving in the farmer groups were more likely to participate in supermarket channels.

Furthermore, it was also important to highlight that there was distinct proportions observed between the two market channels. Out of the traditional market channel suppliers, 63% were farmers who were not involving as a member of any farmer groups, while 37% respondents participated as a member of the farmer groups. Conversely, among the supermarket channel suppliers, the majority of the respondents (80.8%) joined the farmer groups as a member, while about 19% respondents were not being a member of the farmer groups.

Table 6. 16. Membership of farmer groups by market channel participation

Membership of farmer groups		Market channel	
		Traditional market	Supermarket
No	Count	63	5
	% within Membership of farmer groups	92.6%	7.4%
	% within Market channel	63.0%	19.2%
Yes	Count	37	21
	% within Membership of farmer groups	63.8%	36.2%
	% within Market channel	37.0%	80.8%

Pearson chi square = 14.200, sig. = 0.000, ϕ = 0.355

Overall, the chi square tests had provided information regarding whether every single explanatory variable significantly related to market channel participation or not. Variables such as age of farmer, vegetable cultivated area, estimated transportation costs, average price received by farmers, and membership of farmer groups were found significantly relating to market channel participation. Furthermore, although some variables were in line with the logistic regression outcome, variables such as education of farmer, transportation cost, and average prices showed contradictive results between the two analyses, as highlighted in table 6.17.

6.4. Impact of Market Channel Participation on Vegetable Income

It was generally acknowledged that one of the economic benefits that smallholder farmers expected from the participation in the high value markets was obtaining a relatively higher prices for vegetable produce sold. The further implication of receiving

high prices in the high value markets can relate to an increase of farmer household income. Therefore, by utilising a bivariate correlation analysis, this study also attempted to analyse whether or not market channel participation had an impact on the income generated from vegetable farms.

Table 6. 17. The summary of the statistical results of market channel participation

Independent variables	Binary logistic regression	Chi square test
Age of farmer	√	√
Education level	√	
Farming experience		
Family size		
Vegetable cultivated area	√	√
Irrigation methods		
Livestock ownership		
Distance to supermarket		
Transportation costs		√
Average price received by farmers		√
Attendance of extension meetings		
Access to credit		
Access to market information		
Membership of farmer groups	√	√

The bivariate correlation analysis was conducted under the null hypothesis, stating that there was no correlation between market channel participation and vegetable income, and the alternative hypothesis stating that there was a correlation between these two variables. The result of the correlation analysis regarding the relationship between market channel participation and income was presented in table 6.18.

Table 6. 18. Correlation between market channel and vegetable income

		Vegetable Income
Market channel	Pearson Correlation	.258**
	Sig. (2-tailed)	.004
	N	126

** Correlation is significant at the 0.01 level (2-tailed)

The Pearson correlation coefficient (*r*) was 0.258, with a related significance level of 0.004. Based on these outcomes it can be concluded that the association between market channel participation and income generated from vegetable farms was positive and statistically significant. In addition, this relationship was categorised between small and moderate correlation (Cohen, 1988, as cited in Corder & Foreman, 2014). This finding implied that differences in vegetable marketing practices contributed to essential

differences in profitability between traditional market suppliers and supermarket channel suppliers. Furthermore, this finding was also in line with results from previous studies revealing that participation in the modern market channels was associated with relatively higher household income (Neven & Reardon, 2006; Miyata et al., 2009; Rao & Qaim, 2011). For the context of Manokwari region, where the supermarket channels has been growing, the result also suggested that this marketing channel mode can be beneficial for smallholder farmers in relation to providing alternative marketplaces and economic potentials.

6.5. Summary

This chapter provides an analysis of the factors affecting the market channel participation of smallholder vegetable farmers in the Manokwari region, Papua Barat province of Indonesia. A binary logistic regression model was employed to find out which determinants significantly influencing market channel participation of smallholder vegetable farmers. Secondly, the chi square test was run to estimate the independence between every single explanatory variable and the dependent variable. Lastly, a simple bivariate correlation test was employed to find out the relationship between market channel participation and income generated from vegetable farms.

From the model of binary logistic regression, key variables were identified influencing smallholder farmers' choice in market channels. Education level, vegetable farm size, and membership of the farmer groups had positive and significant effects on market channel participation. Furthermore, the outputs of the chi square test suggested that age, vegetable cultivated area, estimated transportation costs, average price received by farmers, and membership of the farmer groups had significant relationships with market channel participation. In addition, the results of the bivariate correlation showed that supermarket channel participation had a positive and significant correlation with farmer income.

Chapter Seven: Conclusion and Recommendations

7.1. Conclusion

The development of modern food markets, including supermarkets, has been taking place in Indonesia for more than two decades. The presence of supermarkets, with new procurement practices, has affected all actors in the supply chains including smallholder farmers. Participation in supermarket channels can bring opportunities for smallholder farmers in gaining economic advantages. However, smallholder farmers were also facing constraints regarding higher standard requirements that might potentially limit participation possibilities. This study, therefore, has attempted to identify key determinants affecting smallholder vegetable farmers in participating in the supermarkets channel.

The objectives of this research were; first, to analyse determinant factors that influence market channel participation of smallholder vegetable farmers in the Manokwari region, Papua Barat province of Indonesia; second, to compare differences of key factors between the traditional market channel and the supermarket channel; and third, to analyse the impact of supermarket channels on farmer household income. A survey was conducted in order to achieve the research objectives. Using the convenience sampling technique, a total of 126 vegetable farmers were involved in this study as the respondents. The interviews based on a structured questionnaire were conducted to capture information regarding farmers' demographics, farm characteristics, marketing aspects, and institutional factors. Data was analysed using the descriptive analysis and inferential analysis.

