

Horticultural Value Chains for Improved Livelihoods

Opportunities for smallholder farmers from the Karo Highlands,
Sumatra, Indonesia



Noëlie Svara
July 2015

Horticultural Value Chains for Improved Livelihoods

Opportunities for smallholder farmers from the Karo Highlands,
Sumatra, Indonesia

Noëlie Svara
(4038975)

July 2015

This thesis (30 ECTS) was submitted in partial fulfilment of the requirements for the Master of Science degree in Sustainable Development at Utrecht University.

Thesis supervisor: Dr. Guus van Westen

2nd Reader: Dr. Robert Fletcher

Internship Supervisor: Sulaiman Ginting

Sustainable Development - International
Development

Faculty of Geosciences, Utrecht University



Universiteit Utrecht

Cover page picture by: Sutanta Aditya



Executive Summary

The Karo Highlands in North Sumatra are traditionally a very important region for horticultural production in Indonesia and many poor population groups depend on farming to earn a living. Especially the export of fresh fruits and vegetables to the neighbouring countries Singapore and Malaysia has a decades-long tradition and has played an important role in the economic development of the region. Since approximately 2005 the exports have however decreased due to allegations of excessive pesticides use by Indonesian farmers and increased competition from other producing countries with China leading the way. Smallholder farmers who are dependent on agricultural production to gain their livelihoods are thus currently facing difficulties even though the worldwide demand for horticultural products is increasing.

This thesis intends to describe how the expansion of the markets for fruits and vegetables can revive the horticultural production in the Karo Highlands if certain upgrading strategies in the production are taken into account. Since the health-consciousness of consumers in developed as well as in developing countries is changing, the turn to organic production may represent one option through which farmers could have a new opportunity to improve their livelihoods. This research applies a value chain analysis and combines it with the sustainable livelihood framework in order to assess the current structures of value chains and livelihood assets and give recommendations for improvements. Since some farmers have already partly converted to organic production under a contract farming scheme with Taman Simalem Resort, a private sector actor, the livelihood research aims at comparing these farmers with conventional farmers.

The data collection was done using qualitative and quantitative research tools, such as semi-structured interviews with key informants and a household survey. A field trip to Batam, an Indonesian island located just 20km off the Singaporean coast, furthermore offers an additional perspective on domestic value chains, price developments and potential exports to Singapore.

The research leads to the conclusion that the livelihoods of farmers can improve through certain value chain upgrading strategies. For the international market in Singapore the export of organic products with the help of an external actor may represent the best option to gain a foothold again. For the domestic market both conventional and organic value chains offer opportunities, but the chains need to be shortened, for example through the direct marketing of products through farmers' cooperatives. Smallholder farmers who are currently locked-in in traditional value chains will need the assistance of government bodies, NGOs, development organization or the private sector to upgrade in the value chains and improve their livelihoods.

Keywords: Horticultural value chains, Livelihood research, upgrading strategies, organic agriculture, Karo Highlands, Sumatra, Indonesia



Acknowledgements

This thesis is a result of many months of reading, travelling, investigating, learning, analysing and writing in the Netherlands, Indonesia and Germany. I would like to thank my supervisor Dr. Guus van Westen for his guidance before, during and after the fieldwork. In Indonesia I would especially like to thank Sulaiman from the GIZ office in Medan who was so kind to offer me the research placement. A big thank you also to Pak Benyamin and Mami Vina who hosted me during the field research in the Karo Highlands as well as to all other colleagues in Medan and Firdaus in Tiga Panah for his assistance with conducting the surveys; I am very grateful to the men and women in the Karo Highlands who generously offered their time to participate in the survey even though they were very busy working on the fields.

I would like to thank all the great people I met (again) during the time of this research in Indonesia: In Medan Rizky and Tara, Iqbal, Vai and Hendri. Marike and Alexis, thank you for the spontaneous adventures! In Nias Bang Iqbal, Samo and Din's parents; In Yogya Wahyu - thank you for all the moral support and for being the best host - and in Bali Seno, Stefanus, Venus and Joko. Furthermore, *terima kasih* to all the *Bapaks* and *Ibus*, *Kakaks* and *Adiks* met along the way. The friendliness of Indonesian people never fails to amaze me!

Finally, I would like to express my gratitude towards my parents and my brother who always support me with my studies and internships abroad. Without you this research would not have been possible. Merci pour tout.

Noëlie Svava, July 2015

Table of Contents

Abbreviations	vi
Currency Conversion.....	vii
List of Figures.....	viii
List of Tables.....	viii
List of Maps	viii
CHAPTER 1: INTRODUCTION	1
1.1 Background information.....	1
1.2 Problem Definition	2
1.3 Knowledge Gap	3
1.4 Thesis structure	4
CHAPTER 2: THEORETICAL FRAMEWORK.....	5
2.1 Theoretical Approaches to Value Chains	5
2.2 Value Chain Approach to Economic Development and Poverty Reduction	8
2.3 The Sustainable Livelihood Approach.....	10
CHAPTER 3: RESEARCH DESIGN	12
3.1 Research Objective	12
3.2 Research Questions	12
3.3 Conceptual Model	14
3.4 Significance of the Study.....	16
3.5 Case Study Area.....	16
3.6 Methodology.....	17
3.5.1 Literature Study	17
3.5.2 Household survey	18
3.5.3 Case Study Batam	20
3.5.4 Key Informants	20
3.5.5 Analysis.....	21
3.7 Limitations.....	21
CHAPTER 4: REGIONAL FRAMEWORK INDONESIA	23
4.1 Introduction	23
4.2 Indonesian Economic Development.....	24
4.3 The Role of Agriculture in the Indonesian Economy	26
4.3.1 Indonesia’s Agricultural Development.....	26
4.3.2 Agricultural Growth and Poverty Reduction	26
4.3.3 Indonesia’s Agricultural and Development Strategies.....	28
4.3.4 Development of Organic Farming in Indonesia	30
4.4 The Role of Horticulture Production	32

4.4.1	Indonesia	32
4.4.2	North Sumatra and the Karo Regency	36
CHAPTER 5:	HORTICULTURAL VALUE CHAINS	40
5.1	Domestic Value Chains	40
5.1.1	Conventional Value Chain Configuration – Medan	40
5.1.2	Organic Value Chain Configuration – Contract Farming	41
5.1.3	Case Study Batam	42
5.2	International Value Chain	47
5.2.1	Export market – Singapore	47
5.2.2	International Value Chain Configuration	49
5.3	Conclusion.....	50
5.4	Governance Types and Upgrading	52
5.4.1	Discussion of Governance Types	52
5.4.2	Upgrading Framework	56
5.5	Conclusion.....	64
CHAPTER 6:	LIVELIHOOD ANALYSIS	66
6.1	Household Characteristics	66
6.2	Analysis of the 5 Livelihood Capitals	67
6.2.1	Natural Capital.....	67
6.2.2	Physical Capital	69
6.2.3	Human Capital	71
6.2.4	Social Capital	73
6.2.5	Financial Capital.....	76
6.3	Conclusion.....	77
CHAPTER 7:	CONCLUSIONS & DISCUSSION	79
7.1	Conclusions	79
7.2	Discussion	83
7.3	Closing Remarks	85
GLOSSARY	.....	86
BIBLIOGRAPHY	.....	87
Appendix A – Household Survey	.....	97
Appendix B – Score Breakdown of Livelihood Analysis	.....	106
Appendix C – List of Key Informants	.....	109

Abbreviations

ADB	Asian Development Bank
AFTA	ASEAN Free Trade Area
ASEAN	Association of Southeast Asian Nations
ASEIBSSINDO	Asosiasi Eksportir Importir Buah dan Sayuran Segar Indonesia Fresh Fruits and Vegetables Importers and Exporters Association
AVA	Agrifood and Veterinary Authority of Singapore
AWG	Agribusiness Working Group
BAPPENAS	Badan Perencanaan Pembangunan, Nasional Ministry of National Development Planning
BULOG	Badan Urusan Logistik, Logistics Agency
CAGR	Compound Annual Growth Rate
CEPT	Common Effective Preferential Tariff
CIA	Central Intelligence Agency
CME	Coordinating Ministry of Economic Affairs
DFID	Department for International Development
DISPERINDAG	Dinas perindustrian dan perdagangan Chamber of industry and trade of North Sumatra
FAO	Food and Agricultural Organisation
FTZ	Free Trade Zone
GAP	Good Agricultural Practices
GAPOKTAN	Gabungan Kelompok Tani, Farmer Cooperative
GDP	Gross Domestic Product
GIZ	Gesellschaft für International Zusammenarbeit/ German Agency for International Cooperation
GVC	Global Value Chain
Ha	Hectare
ICASEPS	Indonesian Center for Agricultural and Socio Economic and Policy Studies
IFOAM	International Federation for Organic Agriculture Movements
IMF	International Monetary Fund
IOA	Indonesian Organic Alliance
Kg	Kilogram
Km	Kilometer
MAPORINA	Masyarakat Pertanian Organik Indonesia, Indonesian Organic Community
MDG	Millennium Development Goals
MoA	Ministry of Agriculture
NGO	Non-Governmental Organisation
NIE	New Institutional Economics
OECD	Organisation for Economic Co-operation and Development
OKPO	Organic Food Competent Authority
PGS	Participatory Guarantee Systems
Rp	Rupiah
RPJMN	Rencana Pembangunan Jangka Menengah Nasional, Medium- term development plan
RPJPN	Rencana Pembangunan Jangka Panjang Nasional, Long-term development plan

SFVA	Singapore Fruits and Vegetables Importers and Exporters Association
SIJORI-GT	Singapore-Johor-Riau Growth Triangle
SPS	Sanitary and phytosanitary
TSR	Taman Simalem Resort
UNIDO	United National Industrial Development Organization
USD	US Dollar
WB	World Bank
WTO	World Trade Organisation

Currency Conversion

As of July 16 2015:

Euro 1.00	=	14.500 IDR (Indonesian Rupiah)
USD 1.00	=	13.300 IDR
IDR 1.000.000	=	69 Euro
IDR 1.000.000	=	75 USD

List of Figures

Figure 1: Generic Value Chain	7
Figure 2: Sustainable Livelihoods Framework.....	11
Figure 3: Conceptual model	15
Figure 4: Cross-sectional view of the Karo area	17
Figure 5: Pie chart indicating the interview locations and number of interviews.....	18
Figure 6: Development of Indonesia's Real GDP, 1980 = 100, log scale	25
Figure 7: Sectoral GDP Share in Indonesia, 1971-2010 (%).....	25
Figure 8: The National Poverty Rates in Indonesia, 1976-2010 (%)	27
Figure 9: Poverty Rates in Indonesia 2009.....	28
Figure 10: Official logo for organic products in Indonesia	30
Figure 11: Organic Farming Development Stages 2001 – 2010	31
Figure 12: Price fluctuation of selected horticultural crops	35
Figure 13: Value Chain Configuration of Horticultural Products from North Sumatra.....	51
Figure 14: Income of organic farmers 2013-2015	58
Figure 15: Compound Annual Growth Rate (CAGR) based on 2015 estimates.....	58
Figure 16: A new typology of upgrading strategies	65
Figure 17: Differentiation of organic and conventional households by age and gender.....	66
Figure 18: Radar Diagram showing the results of the Livelihood Scoring System	78
Figure 19: SWOT Analysis.....	83

List of Tables

Table 1 Accredited Organic Certification Bodies in Indonesia	32
Table 2: Harvested Area and Production of Horticulture, 1998 – 2005	32
Table 3: Vegetable yield in Indonesia 2004 and 2010-2014 (ton)	33
Table 4: Vegetable production in North Sumatra (ton), 2009-2013.....	37
Table 5: Results of Livelihood Scoring System.....	77

List of Maps

Map 1: Map of North Sumatra with indication of the Karo Regency and the export markets Kuala Lumpur & Malaysia	17
Map 2: Map of the Karo Regency with indication of survey areas.....	19
Map 3: Map of Batam indicating the research areas.....	20
Map 4: Map of the Indonesian Archipelago	23
Map 5: Map of the Indonesian Provinces	36

List of pictures

Picture 1: Picture showing the eruption of Sangeang Api, Sumbawa	23
Picture 2: Tomato plantation covered in ash. Picture by Dedy Sinuhaji.....	38
Picture 3: Cabbage sorting facility in Tiga Panah/ Carrots are being weighed and packed in plastic bags.....	61

CHAPTER 1: INTRODUCTION

“The government is determined to improve the welfare of the people, particularly farmers, who work in the plantation and agricultural sectors”

(President Joko Widodo, 2015)¹

1.1 Background information

According to the Asian Development Bank (2006) the majority of the Indonesian poor population groups live in rural areas and depend on agriculture to gain a livelihood. The persistent poverty problems in developing countries thus cannot be solved without increasing the efficiency and competitiveness of the agricultural sector. Furthermore, the social and economic development of rural areas is dependent on the economic potential available. According to the Food and Agricultural Organization (FAO) the production and marketing of agricultural products is an important factor to ensure food security and to achieve the first of the Millennium Development Goals (MDG) defined by the UN, namely to eradicate extreme poverty and hunger (Crawford, 1997). Horticultural crops contribute both to food security and through marketing activities to income generation for farmers (Batt & Cadilhon, 2007). Since the competitive ability can be measured in market success, the value chain approach represents a central part of rural development policy (Springer-Heinze, 2013).