The descriptive analysis findings indicated that most vegetable farms in the Manokwari region were characterised by small size, growing mixed cultivated vegetables, and having limited irrigation systems. The findings also indicated that chili was the key vegetable due to the highest potential value. Regarding market channels for vegetable produce, despite the fact that supermarket channels were increasing, the market channels for vegetables in the Manokwari region were still dominated by the traditional channels. Marketing channels mostly used by smallholder vegetable farmers included local traders, village markets, traditional markets in the urban area, and supermarkets. In addition, the role of supporting institutions in linking vegetable farmers to supermarkets

in the Manokwari region was limited. The results of this study highlighted that the roles of institutions that supported farmers with market information, credits, and extension services were limited, except the role of farmer groups. Furthermore, the study also found that most farmers perceived positively about the presence of modern market channels in the Manokwari region. Most smallholder vegetable farmers perceived that selling to supermarket channels would bring economic advantages such as receiving a relatively higher price. In addition, having a small farm size was perceived as the main constraint for smallholder farmers to deal with supermarket requirements.

The empirical results indicated important factors affecting smallholder farmers participating in supermarket channels. The important determinant derived from farmers' demographics was education level, which was statistically significant at a 5% level. Thus, it can be said that through a better education level, smallholder farmers could have a higher level ability to analyse market situations and further decide to select the preferred market channels. Farm size was also found as the important factor to enable smallholder farmers to participate in supermarket channels. Farmers with a relatively large farm size may have opportunities in dealing with supermarket requirements. However, majority of vegetable farmers in the Manokwari region owned relatively small areas under vegetables, which also became a main challenge in dealing with supermarkets requirements. Most importantly, the presence of farmer groups was found to be a critical factor in helping smallholder farmers to increase production as well as to access supermarket channels. This implied that the role of collective actions was still needed for smallholder farmers even though the existence of the farmers groups in the Manokwari region was not specifically aimed for supporting vegetable marketing.

Furthermore, by comparing the differences between the traditional market channel suppliers and the supermarket channel suppliers, it was found that besides education level, farm size and membership of farmer groups, some marketing aspects such as transportation costs and the average selling price were significantly associated with market channel participation. This indicated that smallholder farmers also considered economic advantages in choosing market channels. Lastly, this study also attempted to elaborate on the impact of supermarket channel participation on farmer income. The result suggested that participation of smallholder farmers in the supermarket channels had a relatively moderate impact on farmer household income from vegetable farms.

7.2. Recommendations

The results of this study have identified several challenges faced by smallholder farmers, such as small farm size and low institutional roles. Having small farm size has implications for low production volumes and low bargaining power. Therefore, development strategies should focus on technical innovations, which can enhance smallholder farmers' skills and ability in mitigating farm scale problems. Meanwhile, smallholder farmers are also encouraged to build their capacity through sharing knowledge and information within the existing farmer groups. Having higher level technical skills can facilitate smallholder farmers to produce vegetables with high quality and quantity, which can enable them to sell through the high value market channels.

The other challenge facing smallholder farmers is the lack of institutional roles. It is, therefore, important for the local government to initiate the integrated systems, consisting of the related stakeholders, in order to addressing the institutional issues such as lack of market information, standards and grades, credit access, and extension services. Moreover, infrastructure developments, such as roads, transportation, market outlets, and vegetable based industries, should also be improved in order to ensure an adequate environment and low costs for the actors who involved in the vegetable market system in the Manokwari region. Most importantly, collective actions through farmer groups need to be strengthened, especially in marketing linkages aspects. The presence of the collective actions not only helps smallholder farmers in sharing knowledge and information among them, but also strengthens their position when building communication with supermarkets.

7.3. Suggestion for Future Research

Since this study involved vegetable farmers growing many types of vegetable, it may have implications for inaccurate interpretations. Therefore, the future investigations should focus on particular horticulture produce so that the results of the research might reduce biases. Moreover, this research only assessed the smallholder farmers' market channel participation in one particular year, which may have omitted the key information regarding changes in farm assets and farmers' marketing behaviour. Thus, it is suggested for future research to broaden the scope of analysis, so that it can capture

the more comprehensive information regarding market channel participation. In addition, the sample size of this study was considerably small, especially for the supermarket channel suppliers. This has implications for the issue of generalization. Therefore, it is important for future research to include a larger sample size.

References

Abdurrahman, M. N., (2013). *Konsumsi buah dan sayur di Indonesia ketinggalan dari negara tetangga*. Retrieved from http://health.detik.com/read/2013/06/28/190119/2287595/763/konsumsi-buah-dan-sayur-di-indonesia-ketinggalan-dari-negara-tetangga

Alene, A. D., Manyong, V. M., Omanya, G., Mignouna, H. D., Bokanga, M., & Odhiambo, G. (2008). Smallholder market participation under transaction costs: Maize supply and fertilizer demand in Kenya. *Food Policy*, 33, 318-328.

Aparna, B., & Hanumanthaiah, C. V. (2012). Are supermarket supply channels more efficient than traditional market channels? *Agricultural Economics Research Review*, 25(2), 309-316.

Balint, B., & Wobst, P. (2006). Institutional factors and market participation by individual farmers: The case of Romania. *Post-Communist Economies,* 18(1), 101-121.

Barrett, C. B., Bachke, M. E., Bellemare, M. F., Michelson, H. C., Narayanan, S., & Walker, T. F. (2011). Smallholder participation in contract farming: Comparative evidence from five countries. *World Development*, 40(4), 715-730.

Berdegue, J. A., Balsevich, F., Flores, L., & Reardon, T. (2005). Central American supermarkets' private standards of quality and safety in the procurement of fresh fruits and vegetables. *Food Policy*, 30, 254-269.

Blandon, J., Henson, S., & Cranfield, J. (2009). Small-scale farmer participation in new agri-food supply chains: Case of the supermarket supply chain for fresh fruit and vegetables in Honduras. *Journal of International Development*, 21, 971-984.

Boselie, D., Henson, S., & Weatherspoon, D. (2003). Supermarket procurement practices in developing countries: Redefining the roles of the public and private sectors. *American Journal of Agricultural Economics*, 85(5), 1155-1161.