Globalization and growing international markets for agricultural products offer new opportunities for the participation of agricultural producers from developing countries and entering these global markets can be an important driving force of economic and social development (Rock, 2002). Furthermore, since middle and high income population groups are growing at a fast pace in developing countries, national markets also represent a growing outlet for high value horticultural crops. In the last decades global value chains have been marked by trade liberalization, which intensified the participation opportunities for small farmers, but at the same time created entry barriers due to increasingly complex structures of international markets (Van Der Meer, 2006).

Globalization also spurs the importance of intergovernmental trade agreements as it is the also the case in the present study. Within Southeast Asia, the countries are grouped together to form the Association of Southeast Asian Nations (ASEAN) that encourages and regulates the trade of products within and outside the region (Batt & Cadilhon, 2007). “Globalization has changed the rules of the game significantly” (Stanton & Burkink, 2008), which implicates that farmers have to increase their knowledge on production, distribution, as well as quality and safety standards for complex international and domestic market structures (Dolan and Humphrey, 2004). In developed countries but also in emerging Asian economies, the change in domestic markets is fuelled by the rapid evolution of supermarket chains (the “supermarket revolution”, Schwentesius & Gómez, 2002) and the growing incomes of the consumer classes. When incomes rise, the concern of consumers for their health, the environment, sustainable and fair production, as well as animal welfare grows likewise and influences the decision to buy and consume higher quality food (Batt & Cadilhon, 2007). In Indonesia the consumption of fresh fruits and vegetables reached 120% compared to consumption levels in 1999 (Sudaryanto, 2015), but the per capita consumption of the Indonesian population is still under the recommendations issued by the Food and Agriculture Organization (FAO). With a

¹ Citation taken from Antara News (Abdussalam, 2015)

growing middle class that will comprise 30 million Indonesians by 2015 the domestic demand for horticultural products will continue to grow (World Bank, 2007).

The shift to higher quality products is also an important factor in convention theory that has its origins in neo-institutional economics. With regard to the agro-food sector, convention research analyses the decline of the Fordist system that was marked by mass production and consumption compared to the post-Fordist regime, which is dominated by “an obsession with quality”. According to this approach prices alone cannot evaluate quality and thus “quality conventions”, such as trust, third party evaluations or collective commitment, are necessary (Raikes et al. 2000). One example of how quality attributes can be asserted is certification of organic or Fairtrade products.

This change in consumption patterns increases the worldwide demand for organic foods significantly and the world market for organic products is growing by approximately 19% per year, being worth US\$ 23-25 billion in 2003 (Yussefi & Willer, 2003). Even though organic products represent only a small share of the global food market, the sales of organic products have increased considerably so that the market for organics now represents the food industry’s fastest growing sector (FAO/ITC, 2001). In Indonesia the trend towards healthier and more sustainable lifestyles and the turn to purchasing more fruits and vegetables in general and organic products in particular can also be observed but it is less pronounced. Organic production activities were started in Indonesia in the 1980s and the sector is growing at approximately 10% per year (Arifin et al., 2009), with a faster increase since 2010 (Inawati, 2010). Especially in some big cities in Indonesia the demand for organic products, especially rice and vegetables, increases steadily (Syaukat, 2008). According to Voon et al. (2011) the Southeast Asian region (i.e. Singapore, Malaysia, Thailand, Indonesia, etc.) represents one of the most promising outlets for organic produce, but there still is a lack of knowledge about consumption trends.

1.2 Problem Definition

According to data from the Indonesian Central Bureau of Statistics there is a great need to support farmers throughout the country in order to improve the agricultural sector and contribute to poverty reduction. This need is driven by the fact that the number of agricultural workers has decreased from 31 million to 26.5 million in the decade between 2003 and 2013. This means that each year approximately 500 farming families changed their livelihood due to a narrow outlook in the agricultural sector (Abdussalam, 2015). Thus, measures have to be undertaken to revive the primary sector of the economy and encourage farmers to continue their production. As described in the previous section the horticultural sector offers great opportunities due to an increased worldwide demand for fresh fruits and vegetables, both conventional and organic.

For farmers in developing countries the participation in the global organic horticultural trade, compared to the trade of conventional products, can be seen as a so-called upgrading strategy that aims at improving the competitiveness and strategic position in value chains (Kaplinsky & Morris, 2001; Gibbon 2003). Such upgrading strategies are often also supported by actors outside of the value chain, for example government agencies, development or private sector organizations and NGOs (Trienekens, 2011; Lie et al. 2012). This is also done in the research area in the Karo Highlands in North Sumatra, where the German Agency for International Cooperation (GIZ) is advising and training local farmers in organic agriculture as part of the Sustainable Agrifood Systems project (former ASEAN Biocontrol). This focus on upgrading is related to the fact that producers and other chain actors can obtain higher prices in differentiated markets, which offer price premiums for higher

quality products (Bacon, 2005; Kiemen & Beuchelt, 2012). In this way smallholder farmers from developing countries may capture larger shares of added value and improve their livelihoods (Trienekens, 2011). Farmers' participation in high value-adding value chains can however be constrained by stringent quality and safety standards, since the knowledge of certain requirements and the adequate production techniques may not be available (Dolan & Humphrey, 2000; Grunert, 2006). For producers, the compliance with standards may involve high certification costs and buyers have to bear the monitoring costs (Trienekens, 2011). As stated by Jahn et al. (2004) certification that complies with these standards is however conditional in order for farmers to gain access to modern markets. Additionally, the lack of institutional or infrastructural support that enables market access and an efficient participation in value chains may pose a further constraint (De Janvry & Sadoulet, 2005; Daviron & Gibbon, 2002). The opportunities and constraints to market participation have to be weighed against each other in order to assess which market, domestic or international, conventional or organic, is more suitable for smallholder farmers. Kaplinsky (2000) describes that in order to participate in global value chains, products with high added value are required, which is in favor of organic or processed products for export markets. Stanton & Burkink (2008), Shepherd (2007), Batt & Cadilhon (2007) and Lie et al. (2012) share the belief that the requirements of the global market may be too complex for smallholders. Domestic value chains that target the growing local demand may therefore be more suitable for small-scale farmers of horticultural products.

1.3 Knowledge Gap

The agricultural sector in Southeast Asia represents one of the most important drivers of economic growth and in the case of North Sumatra, the "fruit and vegetables from this regency [N.B. the Karo Regency] have become a key export commodity for North Sumatra, especially to Singapore and Malaysia" (SMERU, 2001, quoted after Situmorang, 2011). The export of horticultural products to these two neighbouring countries has however decreased since around 2005 due to allegations of excessive pesticide residues on products originating from Karo. Furthermore, compared to other producing countries within Asia, such as China, Thailand, Malaysia and the Philippines, the province of North Sumatra has increasing difficulties in competing with fruits and vegetable producers from these countries. Especially China is flooding the Asian market with low priced vegetables and Malaysia, Thailand and the Philippines are for example important producers of tropical fruits. In consideration of these issues different options have to be analyzed: trying to revive the horticultural production for the export market or focusing on the expansion of the domestic market of fresh fruits and vegetables; conventional and organic production are the two possibilities that will be examined.

Throughout the ASEAN region there have been changes on the demand side and consumers increasingly ask for horticultural products of higher quality, such as organic fruits and vegetables (Surasakjinda, 2014). There already exists abundant literature about organic trade between the South and the North, for example between South America and the U.S. or between African countries and Europe (Yussefi & Willer, 2003; Raynolds, 2004; Bacon, 2005; Fromm, 2007; Kiemen & Beuchelt, 2012), but there is a lack of research on organic value chains within Southeast Asia, especially on the export of organic horticultural products from Indonesia to other Southeast Asian countries, like Singapore or Malaysia. Additionally, even though it is stated, that the demand for organic products is steadily increasing in some big cities in Indonesia (Syaukat, 2008), little research is available on local value chains of organic products in the national market. Furthermore, there exists a lot of research on smallholder farmers' participation in global value chains for a range of developing countries, but research on Indonesia (except for coffee) is still very scarce. It is therefore of great interest to

investigate, which opportunities the participation in both global and local value chains for horticultural products has for smallholder farmers from the Karo Highlands in Sumatra.

1.4 Thesis structure

Chapter 2 will offer the theoretical background on value chains and their importance for economic development and poverty reduction as well as on the sustainable livelihood framework. Chapter 3 presents the full research design and elaborates in detail on the research questions and the methodology. Chapter 4 deals with the regional framework and provides information about the Indonesian context, especially the economic and agricultural sectors, as well as about the case study area. Chapter 5 is the first of two chapters in which the data analysis is laid out and the research questions answered. Chapter 5 deals with the value chain analysis while chapter 6 focusses on the livelihood research. Finally, chapter 7 presents the conclusions drawn from the analyses and combines the insights in order to answer the main research question.

CHAPTER 2: THEORETICAL FRAMEWORK

2.1 Theoretical Approaches to Value Chains

Research on value chains emerged in the 1960s (Fromm, 2007) and there exist complementary traditions that focus each on different aspects of producer-consumer relationships (Raynolds, 2004). As pointed out by Lazzarini et al. (2001) there has been extensive theory building with regard to value chains in the past decades, which has resulted in a range of definitions and analytical approaches.

One simple definition by Kaplinsky and Morris (2001) states that value chains describe “the full range of activities that are required to bring a product from its conception to its end use and beyond”. Steps included are for example conceptualizing, production, marketing, distribution to the end consumer and after-sales support (Fromm, 2007). Value chain theory encompasses a variety of perspectives and often analyses different actor relationships in one or different geographical areas. In the following, scientific theories that contribute to the development of the value chain theory will be described in brief.

Social Network theory deals with economic and social interactions in production networks, which consist of several horizontal and vertical relationships between the different actors in the value chain. Companies are thus embedded in a complex network of relationships with other firms and organizations that supply inputs and services, i.e. advice, credit, transport. According to this theory relationships are not only built by taking economic factors into account but social factors such as trust, power and reputation also play an important role in shaping the structure and length of relationships between companies (Uzzi, 1997). Within the Social Network theory the social capital approach has therefore gained importance since the 1990s. Companies with wide network relations can improve their social capital and have easier access to economic support, information or technical expertise and in this way reduce transaction costs (Humphrey & Schmitz, 2002).

Supply chain management focuses on controlling flows of production and services between companies. This literature stream emerged in the 1980s within the field of logistics and originally dealt with planning and optimizing inventories in the supply chain. In this approach the customer demand plays the principal role in shaping the chain so that supply and demand is balanced out (Cooper et al., 1997). Trienekens (2011) adds that well-functioning communication and information systems are prerequisites for the efficient management of supply chains.

New Institutional Economics (NIE) theory is yet another stream of literature that focusses on the organization and governance structures of inter-company (bilateral) transactions (Trienekens, 2011). Transaction cost economics and agency theory form part of this school of thought. In their relationships with other actors, companies will seek to minimize transaction costs under the premise that rationality is limited and that other actors may behave in an opportunistic way. Contracts, monitoring systems and joint investments are therefore arrangements between value chain actors to minimize risks. Agency theory includes two actors, namely the principal and the agent. The principal delegates a task to the agent, which involves the risk of the task not properly being carried out. Government solutions should therefore reduce and balance the risk of opportunistic behavior between principal and agent.

The analysis of *Global Value Chains* investigates the governance structure and power relationships between producers that are often located in the global South and end markets in the North. This approach has its origin in the *filière* and commodity chain concepts.

The *filière concept* was introduced in the 1960s to investigate the value added processes for agricultural products in the U.S. and the processes of vertical market integration in the French agriculture system (Raikes et al., 2000). The *filière* approach was mainly adopted for the study of the agricultural sector of French colonies, especially the production of rubber, cocoa, cotton, coffee. The framework analyzed how producers in developing countries are linked to processors, traders, exporters and end consumers. Empirical *filière* research predominantly focused on the supply of commodities and economic flows in physical and quantitative terms. Later the focus of the analysis was put on political economy and the study of national political regulations and public institutions (Lauret, 1983 quoted from Reynolds, 2004).

In the mid-1990s Gereffi (1994) developed one of the most consistent and best-known approaches, namely the *Global Commodity Chain framework* that in turn originated from world systems theory. It analyzes the linkages of products and services in a succession of value adding activities as well as the organizational and spatial set-up of firms that form production and marketing networks. Furthermore, the governance structure that determines the resource allocation within the commodity chain is also taken into account. Especially with regard to agro-food systems (Dolan & Humphrey, 2000; Talbot, 2002) and manufacturing networks (Gereffi & Kaplinsky, 2001) the Global Commodity Chain approach has been widely applied to analyze the global economic structure, the spatial setting and the power relationships of commodity chains. In recent years scholars concerned with Global Commodity Chains have abandoned the term 'commodity chain' and replaced it by 'value chain' in order to broaden the scope and include products which do not have 'commodity' characteristics (Fromm, 2007).

In the *Global Value Chain (GVC) framework* power relations and information asymmetries are of major importance (Trienekens, 2011). The emphasis of investigation is therefore on governance structures, inter-firm relationships and upgrading opportunities, which especially holds true for developing country value chains (Kaplinsky & Morris, 2001). The term governance was already used in the 1980s by Williamson (1985, quoted from Fromm, 2007) to describe the institutional arrangements that set the boundaries of a transaction. In Gereffi's work (1994) the term governance basically defines the vertical coordination of activities. The chain is dominated by a lead-firm, which has the role of coordinating the interactions of actors within the chain. Kaplinsky & Morris (2001) however point out that coordination does not imperatively require that only one dominant firm governs the whole chain. Governance functions can be carried out at each link within the chain.

According to Gereffi (1994) who analyzed the manufacturing sector, there exist two ideal types of governance: "producer driven" chains in which the distribution of capital and knowledge gives producers the power to govern the chain and "buyer driven" chains, where big brands exert control over the industry and set the requirements for design and market access. Recent studies applied these governance structures to the agro-food sector and suggest that buyers increasingly have the power to govern market entry, production and standards in global value chains (Dolan & Humphrey, 2000; Ponte, 2002; Talbot, 2002). Commodity chains are typically "buyer driven", with large supermarket retailers, processors, powerful global branders or international traders governing the chain (Dolan & Humphrey, 2000; Ponte, 2002). Agricultural value chains therefore tend to exclude

producers from coordination functions (Dolan & Humphrey, 2000). Examples of this power asymmetry can be found in various agricultural value chains, such as coffee, cocoa, horticulture or fresh cut flowers (Fromm, 2007).

In order to increase their competitiveness against other actors within the chain, actors can engage in different upgrading strategies. Gereffi (1999) defines upgrading as *“a process of improving the ability of a firm or an economy to move to more profitable and/or technologically sophisticated capital and skill-intensive economic niches”*. For McDermott (2005) upgrading is *“the shift from lower- to higher-value economic activities by using local innovative capacities to make continuous improvements in processes, products and functions”*. Kaplinsky & Morris (2001) describe four upgrading strategies which aim at increasing the competitive advantage against other players. These are similar to those proposed by McDermott: process, product, functional and chain upgrading.

- Process upgrading refers to an increased efficiency in the production process. In the case of agricultural value chains these are improved yields or better processing of the products.
- Product upgrading relates to the definition of a new product by, for example, investing in unique quality features.
- Functional upgrading requires the chain actor to change the range of activities or to move the focus of activities to another node in the chain, for example through outsourcing or taking up new activities. For agricultural value chains this can mean to include the processing step into the activities carried out.
- Finally, chain upgrading is the move to a new chain in the light of higher profitability. Farmers can for instance diversify their production and start growing cash crops to gain higher incomes.

Difficulties with this classification are that the distinction between product and process upgrading is not always clear-cut: With regard to agricultural products the turn to organic processes generates a new product of higher quality. According to Gibbon (2003) organic or Fairtrade products can however be included in the category of product upgrading. Figure 1 shows a generic value chain.

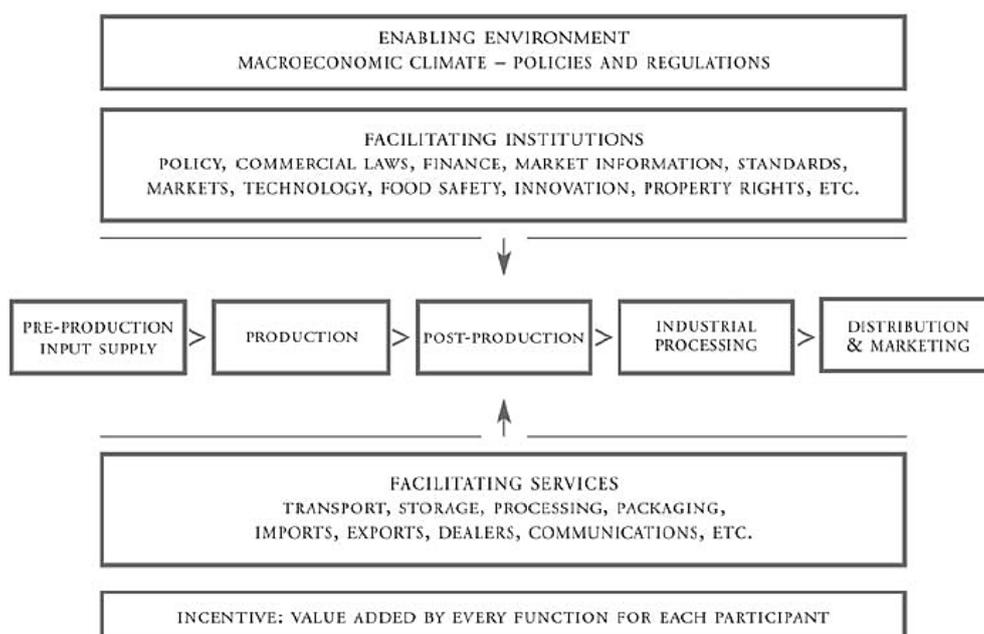


Figure 1: Generic Value Chain (UNIDO, 2009)

2.2 Value Chain Approach to Economic Development and Poverty Reduction

Urbanization, population growth and a growing global middle class are driving the global demand for agricultural products thus creating an important opportunity for developing countries to use their comparative advantage in productive land and cheap labour to enter and upgrade in global agricultural value chains (Bamber et al., 2014). For example in 2008 the international trade of fresh fruits and vegetables alone amounted to \$US 139.6 billion (UNComtrade, 2011).

This large global demand motivates developing countries to enhance their production of high-value agricultural products and increase exports in view of reduced poverty levels through increased participation, higher incomes and rural job creation (Weinberger & Lumpkin, 2007). However, during the past three decades high-value agricultural markets have changed significantly in terms of complexity and levels of regulation so that it becomes increasingly difficult for small-scale producers to participate in these advanced value chains. High-value agricultural or agro-food products are non-bulk agricultural commodities that, like fruits and vegetables, require special post-harvest handling or are processed before reaching the market, such as specialty coffee or honey. The special handling and processing makes these products more labour intensive compared to cereal or other food crops because mechanization is complicated and costly and the high-value products are easily damaged (Joshi et al., 2004). For these products quality aspects are the most important factors in determining the price and the market on which they can be sold. In the optimal case high-value agricultural products achieve higher prices and can thus contribute to the income generation for producers in a significant way (Weinberger & Lumpkin, 2007).

The value chain approach is a useful framework to understand the changing production configurations, analyze geographically scattered activities and players and assess the power relationships between actors in both developed and developing countries (Fernandez-Stark et al., 2012).

Traditionally producers of all size participated in the agro-food sector and traded their goods on spot markets, where the supply and demand determined the prices of the products. It remained the decision of the farmers which crops to grow, which production techniques to use and which quality levels to achieve. Nowadays, this simple system has increasingly been exchanged by a highly sophisticated agro-food system. This means that the described traditional markets have been replaced in both developed and developing countries and have become buyer-driven markets, where the actors are integrated and coordinated in a vertical chain configuration. Especially the emergence of large supermarket chains operating in domestic, regional and global markets has led to a rapid change in value chain configurations. Additionally, consumers have an increased awareness of food safety and hygiene standards so that the agricultural food products that are shipped around the globe underlie strict sanitary and phytosanitary (SPS) applications (Reardon et al., 2009). To meet the discerning consumer demand and reduce transaction costs buyers have progressively consolidated their supply chains and cut down the amount of suppliers. For the preferred suppliers this means that they have to be able to consistently supply high-quality product in accordance to a preset schedule and at the cheapest costs possible. The competition is therefore high and suppliers have to demonstrate that they are able to meet the requirements in order to keep their position in the chain (Bamber et al., 2014). It is thus not anymore the local producer who takes the decision of how to

produce the crops but the national and international lead firms who regulate how a product is cultivated, harvested, transported, processed and packaged.

With regard to south-south trade and regional markets the described barriers to participation are less pronounced. First, many regional trade blocks offer tariff-free movement of products on the regional market, even though developing countries usually have higher tariff barriers for agricultural commodities compared to other products (Escaith & Inomata, 2011). Second, the standards on regional markets tend to be less strict and therefore have lower entry barriers for developing countries (Diaz Rios & Jaffee, 2008). And thirdly regional chains are usually less compressed and allow the participation of a greater number of suppliers. The “supermarket revolution” (Humphrey, 2007) is however also starting to change the value chain configurations in developing countries

Despite strong demand the above mentioned factors pose barriers to developing country actors, especially small scale producers, to participate in these complex value chains. Recently, the term *inclusive value chain* emerged to emphasize the intention of including smallholders, micro-entrepreneurs and other low income households into value chains. *Inclusive market systems* are supposed to include low income households in large numbers (Dunn, 2012). A way for small producers in developing countries to enter value chains or improve their position within the chains is to engage in upgrading activities. The four upgrading trajectories, as mentioned in Chapter 2.1, are process upgrading, product upgrading, functional upgrading and chain upgrading. Entering the value chain for example means that a farmer switches from subsistence agriculture to the production of fruits and vegetables for the national or international markets. Process upgrading could be the installation of greenhouses or irrigation systems or applying new planting and harvesting techniques. Product upgrading describes the production of higher value products, for example organic horticultural products. Functional upgrading means that one or several processing steps are added after the cultivation and harvesting of the crop (Fernandes-Stark et al., 2011).

The most difficult entry barrier to overcome is said to be the observance of strict public and private quality and safety standards, since subordinated companies are standard takers and have to bare high costs of compliance (Bamber et al., 2014). Product upgrading furthermore may require costly certification for organic products. In developing countries constraints that challenge the producers’ competitiveness exist furthermore on the country level. An inadequate infrastructure (water, electricity, transportation) and the absence of value chain actors who are able to supply inputs, such as seeds, fertilizer, pesticides, and other supporting services, hinder producers to successfully participate in value chains (Markelova et al., 2009). Other factors, which affect chain participation, comprise macro-economic stability, the business environment, import and export restrictions trade policy and vulnerability to climate, disease and natural disasters (Diaz Rios & Jaffee, 2008, Fernandez-Stark et al., 2012).

Despite limitations to participations, studies demonstrate that smallholder farmers do in fact continue to be an important part of modern, high-value agricultural chains in terms of political changes, labour absorption and the structure of land ownership. Country studies on value chains for specific products revealed that in some cases it is more efficient to procure products from small or medium sized producers, for example in the Sri Lankan tea sector or the vegetable production in Madagascar (Reardon et al., 2009). However, the increased complexity of value chains has created numerous conditions that have to be met by small and often vulnerable farmers to participate in chains and stabilize their positions. In general the support of an external actor is required to assist

the farmers in overcoming obstacles and a number of projects have been carried out in developing countries over the past decade to boost rural development. Two factors have to be considered in particular: first, the labour-capital intensity ratio, which shows if farmers have a comparative advantage in producing certain crops compared to larger producers due to labour intensity; and second the commercial viability, which indicates if a certain crop selected for production has an important and already existing market. Previous research indicates that smallholder farmers should try to enter existing chains, since they lack the necessary resources to develop markets for new crops. Organic fruits and vegetables for example fall into both categories because the production is labour intensive and the market for organic horticultural products is growing across the developed world and the emerging economies (Fernandez-Stark et al., 2012).

2.3 The Sustainable Livelihood Approach

For this study the sustainable livelihoods framework will be used to assess the effects of organic farming and the choice of marketing channel (domestic or international) on the livelihoods of farmers.

The sustainable livelihood approach is a concept that first appeared in research literature in the 1980s (Solesbury, 2003) and was a central aspect of the well-known Brundtland report of the World Commission on Environment and Development of 1987 (Chambers & Conway, 1991). The framework (Figure 2) was developed due to the limitations of concepts like wealth or income to assess the wellbeing of individuals and the impact of development interventions. According to the Department for International Development (DFID) a sustainable livelihood is described as comprising

“the capabilities, assets (including both material and social resources) for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base” (DFID, 1999).