Brewer, J. & Hunter, A. (1989). *Multimethod Research: A Synthesis of Style*. California, USA: Sage Publications, Inc.

CCOP EPF. (2014). *Indonesia country profile*. Retrieved from http://www.ccop.or.th/epf/indonesia/indonesia_profile.html

Chowdhury, S., Gulati, A., & Gumbira-Sa'id, E. (2005). The rise of supermarkets and vertical relationships in the Indonesian food value chain: Causes and consequences. *Asian Journal of Agriculture and Development*, 2(1&2), 39-48.

CIA. (2014). *The world factbook*. Retrieved from https://www.cia.gov/library/publications/the-world-factbook/geos/id.html

Corder, G. W., & Foreman, D. I. (2014). *Nonparametric Statistics: A Step-by-step Approach.* (2nd ed.). New Jersey, USA: John Wiley &Sons, Inc.

Creswell, J. H. (2009). *Research Design: Quantitative, Qualitative, and Mixed Methods Approaches* (3rd ed.). California, USA: Sage Publications, Inc.

Dane, F. C. (1990). *Research Methods*. California, USA: Wadsworth, Inc.

Eaton, C., & Shepherd, A. W. (2001). Contract farming: Partnerships for growth. *Food and Agriculture Organization*. FAO Agricultural Services Bulletin No. 145.

FAOSTAT. (2014). *Food and agricultural commodities production*. Retrieved from http://faostat.fao.org/site/339/default.aspx

Ferrari, M. F. (1994). 20 years of horticulture in Indonesia: The vegetable subsector. *The CGPRT Centre.*Working paper No15.

Field, A. (2005). *Discovering Statistics Using SPSS* (2nd ed.). London, UK: Sage Publications Ltd.

Garnevska, E., Liu, G., & Shadboldt, N. M. (2011). Factors for successful development of farmer cooperatives in Northwest China. *International Food and Agribusiness Management Review*, 14(4), 69-84.

Glover, D. J. (1984). Contract farming and smallholder outgrower schemes in less-developed countries. *World Development*, 12 (11-12), 1143-1157.

Glover, D., & Kusterer, K. (1990). *Small Farmers, Big Business: Contract Farming and Rural Development*. London, UK: Macmillan Press.

Gong, W., Parton, K., Cox, R. J., & Zhou, Z. (2007). Transaction costs and cattle farmers' choice of marketing channels in China: A tobit analysis. *Management Research News*, 30(1), 47-56.

Greene, W. H. (2008). *Econometric Analysis* (6th ed.). New Jersey, USA: Pearson Education, Inc.

Gujarati, D. (2004). *Basic Econometrics* (4th ed.). New York, USA: McGraw Hill.

Gulati, A., Minot, N., Delgado, C., & Bora, S. (2007). Growth in high-value agricultural in Asia and the emergence of vertical links with farmers. In J. F. M. Swinnen (ed.), *Global Supply Chains, Standards and the Poor* (pp. 91-108). Trowbridge, England: Cromwell Press.

Hellin, J., Lundy, M., & Meijer, M. (2009). Farmer organization, collective action and market access in Meso-America. *Food Policy*, 34, 16-22.

Hernandez, R., Reardon, T., & Berdegue, J. (2007). Supermarkets, wholesalers, and tomato growers in Guatemala. *Agricultural Economics*, 36, 281-290.

Hobbs, J. E. (1996). A transaction cost approach to supply chain management. *Supply Chain Management*, 1(2), 15-27.

Hosmer, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied Logistic Regression* (3rd ed.). New Jersey, USA: John Wiley &Sons, Inc.

Irianto, B., and Herwanto. (2009). Linking small banana producers in Lumajang district to better markets. In P. P. Oppenheim (Ed.), *Proceedings of the Sixteenth International Symposium on Horticultural Economics and Management* (pp. 115-122). Leuven, Belgium: Acta Hort.

Ismail, M., Kavoi, M. M., & Eric, B. K. (2013). Factors influencing the choice of supermarket channel by smallholder vegetable farmer suppliers in Nairobi and Kiambu Counties, Kenya. *Journal of Agricultural Economics and Development*, 2(9), 333-344.

Jagwe, J. N., & Machete, C. (2011). Effects of transaction costs on choice of selling point: A case of smallholder banana growers in the Great Lakes region of Central Africa. *Agrekon*, 50, 109-123.

Jari, B., & Fraser, G. C. G. (2009). An analysis of institutional and technical factors influencing agricultural marketing amongst smallholder farmers in the Kat River Valley, Eastern Cape Province, South Africa. *African Journal of Agricultural Research*, 4(11), 1129-1137.

Key, N., Sadoulet, E., & de Janvry, A. (2000). Transaction costs and agricultural household supply response. *American Journal of Agricultural Economics*, 82, 245-259.

King, R. P. (1992). Management and financing of vertical coordination: An overview. *American Journal of Agricultural Economics*, 74(5), 1217-1218.

Louw, A., Jordaan, D., Ndanga, L., & Kirsten, J. F. (2008). Alternative marketing options for smallscale farmers in the wake of changing agri-food supply chains in South Africa. *Agrikon*, 47(3), 287-308.

Louw, A., Vermeulen, H., Kirsten, J., & Madevu, H. (2007). Securing small farmer participation in supermarket supply chains in South Africa. *Development Southern Africa*, 24(4), 539-551.

Mainville, D. Y., & Peterson, C. (2006). Coordination strategy decision in Sao Paulo's fresh produce market: An empirical validation of the Peterson, Wysocky, & Harsh Framework. *International Food and Agribusiness Management Review*, 9(4), 1-25.

Maertens, M., & Swinnen, J. F. M. (2009). Trade, standards, and poverty: Evidence from Senegal. *World Development*, 37(1), 161-178.

Markelova, H., Meinzen-Dick, R., Hellin, J., & Dohrn, S. (2009). Collective action for smallholder market access. *Food Policy*, 34(1), 1-7.

Martinez, S. (2002). Vertical coordination of marketing systems: Lesson from the poultry, egg, and pork industries. *Agricultural Economics Report No. 807*. USDA.

Menard, S. (2010). *Logistic Regression: From Introductory to Advanced Conceps and Applications*. California, USA: Sage Publications, Inc.

Ministry of Agriculture. (2013). Buletin Konsumsi Pangan. Retrieved from http://pusdatin.setjen.pertanian.go.id/tinymcpuk/gambar/file/Buletin-Konsumsi-editTW1-2013.pdf

Ministry of Agriculture. (2014a). *Statistik ketenagakerjaan sektor pertanian tahun 2013*. Retrieved from http://pusdatin.setjen.pertanian.go.id/tinymcpuk/gambar/file/Statistik_Tenaga_Kerja_Pertanian_2013.pdf

Ministry of Agriculture. (2014b). *Production, area, and productivity of estate crops in Indonesia*. Retrieved from http://www.pertanian.go.id/Indikator/tabel-3-prod-lsareal-prodvitas-bun.pdf

Ministry of Agriculture. (2014c). *Impor dan ekspor sayuran tahun 2012*. Retrieved from http://hortikultura.pertanian.go.id/index.php?option=comcontent&view=article&id=337&Itemid=698

Ministry of Agriculture. (2015). *Data sub sector hortikultura*. Retrieved from http://www.pertanian.go.id/ap_pages/mod/datahorti

Ministry of Trade. (2014). *Perkembangan ekspor nonmigas (sektor) periode: 2009-2014*. Retrieved from http://www.kemendag.go.id/id/economic-profile/indonesia-export-import/growth-of-non-oil-and-gas-export-sectoral

Minten, B., Randrianarison, L., & Swinnen, J. F. M. (2007). Global supply chains, poverty and the environment: Evidence from Madagascar. In J. F. M. Swinnen (ed.), *Global Supply Chains, Standards and the Poor* (pp. 147-158). Trowbridge, England: Cromwell Press.

Miyata, S., Minot, N., & Hu, D. (2009). Impact of contract farming on income: Linking small farmers, packers, and supermarkets in China. *World Development*, 37(11), 1781-1790.

Moustier, P., Tam, P. T. G., Anh, D. T., Binh, V. T., & Loc, N. T. T. (2010). The role of farmer organizations in supplying supermarkets with quality food in Vietnam. *Food Policy*, 35, 69-78.

Mwambi, M., Oduol, J., Mshenga, P., & Saidi, M. (2013). *Does contract farming improve smallholder farmers income? The case of avocado farming in Kenya*. Paper presented at the 4th International Conference of the African Association of Agricultural Economics, Hammamet, Tunisia, September 22-25, 2013.

Narrod, C., Roy, D., Okello, J., Avendano, B., Rich, K., &Thorat, A. (2009). Public-private partnerships and collective action in high value fruit and vegetable supply chains. *Food Policy*, 34(1), 8-15.

Neven, D., Odera, M. M., Reardon, T., & Wang, H. (2009). Kenyan supermarkets, emerging middle-class horticultural farmers, and employment impact on rural poor. *World Development*, 37(11), 1802-1811.

Neven, D., & Reardon, T. (2006). Farmer response to the rise of supermarkets in Kenya's fresh fruit and vegetables supply system. *Journal of Food Distribution Research*, 37(1), 120-124.

Ouma, E., Jagwe, J., Obare, G. A., & Abele, S. (2010). Determinants of smallholder farmers' participation in banana market in Central Africa: The role of transaction costs. *Agricultural Economics*, 41, 111-122.

Panda, R. K., & Sreekumar. (2012). Marketing channel choice and marketing efficiency assessment in agribusiness. *Journal of International Food and Agribusiness Marketing*, 24:3, 213-230.

Patrick, I. (2004). Contract farming in Indonesia: Smallholders and agribusiness working together. *Australian Centre for International Agricultural Research.* ACIAR Technical Report No. 54.

Peterson, H. C., Wysocki, A., & Harsh, S. B. (2001). Strategic choice along the vertical coordination continuum. *International Food and Agribusiness Management Review*, 4(2), 149-166.

Qaim, M., and Rao, E. J. O. (2012). The supermarket revolution and smallholder farmers. *Rural 21*, 04/2012.

Rao, E. J. O., Brummer, B., & Qaim, M. (2012). Farmer participation in supermarket channels, production technology, and efficiency: The case of vegetables in Kenya. *American Journal of Agricultural Economics*, 94(4), 891-912.

Rao, E. J. O., & Qaim, M. (2011). Supermarkets, farm household income, and poverty: Insights from Kenya. *World Development*, 39(5), 784-796.

Reardon, T., Barrett, C. B., Berdegue, J. A., Swinnen, J. F. M. (2009). Agrifood industry transformation and small farmers in developing countries. *World Development*, 37(11), 1717-1727.

Reardon, T., Berdegue, J. A., Timmer, C. P., Cabot, T., Mainville, D., Flores, L. F., …, Belsevich, F. (2005). Links among supermarkets, wholesalers, and small farmers in developing countries: Conceptualization and emerging evidence. In *the future of small farms: Proceeding of a research workshop*, Wyu, UK, June 26-29, 2005. Washington, DC.

Reardon, T., Timmer, C. P., & Minten, B. (2012). Supermarket revolution in Asia and emerging development strategies to include small farmers. *PNAS*, 109(31), 12332-12337.

Ruane, J. M. (2005). Essentials of research methods. Victoria, Australia: Blackwell Publishing.

Sartorius, K., & Kirsten, J. (2007). A framework to facilitate institutional arrangements for smallholder supply in developing countries: An agribusiness perspective. *Food Policy*, 32, 640-655.