The framework puts individuals or households in the centre of the investigation and involves them with the assessment of causes and the finding of solutions to poverty. Furthermore, it takes into account the whole livelihood system rather than investigating a single component (DFID, 1999). As mentioned in the above definition, individuals or households must possess the five types of capitals that belong to the livelihood assets to escape from poverty (Figure 2). Definitions of the capitals are as follows:

- (1) **Natural capital** includes natural resource stocks, such as land, trees, water, biodiversity, that are valuable for livelihoods.
- (2) **Social capital** is developed through networks or groups and encompasses factors like trust, exchange, or reciprocity. People can benefit from these social resources to pursue their livelihood strategies.
- (3) **Human capital** comprises the skills, knowledge, or health that people require for their livelihoods.
- (4) **Physical capital** includes the entire infrastructure (transport, shelter water supply, sanitation, energy) and the tools and equipment needed to pursue livelihoods.
- (5) **Financial capital** encompasses all the financial resources (income, savings) that people need in order to reach their livelihood objectives.

The order in which the assets are presented here does not suggest any priority. In fact, a change in one asset affects other assets in a complex way and thus impacts the livelihoods and the strategies pursued (DFID, 1999).

Sustainable livelihoods framework

Key
 H = Human Capital S = Social Capital
 N = Natural Capital P = Physical Capital
 F = Financial Capital

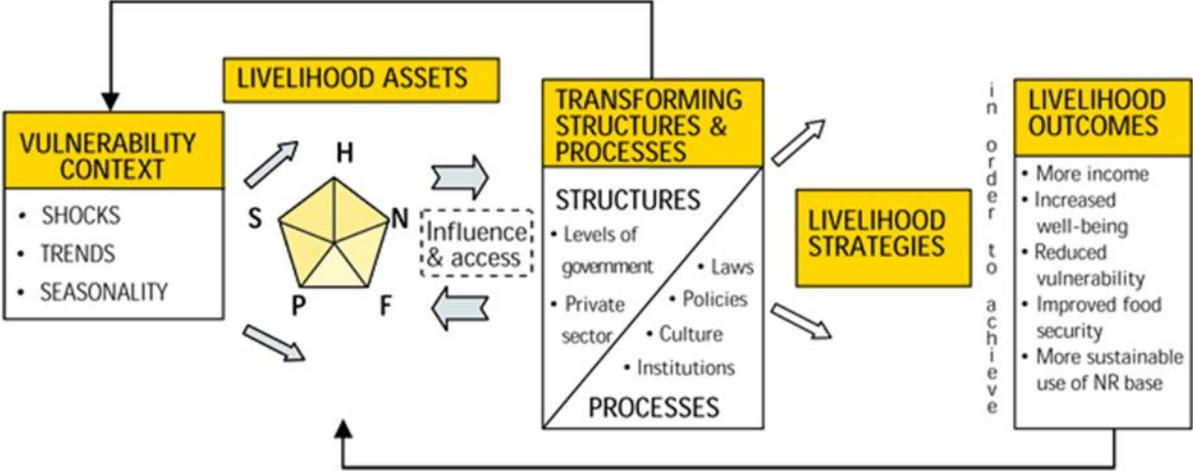


Figure 2: Sustainable Livelihoods Framework (Source: DFID)

CHAPTER 3: RESEARCH DESIGN

3.1 Research Objective

This research sheds light on the opportunity for smallholder farmers from North Sumatra, Indonesia, to participate in domestic or international value chains for conventional and organic horticultural products. Since researchers are divided over the question whether local or global value chains are more suitable for improving the livelihoods and reducing poverty levels of smallholder farmers, this research investigates both marketing channels and presents a clear understanding of the market conditions by using a value chain approach. Furthermore, some farmers in the research area started to switch to organic agriculture in 2013 under a contract farming scheme with Taman Simalem Resort an eco-tourism/agritourism Hotel close to Lake Toba. The German Agency for International Cooperation/“Gesellschaft für International Zusammenarbeit” (GIZ) acts as external advisor in this project. This advisory service is in turn offered in the context of the “Sustainable Agrifood Systems” project initiated by ASEAN and its member states in cooperation with the GIZ. It is therefore a further objective of this study to investigate the impacts that the turn to organic agriculture had on smallholder farmers of horticultural products and compare the livelihoods of these farmers with those of conventional farmers.

3.2 Research Questions

Considering the research background, the knowledge gap and the objective of this research, the main research question was defined as follows:

In what way does the growing market for horticultural products in Southeast Asia offer opportunities for smallholder farmers from the Karo Highlands in North-Sumatra, Indonesia?

The central question of the research has been divided into three sub-questions, which together are expected to answer the main question.

- (1) How are both the domestic and international (i.e. Singaporean) value chains for horticultural products, conventional and organic, from the Karo Highlands organized? More precisely, what are the structures and the governance forms of the value chains?

Answering this question intends to position all stakeholders within the value chains, offers further insights into understanding power relations between chain actors and describes who is making the highest profits from participating in the chain. After knowing the structures of the chains and having worked out bottleneck problems for a successful participation of smallholder farmers, a further question to be asked is which opportunities for improvement exist. The second sub-question is therefore:

- (2) Which upgrading strategies exist and are most promising for smallholder farmers?

This sub-question analyzes improvement possibilities for horizontal and vertical coordination of value chains, as well as the four upgrading strategies defined by Kaplinsky & Morris (2001), which are process, product, functional and chain upgrading. The third sub-questions moves away from the value chain analysis and investigates the livelihoods of smallholder farmers from the Karo Highlands in more detail:

- (3) How do the livelihoods of organic and conventional farmers differ, also with regard to the value chains they participate in to market their products?

The analysis of the five livelihood capitals (natural, social, human, physical, financial) sheds light on the current situation of the farmers and compares different farming populations in order to give final recommendations for the choice of the most beneficial horticultural value chain.

Explanation of main concepts:

Value chain structure refers to the vertical and horizontal linkages of the value chain. The vertical dimension shows the product flow from the primary producer to the end consumer in one of the market outlets (local, regional, global) and the horizontal dimension demonstrates the relationships between the actors belonging to the same part of the chain, for example between farmers, between traders, etc. (Trienekens, 2011).

The governance form describes the organizational structure between horizontal and vertical value chain actors and is closely related to power relationships and leadership of chain actors. Non-market elements, like standards or regulations are very important (Van den Berg, 2004) and play a decisive role in the possibility to enter a certain type of market (local or international) (Gereffi et al., 2005).

Value addition explains how value, in terms of quality, low costs and delivery time etc. is added throughout the chain. Organic production and/or certification represent possibilities to add value to products (Humphrey & Schmitz, 2002).

Upgrading “refers to the acquisition of technological capabilities and market linkages that enable firms to improve their competitiveness and move into higher-value activities” (Kaplinksy & Morris 2001).

Sustainable Livelihood: Following Chamber & Conway (1992) “a livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term.”

3.3 Conceptual Model

Figure 3 on the following page shows the conceptual model that illustrates the main concepts and the relationships that are analyzed throughout this thesis. The previous chapters already indicated that smallholder farmers of horticultural products are the main actors that are studied. Their livelihoods are therefore central to the analysis. Each farmer has the ability to choose between different so-called livelihood strategies that is to say the activities he undertakes to gain a living. Since this research investigates the opportunities for smallholder farmers to participate in different markets, the farmers' livelihood strategies under scrutiny here are the selection of and participation in value chains.

Smallholder farmers from the Karo Highlands can produce in a conventional or organic way and can choose between the domestic or international market to sell their horticultural products. This is of course a very simplified statement since many factors play important roles in shaping livelihood strategies. For each selection they make, they will engage with different value chain actors in further downstream parts of the chain.

This value chain participation in turn has certain livelihood outcomes and the farmers will either be content with the income achieved or they will reconsider the choice of livelihood strategy and try to achieve improvements by choosing another way of selling the products.

The description of value chains and the position of farmers within these chains will be discussed in chapter 5.

Shocks and stresses have direct impacts on the livelihoods of farmers and influence which livelihood strategies are chosen. As stated in the problem description one of the stresses affecting the livelihood of farmers can for example be the narrow outlook in the agricultural sector due to reduced incomes, which pushes farmers to withdraw from horticultural production (Abdussalam, 2015). Another threat later described in section 4.4.2 is the vulnerability of farmers to natural hazards.

The institutional environment is the framework in which all activities take place. The shape of this environment therefore influences all aspects represented in the conceptual model. Shocks like natural disasters of course cannot be influenced by the institutional environment, but the government can for example design certain measures to cope with these shocks. The institutional framework can furthermore have effects on the selection and the structure of value chains as will be described in the value chain upgrading framework in section 5.4.2. Value chains are embedded in systems and are influenced by government policies, the work of NGOs or development organizations, social structures and nowadays increasingly by the international environment as well.

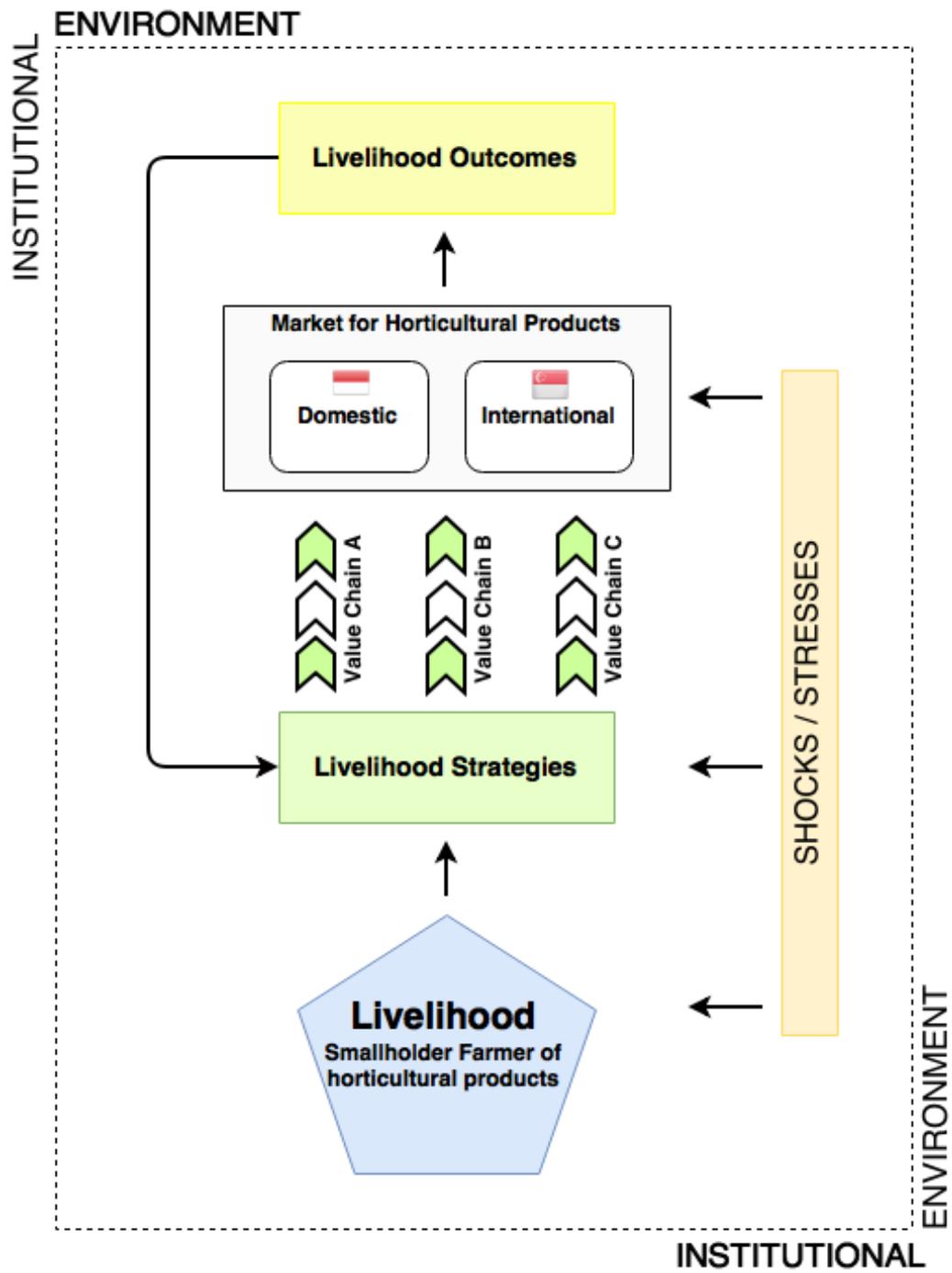


Figure 3: Conceptual model

3.4 Significance of the Study

This study creates knowledge on value chains for horticultural products from Indonesia and the outlet opportunities on the domestic and international markets. The research assesses in which market smallholder farmers have the greatest benefits and face the least barriers to participation. This is an important point due to the fact that many smallholder farmers in North Sumatra still live in poverty and predominantly rely on agriculture to gain a living. They can possibly achieve higher incomes by implementing upgrading strategies that aim at increasing the value of the products and choosing the best marketing channel or value chain configuration. The outcomes of this research will furthermore be of great use for the ASEAN Sustainable Agrifood Systems project and the work of the GIZ regional office in Medan that aims at implementing projects and offering advisory services to improve the livelihoods of smallholder farmers.