Schipmann, C., & Qaim, M. (2010). Spillovers from modern supply chains to traditional markets: Product innovation and adoption by smallholders. *Agricultural Economics*, 41, 361-371.

Schipmann, C., & Qaim, M. (2011). Supply chain differentiation, contract agriculture, and farmers' marketing preferences: The case of sweet pepper in Thailand. *Food Policy*, 36, 667-677.

Shankar, B., Posri, W., & Srivong, T. (2010). A case study of a contract farming chain involving supermarkets and smallholders in Thailand. *Canadian Journal of Development Studies*, 31(1-2), 137-153.

Shiimi, T., Taljaard, T. P. R., & Jordaan, H. (2012). Transaction cost and cattle farmers' choice of marketing channel in North Central Namibia. *Agrekon*, 51 (1), 42-58.

Simmons, P., Winters, P., & Patrick, I. (2005). An analysis of contract farming in East Java, Bali, and Lombok, Indonesia. *Agricultural Economics*, 33, 513-525.

Statistics Indonesia. (2014a). *Jumlah rumah tangga usaha pertanian pengguna lahan dan rumah tangga petani gurem menurut wilayah tahun 2003 dan 2013*. Retrieved from http://st2013.bps.go.id/dev/st2013/index.php/site/tabel?search-tabel=Jumlah+Rumah+Tangga+Usaha+Pertanian+Pengguna+Lahan+dan+Rumah Tangga+Petani+Gurem+menurut+Wilayah+Tahun+2003+dan+2013&tid=22&search-wilayah=Indonesia&wid =0000000000&lang=id

Statistics Indonesia. (2014b). *Statistik Indonesia 2013*. Retrieved from http://www.bps.go.id/hasil_publikasi/SI_2013/index3.php?pub=StatistikIndonesia 2013

Statistics Indonesia. (2014c). *Distribusi persentase produk domestic bruto atas dasar harga berlaku menurut lapangan usaha 2004-2013*. Retrieved from http://www.bps.go.id/tab_sub/view.php?kat=2&tabel=1&daftar=1&id_subyek=11 &notab=5

Statistics Indonesia. (2014d). *Data inflasi dan indeks harga konsumen*. Retrieved from http://www.bps.go.id/aboutus.php?inflasi=1

Statistics Indonesia. (2014e). *Jumlah penduduk miskin dan garis kemiskinan, 1970 - 2013*. Retrieved from http://www.bps.go.id/tab_sub/view.php?kat=1&tabel=1&daftar=1&id_subyek=23&notab=7

Suryadarma, D., Poesoro, A., Akhmadi, Budiyati, S., Rosfadhila, M., & Suryahadi, A. (2010). Traditional food traders in developing countries and competition from supermarkets: Evidence from Indonesia. *Food Policy*, 35, 79-86.

Swinnen, J. (2007). The dynamics of vertical coordination in agri-food supply chains in transition countries. In Swinnen, J. (ed.), *Global Supply Chains, Standards and the Poor: How the Globalization of Food Systems and Standards Affects Rural Development and Poverty*. (pp. 42-58). CAB International.

Van der Heijden, T., & Vink, N. (2013) Good for whom? Supermarkets and small farmers in South Africa – a critical review of current approaches to increasing access to modern markets. *Agrikon*, 52(1), 66-86.

Wang, H. H., Zhang, Y., & Wu, L. (2011). Is contract farming a risk management instrument for Chinese farmers?: Evidence from a survey of vegetable farmers in Shandong. *China Agriculture Economic Review*, 3(4), 489-505.

Williamson, O. (1981). The economics of organization: The transaction cost approach. *American Journal of Sociology*, 87(3),548-577.

White, B. (2007). Vegetable value chains in Eastern Indonesia: A focus on chili. *Australian Centre for International Agricultural Research.* SADI-ACIAR Research Report.

Wooldridge, J. M. (2013). *Introductory Econometrics: A Modern Approach* (5th ed.). Ohio, USA: South-Western.

World Bank. (2014). *World development indicators*. Retrieved form http://data.worldbank. org/country/indonesia

Appendices

Appendix 1. Research questionnaire

QUESTIONNAIRE

Location District : _____ Village : _____	Questionnaire No. : _____	Date of fulfilment : _____

Section A. Farmer demographics			
1. Name: _____	2. Age: _____	3. Gender: ☐ Male ☐ Female	4. Education : ___ (years)
5. Number of household members:	6. Farming as the main occupation: ☐ Yes ☐ No 7. If no, what is the main occupation? _____		8. How long have you been working as a vegetable farmer? _____

Section B. Farm characteristics

9. Agriculture land area owned in the last one year:

Type of crops	Land area (ha)	Production (kg)
Vegetable:		
Cabbage		
Tomato		
Chili		
Amaranth		
Water spinach		
Pak choy		
Yard bean		
_____		
Other crops:		
Rice		
Cocoa		
Cassava		
Taro		
Sweet potato		
_____		

10. Did you apply any irrigation systems in your vegetable farm in the last season?
☐ Yes
☐ No (go to question 12)

11. What type of irrigation did you apply?
☐ Rain-fed
☐ Manual
☐ Water spray
☐ Sprinkle
☐ Others: _____

12. Do you have any livestock?
☐ Yes
☐ No (go to question 14)

13. What kind and number of livestock do you own?

Type of livestock	Number (head)

14. Production input used for the main vegetable production in the last season?

Type of vegetables	Non-hybrid seed (Y=yes, N=no)	Hybrid seed (Y=yes, N=no)	Organic fertilizer (Y=yes, N=no)	Chemical fertilizer (Y=yes, N=no)	Pesticide (Y=yes, N=no)	Herbicide (Y=yes, N=no)
Cabbage						
Tomato						
Chili						
Amaranth						
Water spinach						
Pak choy						
Yard bean						
_____						

15. If you have purchased such inputs as listed in question 14, please indicate the average cost for buying inputs in the last season? _____(IDR)

16. If you have purchased such inputs as listed in question 14, please indicate the main source of them?

17. Did you hire labor for vegetable production in the last season?
☐ Yes
☐ No (if no, go to question 21)

18. What activities did you hire labor for?

Type of vegetable	Land preparation (Y=yes, N=no)	Planting (Y=yes, N=no)	Fertilization (Y=yes, N=no)	Weeding (Y=yes, N=no)	Spraying (Y=yes, N=no)
Cabbage					
Tomato					
Chili					
Amaranth					
Water spinach					
Pak choy					
Yard bean					
_____					

19. If you have hired labor, how many labor did you use in your vegetable farm? ____(person)

20. If you have hired labor, please indicate the average cost for it in the last season? _____(IDR)

21. Did you apply any mechanization technique in your vegetable farm in the last season?
☐ Yes
☐ No (go to question 23)

22. What type of equipment or machineries do you use?

Equipment/machineries	Years of use	Purchase price (IDR)
Tractor		
Sprayer		
Shovels		
Others: _____		

Section C. Vegetable marketing

23. Who is your main buyer for vegetables produced? (*please tick to indicate the buyer*)

	Cabbage	*Tomato*	*Chili*	*Amaranth*	*Water spinach*	*Pokcay*	*Yard bean*
Local consumer							
Local collector							
Farmer group							
Cooperative							
Wholesaler							
Supermarket							
Processor							
_____							

24. Prices and vegetables sold

Type of vegetable	Price (IDR/kg)	Vegetables sold (kg/year)
Cabbage		
Tomato		
Chili		
Amaranth		
Water spinach		
Pak choy		
Yard bean		
_____		

25. How do you usually communicate with your buyers?
- ☐ Mobile phone
- ☐ Landline phone
- ☐ Buyer comes to the farm
- ☐ Farmer goes to the buyers
- ☐ Through cooperative
- ☐ Through farmer group
- ☐ Through intermediary person
- ☐ Others: …….

26. When are you paid for vegetable sold?
- ☐ Before harvest
- ☐ At delivery
- ☐ 1-7 days later
- ☐ > one week later

27. Describe your bargaining position:
- ☐ Accept price offered
- ☐ Sometimes bargain
- ☐ Set price and do not bargain

28. Where does the sale take place?
- ☐ On farm
- ☐ Roadside
- ☐ Collection place
- ☐ Cooperative
- ☐ Village market
- ☐ District market
- ☐ Wholesaler market
- ☐ Others: ……

29. If sale is not on farm, how do you transport it there?
- ☐ On food
- ☐ Bicycle
- ☐ Motorbike
- ☐ Rented motorbike
- ☐ Car
- ☐ Bus
- ☐ Truck

30. Did you hire transport for selling vegetable products in the last season?
- ☐ Yes
- ☐ No (if no, go to question 32)

31. Please indicate the average cost of transporting vegetable products to market in the last season? _____(IDR)

32. Please indicate the characteristic of transport cost you have paid:
- ☐ Vegetable only
- ☐ Bulk/mixed with other crops

33. What is the distance in kilometres from your house to the nearest marketplace?
_____(km)

34. What is the distance in kilometres from your house to the supermarket?
_____(km)

35. Are your vegetable products certified in the last one year?
- ☐ Yes
- ☐ No (if no, go to question 37)

36. Please indicate the grade has been given:
- ☐ Super
- ☐ Medium
- ☐ Others: _____

37. What do you do after harvest to prepare vegetable for sale?

a. Removing foreign material	☐ Yes ☐ No
b. Removing bad vegetable	☐ Yes ☐ No
c. Sorting into different groups by size	☐ Yes ☐ No
d. Sorting into different group by colour	☐ Yes ☐ No
e. Sorting into different group by quality	☐ Yes ☐ No
f. Washing vegetable	☐ Yes ☐ No
g. Putting into bags or boxes	☐ Yes ☐ No
h. Keeping in storage facility	☐ Yes ☐ No
i. Others: ……	☐ Yes ☐ No

Section D. Institutional factors

38. How many extension program did you attend in the last one year?
- ☐ No (go to question 41)
- ☐ One
- ☐ Two
- ☐ Three
- ☐ >Three

39. Who is the extension service provider that you have attended?
- ☐ Government
- ☐ NGO
- ☐ Research centre
- ☐ Others: _____

40. In what area does the extension service that you have attended provide?
- ☐ Production
- ☐ Marketing
- ☐ Others:___

41. Did you access to financial assistance in the last one year?
- ☐ Yes
- ☐ No (go to question 45)

42. In average, what is the amount you have borrowed in the last one year? _____ (IDR)

43. Where do you access to it?
- ☐ Bank
- ☐ Cooperative
- ☐ Government
- ☐ NGO
- ☐ Farmer group
- ☐ Others: _____

44. In what area do you spend the credit that you have borrowed?
- ☐ Inputs
- ☐ Marketing
- ☐ Education
- ☐ Health
- ☐ Others: _____

45. How many times did you access to market information in the last one year?
- ☐ No (go to question 48)
- ☐ One
- ☐ Two
- ☐ Three
- ☐ >Three

46. What type of information have you accessed?
- ☐ Price
- ☐ New marketplaces
- ☐ Marketing method
- ☐ Financial assistance
- ☐ Grades/standards
- ☐ Others:_____

47. Please indicate sources of market information?
- ☐ Newspaper
- ☐ Radio
- ☐ TV
- ☐ Internet
- ☐ Extension agent
- ☐ Others: _____

48. Are you a member of a farmer organization?
- ☐ Yes
- ☐ No (go to question 50)

49. In what area does the farmer group that you have participated operate?
- ☐ Production
- ☐ Marketing
- ☐ Others: _____

50. Are you a member of a cooperative?
- ☐ Yes
- ☐ No (go to question 52)

51. In what area does the cooperative that you have been a member operate?
- ☐ Production
- ☐ Marketing
- ☐ Others: _____