In the scientific field, results of this research will add to the debate on whether local or global value chains benefit smallholder farmers the most. The livelihood research will moreover expand the knowledge on the livelihoods of farmers who engage in conventional or organic agriculture and who produce crops independently or in vertical or horizontal coordination structures.

3.5 Case Study Area

This research took place in North Sumatra, more precisely in the capital Medan and the Karo Regency (Kabupaten Karo) that comprises the Karo Highlands and the Karo Lowlands. The Highland is a plateau located on the Bukit Barisan mountains north-west of Lake Toba (Map 1). It comprises a vast area of 2.127,25 km², approximately 3% of the North Sumatran province. The administrative centre of the regency is Kabanjahe. The population of Karo amounted to 350.479 people in 2011. The climate in the Highlands is moderate because most of the plateau is situated higher than 700m above sea level (Figure 4), but due to the tropical location there only exist two seasons, a dry and a rainy one. The average temperature is about 19°C and the mean humidity is 86%, which makes the Karo Regency very suitable for agriculture, especially horticulture production. It is thus not surprising that the local economy is mainly supported by agricultural production: most of the population in the Highlands (75%) earns a living through farming and practices small-scale agriculture, mostly fresh fruits and vegetables, but also flowers and a variety of cash crops. The farmers produce for their own consumption but also for the national and the nearby international markets, for example Kuala Lumpur and Singapore (Map 1) (Situmorang, 2011). It is however reported that the production area in the highlands cannot be expanded anymore and that the carrying capacity has been reached. The focus therefore has to lie on productivity gains (USAID, 2007). Medan, the capital of North Sumatra that lies at a distance of approximately 70km from Kabanjahe, is supplied daily with horticultural products from the Karo Highlands.



Map 1: Map of North Sumatra with indication of the Karo Regency and the export markets Kuala Lumpur & Malaysia. (Source: Google Maps)

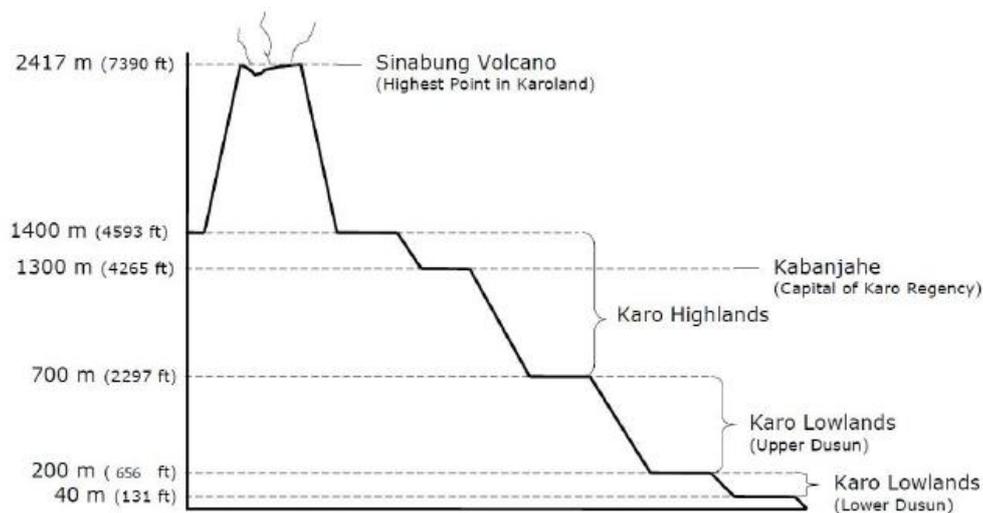


Figure 4: Cross-sectional view of the Karo area (Kushnick, 2006, taken from Situmorang, 2011)

3.6 Methodology

3.5.1 Literature Study

Before leaving for the research location in Indonesia, an extensive literature study of academic and project reports was undertaken to gain a profound understanding of value chain and livelihood research and the use of value chain upgrading strategies for poverty reduction and economic development. Results of this literature review can be found in Chapter 2 that comprises background information on value chain and livelihood research. Furthermore, the preliminary desk research included an examination of the national and regional context, especially with regard to the agricultural sector and horticultural production. The description of the regional framework in Chapter 4 includes information gathered during this desk study. Additional secondary literatures as well as statistical databases were later consulted in the GIZ office in Medan.

3.5.2 Household survey

The household survey was conducted in the form of a structured questionnaire that also included open questions. Therefore both quantitative and qualitative data could be gathered. The interviews, which were held in Indonesian (*Bahasa Indonesia*) lasted for approximately 45-60 minutes and were conducted by the author without the help of an interpreter or research assistant. An accompanying person was however always present to facilitate the interviews. Prior to arriving to the field it was planned to only focus on organic farming, since previous GIZ project reports indicated that around 500 farmers in the Karo Highlands had already been trained in better agronomic practices to learn about organic farming and that around 15 farming households already obtained Organic Indonesia certification. By request of the GIZ office in Medan this plan was however changed and it was decided to focus more on conventional horticultural production and thus have a sample of both organic and conventional farmers. For the organic sample it was agreed to interview farmers that are working for Taman Simalem Resort (TSR) under a contract farming scheme and who already have organic certification. These farmers live all in Pangambatan village. It is important to note that these farmers do not solely produce organically for TSR but also conventionally. The conventional products are marketed individually. With the help of TSR employees a list of 11 (of 15 possible) farmers was compiled to be interviewed for this study since a few farmers were not active anymore. Due to logistical and time constraints some other contract farmers in distant areas could also not be included. All the interviewed farmers live in Pangambatan village close to Merek in the surroundings of the resort (Map 2).

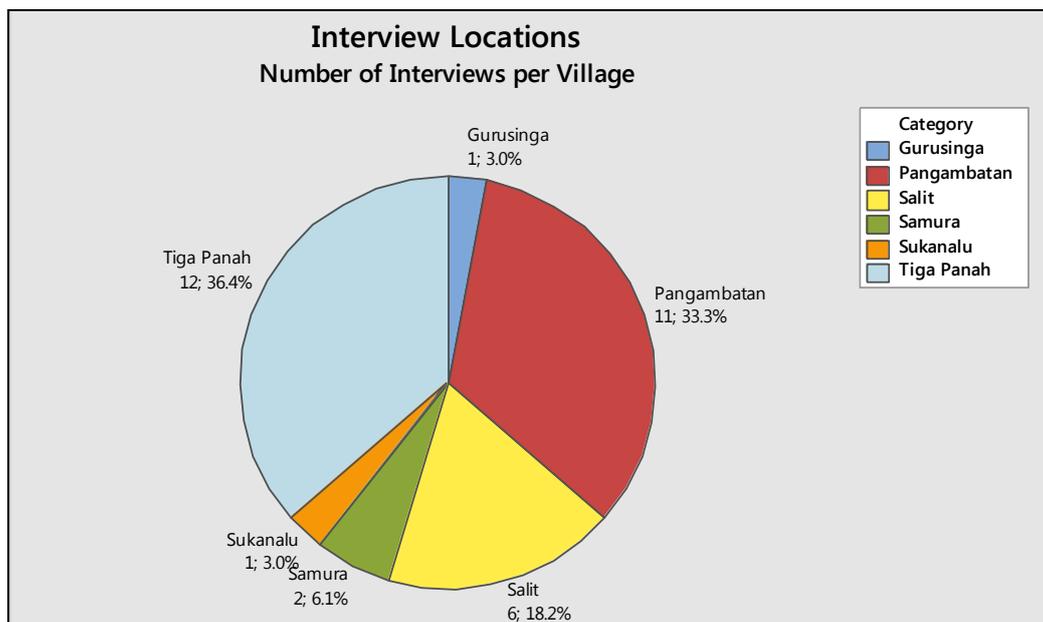
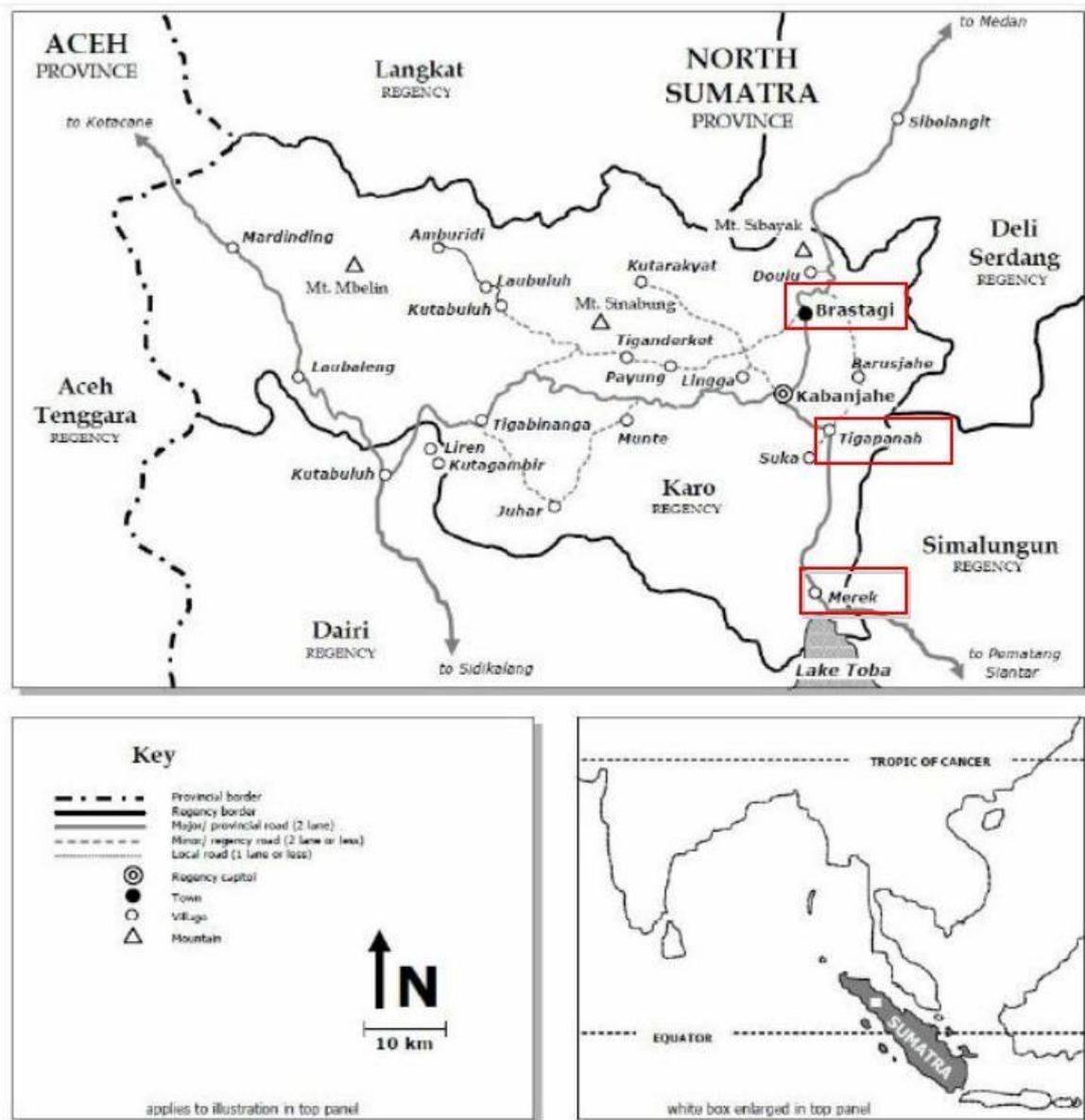


Figure 5: Pie chart indicating the interview locations and number of interviews

For the second group, horticultural farmers who produce individually and in a conventional way, there was no sampling frame from which the farmers could be selected. Since there is a well-known horticultural wholesale market in Tiga Panah where farmers sell their products for the further distribution, Tiga Panah and surrounding villages (mostly Salit, but also Samura and Sukanalu) were chosen to conduct the survey. A visit to Berastagi and its famous fruit and vegetable market furthermore offered the opportunity to interview one more farmer in Gurusinga village, Berastagi (Figure 5). Besides making a selection and choosing only horticultural farmers for the household survey, the 22 interviewees were selected randomly, which was important to achieve statistically