Section E. Perception of high value markets

52. Do you have any experience of selling the agricultural products into the high value markers, such as supermarkets or convenient stores?
- ☐ Yes
- ☐ No (go to question 54)

53. How is your experience selling into the supermarket/convenient stores?
- ☐ Positive
- ☐ Negative
- ☐ Do not know

54. Do you think most farmers would be interested in selling into the high value markets?
- ☐ Yes
- ☐ No
- ☐ Do not know

55. Do you think that farmers can get advantages of selling into the high value markets?
- ☐ Yes
- ☐ No
- ☐ Do not know

56. What do you see as the main advantage of selling into the high value markets?

- ☐ Higher price
- ☐ Access to production input
- ☐ Technical assistance
- ☐ Access to credit
- ☐ No advantages
- ☐ Do not know
- ☐ Others: _____

57. What factor do you think prevent farmers from selling into high value markets?

- ☐ Small farms, small quantities
- ☐ Location far from buyers
- ☐ Low quality of product
- ☐ Cannot supply all year
- ☐ Not enough experience
- ☐ Necessary inputs are too expensive
- ☐ Do not have equipment needed
- ☐ Buyers do not trust small farmers
- ☐ Buyers require farmers to package vegetable
- ☐ Buyers do not pay immediately at delivery
- ☐ Buyers have tied down with traders
- ☐ Do not know

58. What do you think government could do to help more farmers sell vegetables into high value markets?

- ☐ Provide training in production methods
- ☐ Provide training in grades and standards
- ☐ Provide information on prices and markets
- ☐ Improve supply of seeds
- ☐ Improve supply of agricultural chemicals
- ☐ Invest in irrigation
- ☐ Help organize farmers into groups
- ☐ Improve roads in rural areas
- ☐ Provide credits
- ☐ Do not know
- ☐ Others:_____

"Thank you for your participation in this research"

Appendix 2. Ethics approval letter

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA

18 July 2014

Marcus Maspaitella
1/284 Botanical Road
West End
PALMERSTON NORTH 4412

Dear Marcus

Re: Linking Smallholder Vegetable Farmers to High Value Market Chains in Indonesia

Thank you for your Low Risk Notification which was received on 16 July 2014.

Your project has been recorded on the Low Risk Database which is reported in the Annual Report of the Massey University Human Ethics Committees.

You are reminded that staff researchers and supervisors are fully responsible for ensuring that the information in the low risk notification has met the requirements and guidelines for submission of a low risk notification.

The low risk notification for this project is valid for a maximum of three years.

Please notify me if situations subsequently occur which cause you to reconsider your initial ethical analysis that it is safe to proceed without approval by one of the University's Human Ethics Committees.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

A reminder to include the following statement on all public documents:

> *"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research.*
>
> *If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor John O'Neill, Director (Research Ethics), telephone 06 350 5249, e-mail humanethics@massey.ac.nz".*

Please note that if a sponsoring organisation, funding authority or a journal in which you wish to publish requires evidence of committee approval (with an approval number), you will have to provide a full application to one of the University's Human Ethics Committees. You should also note that such an approval can only be provided prior to the commencement of the research.

Yours sincerely

J. O'Neill

John G O'Neill (Professor)
Chair, Human Ethics Chairs' Committee and
Director (Research Ethics)

cc Assoc Prof Blessing Maumbe
Institute of Agriculture and Environment
PN433

Prof Nicola Shadbolt
Institute of Agriculture and Environment
PN433

Dr Elena Garnevska
Institute of Agriculture and Environment
PN433

Prof Peter Kemp, HoI
Institute of Agriculture and Environment
PN433

Appendix 3: Information sheet for data collection.

INFORMATION SHEET

Introduction

My name is Marcus Ronaldo Maspaitella. I am a student at Massey University in Palmerston North, New Zealand, and am doing Master in AgriCommerce. I am now in Manokwari region, Papua Barat province of Indonesia, to do a field work regarding data collection for the completion of my master thesis.

Research Description and Invitation

My research is titled "*Linking smallholder vegetable farmers to high value markets in Manokwari region, Papua Barat province, Indonesia*". The purposes of this research are to (1) investigate determinant factors affecting smallholder farmers' decision on marketing channels; (2) analyse farmers' perception of supermarket channels; and (3) analyse institutional factors enabling smallholder farmers to participate in supermarket channels. During my data collection process, I intend to have interviews with the vegetable farmers as the main participants in this research. In addition, I am hoping to get interviews with other stakeholders such as extension agents, farmer group leaders and members, and agriculture office representatives to obtain comprehensive information.

I am therefore inviting you to participate in this research. If you decide to participate in the interview, you will be asked to sign a consent form on which you can choose to have your name and position acknowledged in this study. The interview will take approximately one hour. With your permission, I would like to record the interview session.

Participant's Rights

If you decide to take part in this interview, you have the right to:

- Decline to answer any particular question;
- Withdraw from the study at any time during the interview session;
- Ask any question about the study at any time during the interview session;

- Ask for the recorder to be turned off at any time during the interview session; and
- Be given access to a summary of the research results when it is concluded.

Data Management

Data gathered will be analysed and utilised for my thesis completion in the degree of Master in AgriCommerce and for other academic publications. All data will be stored securely in a safe place. While required, names will be changed and pseudonyms will be used to ensure confidentiality. The thesis will be accessed through the Massey University library.

Project Contacts

For your convenience, contact details of me and my supervisors have been provided below:

Researcher	**Chief Supervisor**	**Second supervisor**
Marcus Maspaitella	Dr. Elena Garnevska	Prof. Nicola M. Shadbolt
1/284 Botanical Road	Senior lecturer, Agribusiness	Professor, Agribusiness
Palmerston North	Department, Institute of	Department, Institute of
New Zealand	Agriculture and Environment	Agriculture and Environment
	Massey University	Massey University
	Palmerston North	Palmerston North
	New Zealand	New Zealand
	(+64) 6 356 9099 ext. 84794	(+64) 6 356 9099 ext. 84793
max_maspaitella@yahoo.co.id	E.V.Garnevska@massey.ac.nz	N.M.Shadbolt@massey.ac.nz

I thank you in advance for your participation,

Marcus

Appendix 4: Consent form for data collection

PARTICIPANT CONSENT FORM - INDIVIDUAL

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree to participate in this study under the condition and participant rights set out in the the Information Sheet.