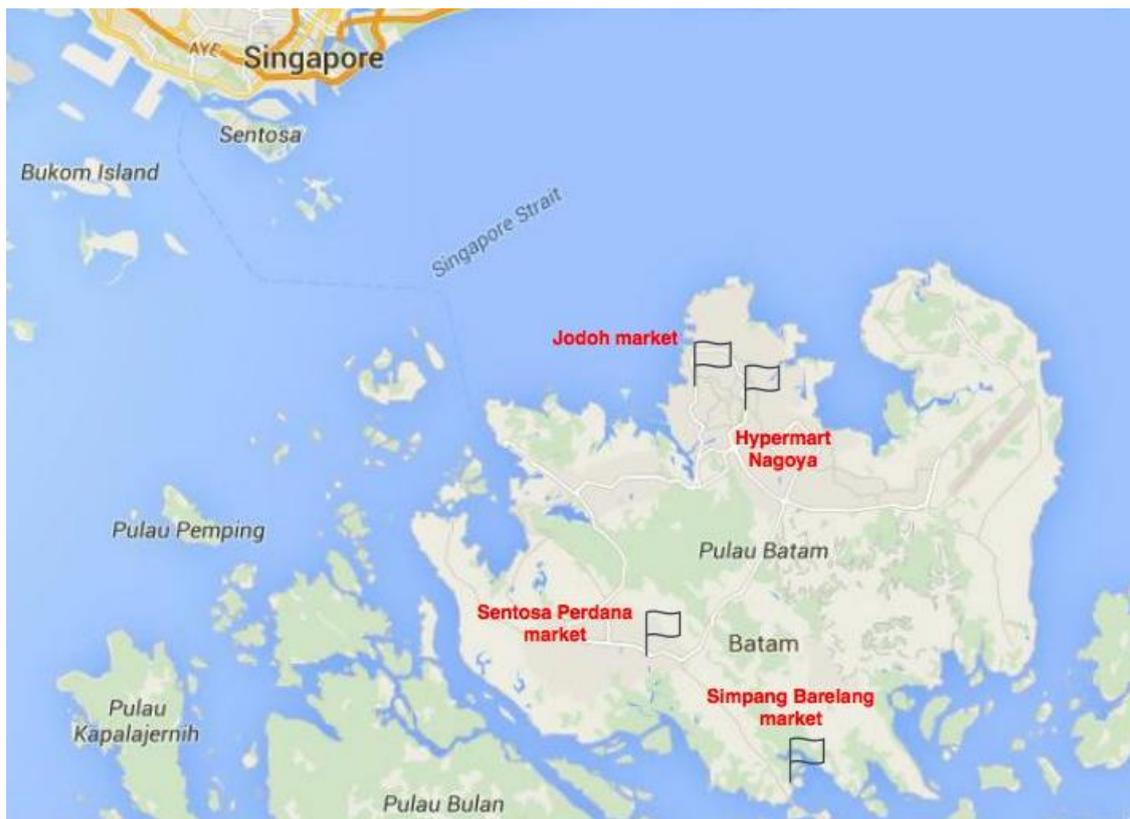
significant results. The primary objective of reaching a non-organic sampling size of at least 40 households unfortunately had to be abandoned due to the limited time and temporal unavailability of support from the GIZ colleague on site. The detailed characteristics of the surveyed households can be found in chapter 6. The anonymity of interviewees is guaranteed by the authors and no private information is revealed throughout this thesis.



Map 2: Map of the Karo Regency with indication of survey areas (Source: Kushnick, 2006, taken from Situmorang, 2011)

3.5.3 Case Study Batam

In addition to the research in Medan and the Karo Highlands, a three-day field trip to Batam Island was undertaken to gain an understanding of inter-provincial value chains for horticultural products. The visit took place to investigate the hypothesis about “indirect exports” of products from North Sumatra via Batam to Singapore. Batam is one of the Riau islands and lies only 20km off the coast of Singapore. Furthermore the value addition of horticultural products from Karo that are sold in Batam was analyzed. Therefore several wholesale and wet markets around Batam, as well as one supermarket were visited and market sellers interviewed. The markets were: Jodoh market, Sentosa Perdana market, Simpang Bareleng market and the Hypermart at Nagoya Hill Matahari Mall (Map 3). The outcomes of this case study are presented in section 5.1.3.



Map 3: Map of Batam indicating the research areas (Source: Google Maps)

3.5.4 Key Informants

Valuable information regarding the local context, value chain configurations, bottlenecks in the production of horticultural crops, the institutional environment and policies was gained from semi-structured interviews with key informants. Most interviews lasted between 30 minutes and 1.5h. The information received was especially important for triangulation of data gained from the surveys or secondary data. The list of key informants interviewed included several value chain actors present at the local wholesale markets (for example the “tukang kilo” who weighs the farmers’ products, or buyers and middle men), as well as staff members of the GIZ Medan and Taman Simalem Resort, The owner of Sunrose Agri, an organic certifier for LeSOS, the head of the export department of the chamber of industry and trade for North Sumatra; Furthermore several wholesalers and traders in Batam. A list of interviewees, their affiliation, topics discussed and the date of interviews can be found in appendix C.

3.5.5 Analysis

For the livelihood analysis a qualitative scoring system was created to attribute a certain value to a household's asset base. This was done in order to compare the livelihoods of conventional and organic contract farmers by means of assessing the five livelihood capitals. This scoring system was inspired by the livelihood research of Bishop-Sambrook (2005) who analysed the contribution of farm power to smallholder livelihoods in sub-Saharan Africa for the FAO.

For each of the five capitals (human, natural, physical, financial and social) a maximum of 5 points was allocated per indicator. The attribution of points was done as follows:

Indicator with 2 categories (Yes or No)	Yes = 3 points; No = 0 points
Indicator with 2 answer categories	High = 5 points Low = 3 points
Indicator with 3 answer categories	High = 5 points Medium = 3 points Low = 1 point
Indicator with 4 answer categories	Lowest 1point → Highest 4 points

Since the amount of indicators per livelihood capital was not equal and also differed with regard to the amount of points that could be achieved, it had to be made sure that each asset base was weighed equally. Therefore all the ratings were finally adjusted to a scale of 10. For a detailed description of indicators and scores please refer to appendix B. The analysis and comparison of the five livelihood capitals of the two farmer groups is presented in detail in chapter 6.

3.7 Limitations

While conducting this research project several limitations were encountered that have to be taken into account to understand why the research design had to be adjusted and why the focus of the research changed slightly.

While doing the preliminary research and writing the research proposal it was assumed that the research would solely focus on organic agriculture and the domestic and international markets for organic horticultural products. GIZ reports indicated that 500 farmers had been trained in better agronomic practices and that 20 households already received certification. It was thus assumed that there would be a large group of farmers from which a sample could be selected for the research. Once in Medan the focus of the research was however changed upon request so that the priority was put on conventional horticultural farmers.

The households that already obtained organic certification were chosen as comparison group. Unfortunately some households that started to produce organically under the contract farming scheme of TSR were not active anymore and others lived in more remote areas so that the sample size was reduced to only 11 households. What was furthermore not clear from the beginning was that all organic farmers still produced horticultural crops using conventional farming methods, so that the difference between the two groups compared was not as clear cut as expected. As a result the comparison of livelihoods only offers limited insights into the impacts of doing organic farming in a system of vertical coordination.

A further limitation concerns the limited availability of support with regard to the actual data collection in the field. Even though the Karo Highlands can be easily reached by public transport it was not possible to access the farmers' fields independently without an accompanying person. Since the support of a GIZ colleague could not be given at all times due to personal reasons the amount of time spent in the Highlands was thus shorter than previously planned. The total sample of farmers interviewed is therefore much smaller than projected.

The language barrier was furthermore higher than expected because the farmers in the Karo Highlands often preferred communicating in their local dialect and did not always clearly understand the questions posed in Bahasa Indonesia. This necessitated the presence of a local assistant who could translate or reformulate the questions into Karonese language.

Moreover, the difficulty of getting in contact with value chain actors in Medan led to the fact that the supermarket value chain had to be left out for this analysis. The same applies to contacting exporting firms, so that the description of the export value chains partially resorts to previous reports of GIZ advisors.

CHAPTER 4: REGIONAL FRAMEWORK INDONESIA

Chapter 2 presented the theoretic and thematic framework intended to give a deeper understanding of the topics and theories relevant for this research. It is however essential to also take the national and local context of the specific research area into account. This chapter will start with a short introduction about the Indonesian nation as a whole and will then focus on the Indonesian economy, especially the role of the agricultural sector for economic development. In the nation's history, horticultural production has been of great significance for food security, poverty reduction and trade with neighbouring countries. In the last part the attention will be drawn on the horticultural sector of North Sumatra where this research took place.



Map 4: Map of the Indonesian Archipelago (Source: CIA, 2014)

4.1 Introduction

The Republic of Indonesia is an archipelago in Southeast Asia consisting of 17.508 islands of which only 6.000 are inhabited. The archipelago straddles the equator between the Indian Ocean and the Pacific Ocean and extends more than 5.000km East to West and more than 2.000km North to South. Due to the fact, that Indonesia is the largest archipelago on earth, the “archipelagic concept” (*wawasan nusantara*) was developed. This concept implies that the nation known as Indonesia comprises not only islands of land, but also the sea area between these islands. While other nations may refer to themselves as “mother-”, or “fatherland”, Indonesians give the term “*tanah-air*” (land and water) to their country (Dean, 2003).

The five main islands are Sumatra, Java, Borneo, Sulawesi and West-Papua. The climate is mostly tropical, hot and humid with the exception of a more moderate climate in the highlands of bigger islands. Indonesia lies in a geographic zone prone to natural hazards such as volcanic eruptions, tsunamis, earth quakes, floods, severe droughts and forest fires. Indonesia is the country in the world that contains the most volcanoes with some 76 still being active today (Picture 1).

Picture 1: Picture showing the eruption of Sangeang Api, Sumbawa (Source: author, 2014)



Indonesia consists of a very diverse population in terms of culture, ethnicity and languages spoken. The official language which is taught in schools is Bahasa Indonesia but more than 700 regional languages are still in use throughout the archipelago. The estimated number of inhabitants amounts to 255,720,195 as of June 2015 (Worldometers, 2015) making Indonesia the fourth most populated country in the world (UN, 2015). 87% of the population follows Islam, and as a result Indonesia is the country with the largest Muslim population in the world. The Indonesian government guarantees the freedom of religion but only recognizes six official religions: Islam (87%), Protestantism (7%), Catholicism (3%), Hinduism (2%), Buddhism (0,7%) and Confucianism (0,05%). Most of the population (42%) is of child-bearing age which leads to a population pyramid that is very wide from the bottom until the middle and tapering towards the top. The average age of the population is 29 years (compared to 42 years in the Netherlands) with a life expectancy of 71 years (CIA, 2014).

Due to the importance of agricultural production land represents a crucial asset for the Indonesian economy. Around 70% of the land in Java is intensively used which is a much higher rate than the 20% for the island of Sumatra which is ranked second. Approximately 12% of the whole agricultural land is irrigated and around 23% of the 49% actual forest land is classified as protected nature reserves (USAID, 2010). The huge forest area which covers much of the outer islands makes Indonesia the nation with the largest forest area in Asia. The relationships, which local populations have with their land, reflect the various ethnic and cultural differences. The existence of varying degrees of customary land tenure systems, known in Indonesian as *Adat*, shows the deep rootedness of the people with their land. However, customary systems are not uniform across Indonesia and represent again the extreme diversity of cultures and customs. One common theme in the definition of customary land tenure is that land has a spiritual meaning and that it is social and community-owned instead of being seen as an economic good (Heryani & Grant, 2004).

4.2 Indonesian Economic Development

The Indonesian economy has expanded significantly over the past decades, especially since 2010, although the Asian financial crisis of 1997-98 induced an economic recession (Figure 6). Indonesia ranks 16th in terms of GDP with a growth rate of around 5% in 2013. The GDP per capita however remains considerably low with \$US 1.800. Through this strong growth Indonesia is becoming an increasingly important economic player, currently being the fourth largest economy in Asia after Japan, China and South Korea. In the 1950s and 1960s the government's focus lay on the agricultural sector in order to achieve agricultural self-sufficiency. The structure of the economy has since changed considerably towards industrialization and urbanization in the 1960s and a move away from oil exports towards manufactured exports in the 1980s due to falling oil prices. The ratio of exports to GDP rose from 30% in 1970 to 60% in the first decade of the 21st century. In the 1980s trade barriers were furthermore decreased so that Indonesia became more integrated into the global economy (Elias & Noone, 2011). Even though the Indonesian economy follows free market principles the state plays an important role through state-owned enterprises, subsidized fuel and electricity as well as fixed prices for rice and other commodities (Situmorang, 2011).

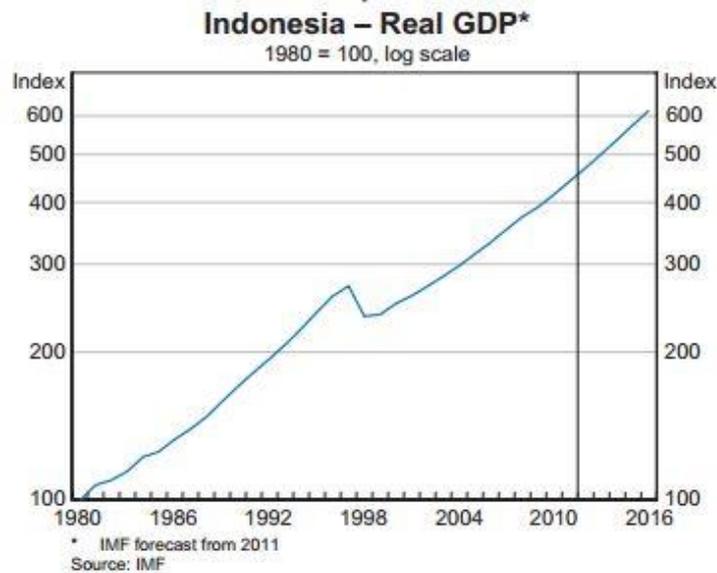


Figure 6: Development of Indonesia's Real GDP, 1980 = 100, log scale (Elias & Noone, 2011)

At the present day agriculture still represents an important sector of the Indonesian economy (Section 4.3). In 2010 this sector accounted for 16% of the economic output (Figure 7), while industry and services reached 35% and 49% respectively (Elias & Noone, 2011). Agricultural products include for example rubber and rubber products, palm oil, poultry, beef, forest products, shrimp, cocoa and coffee. Other industries which contribute significantly to Indonesia's economy are petroleum and natural gas, mining, electrical appliances, textiles, cement, chemical fertilizers, processed food and tourism (CIA, 2014).

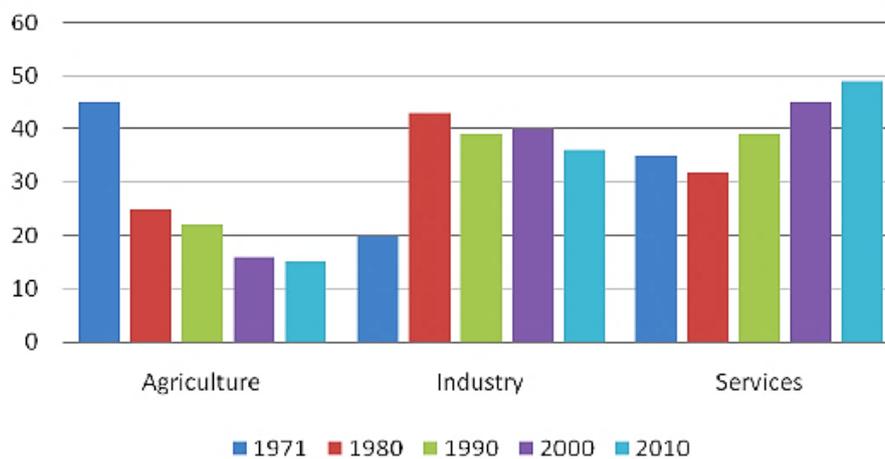


Figure 7: Sectoral GDP Share in Indonesia, 1971-2010 (%) (Suryahadi & Hadiwidjaja, 2011)

Poverty and unemployment rates are still very high (12% still live under the poverty line, section 4.3.2) and the nation struggles with an inadequate infrastructure, widespread corruption, a complex regulatory environment and an unequal distribution of resources among the various regions. Most of the 120 million labour force works in agriculture (39%), industry (13%) and services (48%), (CIA, 2014).

4.3 The Role of Agriculture in the Indonesian Economy

4.3.1 Indonesia's Agricultural Development

Indonesia, as most other countries in the Southeast Asian region, began as a primarily agrarian economy with an agricultural sector contributing the most to GDP, exports and employment. Under the former colonial regime the agricultural production was focused on tropical export crops (rubber, sugarcane, tea), which brought about significant investments in research and infrastructure development in this sector. In comparison the food crop sector remained underdeveloped. After Indonesia gained independence in 1945 Indonesia continued to be dependent on export crops, while the food crop sector was stagnant and marked by low productivity. For the new government under Sukarno the main challenge was to gain food self-sufficiency, especially rice, so that the increase in domestic food production became one of the countries priorities. This focus on the agricultural sector led to a neglect of the non-agricultural sectors since labour and capital were absorbed by primary production. The emphasis on the agricultural sector shifted during the following presidency. During the New Order Regime under Suharto that came into power in the late 1960 and ruled for three decades (until 1998), industrialization, also with regard to technological improvements in agriculture, was at the core of the Indonesian economic development. Until the mid-1980s the government focussed on import substitution industrialization and then turned to an export oriented development strategy (Suryahadi & Hadiwidjaja, 2011).

Throughout the 1970 and 1980s agricultural development policies and technical innovations (Green Revolution) were introduced successfully so that agricultural value added per worker increased by more than 3% per year, compared with a population growth of around 2% during these two decades (ADB, 2006). During this time period the public budget allocation to agriculture amounted to 9.3% and the agricultural resource base as well as the human resources improved. Rice self-sufficiency was temporarily achieved in 1984. In between 1984 and 1996 rural poverty was reduced by 4.5% per annum, while agricultural output increased by 3.2% per year. Just before the Asian financial crisis, rural poverty reached a low of 1.3% (Irawan & Romdiati, 2000). This rapid agricultural growth was based on the Indonesian principle of "*trimatra pembangunan*" (tridimensional development), namely integrated farming, integrated commodities and integrated areas. Policies supporting these developments were implemented in a top-down approach. During this pre-crisis period a dualism between smallholder agriculture and large estate agriculture prevailed, as well as between urban and rural economies. Despite the financial crisis in 1997-1998 the agricultural sector continued to increase since the 1970s but its share of total GDP decreased from 41% in 1970 to around 15% in 2010 (Asian Development Bank, 2006; Suryahadi & Hadiwidjaja, 2011).

4.3.2 Agricultural Growth and Poverty Reduction

As described above, agriculture is an important part of the Indonesian economy. Furthermore, amongst the poor population more than half of household expenditures (55%) are spent on food. Changes in the agricultural sector therefore have a great impact on the general development of Indonesia and the livelihoods of the population (World Bank, 2007).

During the 1980s and 1990s agricultural development generated an important contribution to poverty reduction but efforts towards agricultural growth and rural development are nowadays still crucial for poverty reduction and food-security. During the two decades of fast economic growth, both the total number and the proportion of the population living below the poverty line of USD 1.55 per day was greatly reduced (ADB, 2006). In 1998 the central statistical office (*Badan Pusat Statistik*)

of Indonesia changed the standard of calculating the poverty rates, which resulted in an increase in the percentage of people defined as poor, as can be seen for the year 1996 where the adjustment increased the rate from 11,3% to 17,3% (Figure 8), (Suryahadi & Hadiwidjaja, 2011). The sharp downward trend in national poverty rates was temporarily reversed during the financial crisis leading to a renewed increase in numbers of the population living in poverty from 17.3% to 23.4%. Poverty rates have since decreased below pre-crisis levels; the absolute number of people living in poverty was until recently however still above pre-crisis levels. 2006 was the only other time, besides the financial crisis, where poverty rates increased. This was induced by the government's decision to increase domestic fuel prices by an average of 125% in October 2005. Until today the prices of petrol are controlled and subsidized by the Indonesian government, but the global oil price increase in the year 2005 pressured the government to increase domestic fuel prices (Suryahadi & Hadiwidjaja, 2011).

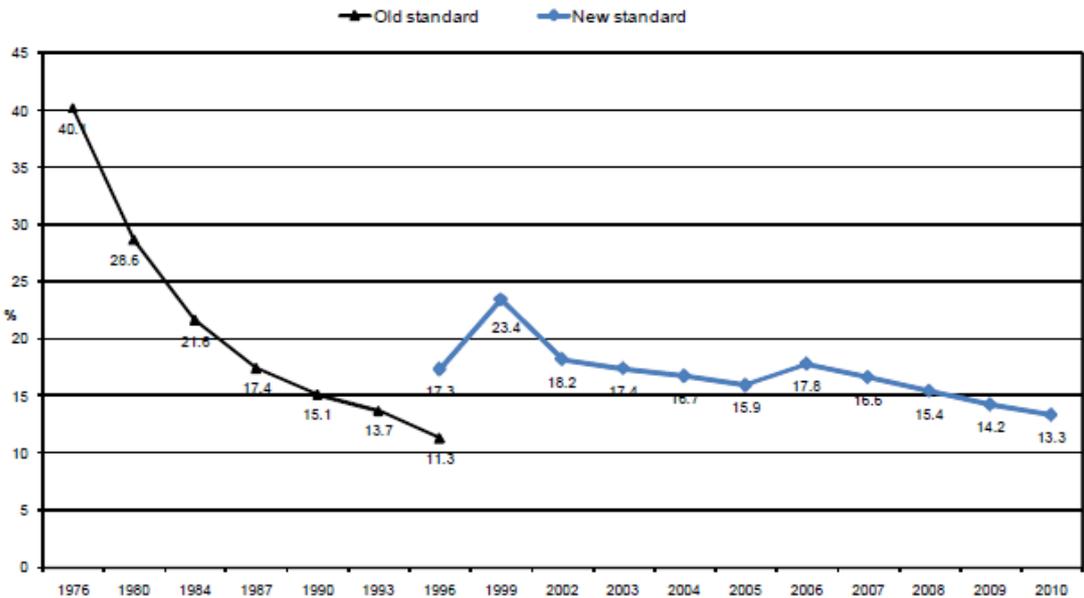


Figure 8: The National Poverty Rates in Indonesia, 1976-2010 (%) (Suryahadi & Hadiwidjaja, 2011)

Previous analyses of the correlation between economic growth and poverty indicate that both the overall rate of economic growth as well as the composition of this growth are important. A general conclusion drawn by scholars is that growth of the agricultural sector is usually more important for poverty reduction than the growth of other economic sectors (OECD, 2010). In Indonesia the contribution of agriculture to employment is gradually declining. As stated above, 39% of the total Indonesian population depend on agriculture as their source of income (CIA, 2014) and of the poor population more than 50% rely on agriculture as their source of livelihood (Suryahadi & Hadiwidjaja, 2011). Especially the poorest proportion of the rural population is dependent on agriculture to gain a living (OECD, 2010).

Incomes in the rural agricultural sector compared to incomes earned in major urban centres are considerably lower, which implies that the agricultural sector has a low labour productivity. Yet, it is in the present day more difficult to boost agricultural productivity beyond what has already been reached since input levels are often already important and marginal returns on yields are diminishing. In order to achieve agricultural growth, new investments have therefore to be focussed on a higher productivity rather than increased inputs (ADB, 2006). This can be achieved through the

adoption of modern farming techniques and irrigation systems, especially on the underdeveloped outer islands of Indonesia (dark blue, Figure 9) (ADB et al., 2010). Yet, it may be difficult to attract the needed investments in agriculture because the manufacturing and services sectors have taken over as the main sources of economic output.



Figure 9: Poverty Rates in Indonesia 2009 (OECD, 2010)

4.3.3 Indonesia’s Agricultural and Development Strategies

The Indonesian economic and development policies are often influenced by exogenous shocks induced by changing international oil prices (Hill, 2000). As an oil exporting country the oil price booms in the 1970s significantly benefited the Indonesian economy, while lower oil prices in the 1980s led to a decrease in GDP growth rates. The mid-1980s are described as the turning point in economic policy-making and from 1985 until the financial crisis 1998 the government started to implement several domestic and international reforms to achieve the goal of food self-sufficiency (Bautista et al., 1997). On the national side the government introduced subsidies for inputs, controlled prices for certain commodities, invested in irrigation systems and promoted agricultural production of staple crops in the outer islands (Bautista et al., 1997; WTO, 1998). Nucleus estate programs furthermore intended to integrate smallholder farmers into the staple crop production of larger plantations (Pray & Fuglie, 2001). At the same time the period between the mid-1980s until the Asian financial crisis in 1997-98 was marked by liberalization efforts and Indonesia joined the WTO in 1995 (Hill, 2000; Magiera, 2003). After the financial crisis Indonesia implemented a series of economic reforms both unilaterally and under World Bank/IMF structural adjustment programs or through agreements with the WTO. Indonesia increasingly promoted an export-oriented strategy for certain cash crops (Rada & Regmi, 2010, OECD, 2012). It was planned to reduce the monopoly power of the Indonesian state-owned Food Logistics Agency (*Badan Urusan Logistik/BULOG*) which controls food distribution, especially rice, and the prices of certain commodities (WTO, 2003); this government enterprise is however still an important player today and controls, amongst others, business activities related to rice, sugar, soy, meat, fish and other commodities (BULOG, 2015).