I agree/do not agree to the interview being sound recorded.

Full name : ……

Signature : ……

Date : ……....

Appendix 5: Binary logistic regression outcomes from SPSS version 22.

Logistic Regression

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	126	100.0
	Missing Cases	0	.0
	Total	126	100.0
Unselected Cases		0	.0
Total		126	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Traditional market	0
supermarket	1

Block 0: Beginning Block

Classification Table[a,b]

			Predicted		
			Market channel		
	Observed		Traditional market	supermarket	Percentage Correct
Step 0	Market channel	Traditional market	100	0	100.0
		supermarket	26	0	.0
	Overall Percentage				79.4

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-1.347	.220	37.444	1	.000	.260

Block 1: Method = Enter

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	46.079	14	.000
	Block	46.079	14	.000
	Model	46.079	14	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	82.209[a]	.306	.480

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	5.806	8	.669

Classification Table[a]

			Predicted		
			Market channel		
	Observed		Traditional market	supermarket	Percentage Correct
Step 1	Market channel	Traditional market	94	6	94.0
		supermarket	14	12	46.2
	Overall Percentage				84.1

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	AGE	.059	.032	3.422	1	.064	1.061
	EDU	.239	.116	4.258	1	.039	1.270
	EXPRNCE	.014	.035	.165	1	.684	1.014
	FMLY_SZ	-.288	.230	1.566	1	.211	.750
	VEG_AREA	2.429	1.227	3.920	1	.048	11.351
	IRR	-.152	.937	.026	1	.871	.859
	LVSTOCK	.344	.701	.240	1	.624	1.410
	DIST_SM	.036	.036	1.041	1	.308	1.037
	TRNS_COST	.000	.000	1.203	1	.273	1.000
	AV_PRICE	.000	.000	1.777	1	.183	1.000
	EXTN	-.279	.729	.147	1	.702	.756
	CREDIT	1.556	1.134	1.883	1	.170	4.741
	MKT_INFO	.097	1.131	.007	1	.931	1.102
	FARMER_GR	2.289	.748	9.358	1	.002	9.865
	Constant	-10.417	2.771	14.133	1	.000	.000

a. Variable(s) entered on step 1: AGE, EDU, EXPRNCE, FMLY_SZ, VEG_AREA, IRR, LVSTOCK, DIST_SM, TRNS_COST, AV_PRICE, EXTN, CREDIT, MKT_INFO, FARMER_GR.

Appendix 6. Correlation between independent variables

		AGE	EDU	EXPRNCE	FMLY_ SZ	VEG_ AREA	IRR	LV STOCK	DIST_ SM	TRNS_ COST	AV_ PRICE	EXTN	CREDIT	MKT_ INFO	FARMER_ GR
AGE	Pearson Correlation	1													
	Sig. (2-tailed)														
EDU	Pearson Correlation	-.398**	1												
	Sig. (2-tailed)	.000													
EXPRNCE	Pearson Correlation	.534**	-.331**	1											
	Sig. (2-tailed)	.000	.000												
FMLY_SZ	Pearson Correlation	-.066	.070	-.132	1										
	Sig. (2-tailed)	.463	.434	.140											
VEG_AREA	Pearson Correlation	.207*	-.045	.136	.107	1									
	Sig. (2-tailed)	.020	.617	.128	.233										
IRR	Pearson Correlation	-.015	.126	.035	-.028	-.157	1								
	Sig. (2-tailed)	.867	.160	.698	.758	.080									
LVSTOCK	Pearson Correlation	-.186*	.145	.021	.007	-.168	-.065	1							
	Sig. (2-tailed)	.037	.104	.812	.937	.060	.470								
DIST_SM	Pearson Correlation	-.084	-.191*	.036	.011	-.300**	-.181*	.183*	1						
	Sig. (2-tailed)	.352	.033	.693	.907	.001	.042	.041							
TRNS_COST	Pearson Correlation	.168	.016	.092	.067	.435**	.152	-.161	-.365**	1					
	Sig. (2-tailed)	.061	.863	.304	.454	.000	.089	.071	.000						
AV_PRICE	Pearson Correlation	-.017	.220*	-.105	.109	.270**	.289**	-.121	-.434**	.356**	1				
	Sig. (2-tailed)	.848	.013	.241	.225	.002	.001	.179	.000	.000					
EXTN	Pearson Correlation	.089	-.046	-.013	.060	-.054	.221*	.098	.192*	.188*	-.067	1			
	Sig. (2-tailed)	.321	.611	.884	.502	.548	.013	.274	.031	.035	.457				
CREDIT	Pearson Correlation	-.079	.034	-.144	.216*	-.129	.000	.092	.145	.199*	-.015	.250**	1		
	Sig. (2-tailed)	.377	.705	.107	.015	.151	1.000	.303	.106	.025	.867	.005			
MKT_INFO	Pearson Correlation	.004	.024	.072	.196*	.090	.254**	-.015	-.074	.035	.103	.176*	.039	1	
	Sig. (2-tailed)	.967	.787	.422	.028	.317	.004	.864	.409	.694	.251	.049	.662		
FARMER_GR	Pearson Correlation	-.107	.133	-.160	.021	-.043	.169	.084	.075	.260**	.061	.355**	.193*	.026	1
	Sig. (2-tailed)	.235	.138	.073	.813	.634	.058	.353	.406	.003	.499	.000	.030	.774	

**. Correlation is significant at the 0.01 level (2-tailed); *. Correlation is significant at the 0.05 level (2-tailed).