Important parts of the policy framework are the long-term (25 years) and the medium-term development plans (five years) that are issued by the National Development Planning Agency (BAPPENAS). The current long-term development plan (RPJPN) covers the period 2005-2025 and defines a comprehensive development vision for Indonesia. In the medium-term development plans (RPJMN) the government describes its strategy and development priorities in more detail and presents the budget allocation for the next five years. The medium-term plans elaborated by the

Yudhoyono government for the periods 2005-2009 and 2010-2014 put a strong focus on agricultural development, especially revitalization of the agricultural sector and food security (OECD, 2010).

These national development plans are then used as the basis for sectoral strategic plans (5 years), one of them being focussed on agriculture. The Agricultural Development Plan 2010-2014 mainly focusses on increased productivity and added value products through environmentally friendly agricultural practices, while consistently following the target of self-sufficiency: Land and water infrastructures are to be restored and developed; the global competitiveness and institutions are to be strengthened; the food supply should be increased and high-yielding commodities for horticultural production, plantations and farming developed. Disadvantaged farmers should furthermore be supported by low-interest credit (Ministry of Agriculture (MoA), 2010).

Another often cited development plan that was issued after the financial crisis in 2008 is the Master Plan for the Acceleration and Expansion of Indonesia's Economic Development 2011-2025 (MP3EI). It was designed to "transform the Indonesian economy into a developed nation [...] through high, inclusive, and sustainable economic growth" (Coordinating Ministry of Economic Affairs (CME), 2011) and aims at developing Indonesia into "one of the world's main food suppliers". Besides agriculture the development plan focusses on mining, energy, industrial, marine, tourism, telecommunication, and the development of strategic regions.

Agricultural land polices additionally aim at protecting farm land from land conversion for example for industry, housing and infrastructure. It is estimated that around 100.000 ha of agricultural land are converted for other purposes every year. Furthermore the ability of the government to develop new agricultural production sites is limited. The government has therefore implemented Law No.41/2009 on the protection of sustainable food crops farmland that is monitored by local governments in their regions. The law states that special zones for agricultural production are protected from land conversion and that if land conversion takes place in a protected zone there has to be an adequate replacement in another region. Unfortunately the law is not strictly enforced in practice, which shows that other economic sectors or commodities (export crops vs. food crops for domestic consumption) are considered more important. The best known case concerns the conversion of rice fields into palm oil plantations because palm oil offers higher returns (Sudaryanto, 2014).

The organization for Economic Cooperation and Development (OECD) has requested the Indonesian government to progressively reform some of its policies regarding agricultural and horticultural production since these sectors, despite their economic potential, remain underdeveloped. In 2012 agribusiness accounted for 15% of GDP and could increase by attracting more investments. Expensive fertilizer subsidies and protectionism against imported crops are said to hinder a fast development of the sector. Fertilizer subsidies in 2012 amounted to \$US 1.59 billion and import limits and tariffs are still imposed on a number of agricultural commodities such as rice, wheat, sugar and soy. In order to promote value-added industries, export taxes are furthermore imposed on some crops like cocoa or palm oil (OECD, 2012; The Jakarta Post, 2012).

The new Strategic Plan 2015-2019 is the first agricultural development plan issued by the new government under Joko Widodo and follows the paradigm of agriculture for development. This plan is part of the National Long Term Development Plan 2005-2025. The vision defined in this plan is the *"realization of sustainable agriculture-bioindustry systems producing various healthy foods and high*

value-added products based on local resources for food sovereignty and farmer welfare” (Rafani, 2015). The main aspects that will be taken into account by the Ministry of Agriculture to achieve the vision are food sovereignty in rice, corn and soybean, sustainable agricultural systems, a focus on farmers’ welfare and bureaucratic reform. It is being recognized that the agricultural sector has a strategic function not only for food security, but also with regard to environmental and social issues. It can furthermore offer opportunities for agri-tourism development.

4.3.4 Development of Organic Farming in Indonesia

In Indonesia the organic farming movement formed in 1984 in Bogor, West Java, through the Bina Sarana Bakti Foundation established by Fr. Agatho Elsener, which became the center for organic agricultural development in Indonesia (Jahroh, 2010). Organic agriculture was seen as an alternative to the Green Revolution introduced in the 1960s, during which large amounts of pesticides and fertilizers were used that had negative impacts on the environment and implied high costs for farmers (Ariesusanty, 2011). More than 10.000 farmers, cooperatives and organizations from all over Indonesia have been trained at the center. In the first years the focus lay on Integrated Pest Management, especially in rice production in order to reduce pesticide use by 90%. The first organic farmer cooperative was founded in 1990 in Yogyakarta, Java, and the first Indonesian Organic Agriculture Network (Jaker-PO) was set up in 1998 with the support of the International Federation for Organic Agriculture Movements (IFOAM). Jaker-PO offers technical support to farmers and helps with the marketing of products. In 1999 organic products, predominantly rice, were for the first time directly sold to end consumers through the SAHANI cooperation.

The government officially became involved in the promotion of organic agriculture in the year 2000 when the Indonesian Organic Community (MAPORINA), consisting mostly of researchers and officers from the Ministry of Agriculture, was formed. By 2007 MAPORINA had 14 branch offices and focused its work on research and consultation activities and the development of sustainable organic farms. In 2001 the Ministry of Agriculture launched the program “Go Organic 2010” (Figure 11, p.31) with the help of MAPORINA, but a lack of support from the Minister of Agriculture is said to be the reason for the failure of the program (Surono, 2007). Unlike the Green Revolution in earlier decades, the organic movement did not receive the full government support in order to be successful. In 2002 the Indonesian Organic Alliance (IOA) was built, which was responsible for the development of the first national certification body “BIOcert” and the national standard for organic food products (Figure 10), (Ariesusanty, 2011). With regard to certification the Ministry of Agriculture has by now accredited seven local certification bodies throughout Indonesia to ensure that organic standards are fulfilled (Table 1, p.32). In 2003 another group, namely the Indonesian Organic Producer Association (APOI) was established and the Ministry of Agriculture introduced the Organic Food Competent Authority (OKPO) (Surono, 2007).

Figure 10: Official logo for organic products in Indonesia



Figure 1. Organic Farming Development Stages 2001-2010

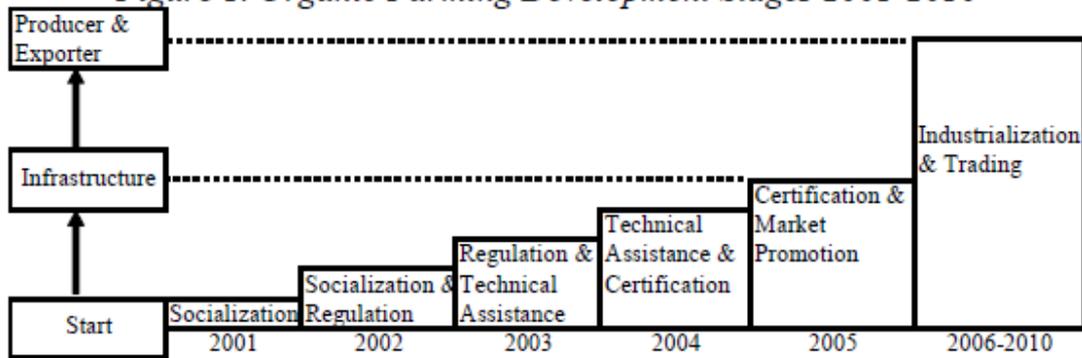


Figure 11: Organic Farming Development Stages 2001 – 2010 (taken from Jahroh, 2010)

In 2012 the certified organic area amounted to 90.135 ha. This land area is considerably low compared to the organic production areas of the three main organic producers Australia (12.126.633 ha), China (3.466.572 ha) and Argentina (2.800.000 ha) (Jahroh, 2010). In Indonesia 134.917 ha are furthermore farmed organically without having obtained adequate certification yet. This is one of the challenges that have to be overcome in the coming years: farmers produce organic products, which fulfill the organic standards, but cannot sell them as organic without having adequate certification. It is said that farmers may be inclined to fake certifications in order to still benefit from price premiums. Or alternatively farmers will sell their organic products to trusting consumers even without certification (Sulaeman, 2012). It is said that 70% of organic farms lack certification due to cost and administrative issues related to the certification process (Fitriani, 2013).

The most important organic commodity is coffee, but organic vegetable production is also significant with 18.000 ha. The domestic organic market is dominated by locally grown fresh produce and imported processed foods (Sulaeman 2012) and currently grows by 5% per year (Handriana, 2014). In general the Indonesian population still has a limited understanding about organic foods. A survey by Gantina & Sulaeman (2006) shows that 80% of the respondents know that organic food is free of pesticides, preservatives and chemicals, while only 8,2% are familiar with the fact that organic products fulfill further requirements, such as free of GMOs, additives, antibiotics and being grown naturally. For the export market the most important products are organic coffee, spices, cashews, coconut sugar and shrimps. The Indonesian government is planning to increase organic agriculture significantly and has set an ambitious target of 8.500.000 ha of land under organic management (Jahroh, 2010). In 2007 \$US 4 million have been allocated to the development of organic agriculture (Surono, 2007). There exists currently no data on the organic market value but estimations set the value between \$US 20-25 million (Sulaeman, 2012).

Compared to conventional horticultural products, organic products are less prone to inflation, which can save farmers from making losses when market prices plummet (Tribun Medan, 2012).

Table 1. Accredited Organic Certification Bodies in Indonesia

No	Certification Body	Products
1	Lembaga Sertifikasi Organik/LSO (Organic Certification Body) Sucofindo, certificate no OKPO-LS-001, Jakarta	fresh products including staple food crops, horticultural products, and livestock products such as milk, egg, meat, and honey
2	LSO MAL, certificate no OKPO-LS-002, Depok, West Java	fresh product including food crops, horticultural products, and livestock products such as milk, egg, meat, and honey; and feed
3	LSO INOFICE, certificate no OKPO-LS-003, Bogor, West Java	fresh crops and livestock products
4	LSO Sumatra Barat, certificate no OKPO-LS-004, Bogor, West Java	fresh products of food crops and horticultural products
5	LSO LeSOS, certificate no OKPO-LS-005, Mojokerto	fresh food crops products
6	LSO BIOCert, certificate no OKP-LS-006, Bogor, West Java	crops products such as food crops, horticultural products, spices, marketing and restaurant, livestock and fishery products, and special products such as mushrooms
7	LSO PERSADA, certificate no OKPO-LS-007, Yogyakarta	fresh and processed products of crops such as food crops, horticultural products, and livestock

Table 1 Accredited Organic Certification Bodies in Indonesia (Jahroh, 2010)

4.4 The Role of Horticulture Production

4.4.1 Indonesia

In Indonesia there is nowadays a fast growing interest in the agricultural economy related to horticultural production. This is due to the fact that, besides exports of traditional estate crops, horticulture represents the major option for diversification for most Indonesian farmers who try to get away from low-value rice farming (World Bank, 2007). The harvested area of horticultural crops comprises 1.8 million ha with vegetables being the major horticultural crops with an area of 1 million ha, compared to 0.75 million ha for fruits. The remaining area is used for floriculture (LEI Wageningen UR, 2013). Table 2 indicates the harvested area for the years 1998-2005:

No.	Items	Year								Trends (%/year)		
		1998	1999	2000	2001	2002	2003	2004	2005	1998-1999	2000-2005	1998-2005
1	Harvested Area (000 ha)											
	a. Vegetables	907	909	866	794	842	913	978	945	0.22	2.17	1.04
	b. Fruits	369	362	406	483	651	723	707	717	-1.92	20.30	11.94
	c. Ornamental Crops	3.63	2.76	3.07	2.74	3.19	2.53	2.58	2.46	-27.40	-4.28	-4.15
	d. Medicinal Crops	9.61	11.91	13.97	14.83	11.92	12.65	14.42	18.91	21.46	-5.16	6.16

Table 2: Harvested Area and Production of Horticulture, 1998 – 2005 (Maulana & Sayaka, 2007)

The Indonesian Ministry of Agriculture defines horticulture as “*all substances related to fruits, vegetables, vegetable ingredients, and floriculture including fungi, algae, and aquatic plants functioned as vegetables, vegetable ingredients, and/or aesthetic materials*” (Law No. 13/2010 Governing Horticulture in Indonesia).

According to the above definition vegetables and fruits represent one of the sub-sectors of horticultural commodities. Throughout Asia, Indonesia is known as a vegetable producing country and production areas can be found in almost all regions, especially in upland areas (Arsanti et al, 2007). Since the beginning of the century the contribution of the horticultural sector, especially fruits and vegetables, to the national GDP has increased. While the Asian financial crisis 1997-98 had

negative effects on the production of fruits and vegetables due to the income-sensitivity of production, the vegetable output doubled and the fruit production grew 2.5 times during the period 1990-2010. Negative consequences of the financial crisis with regard to the production of vegetables can be observed until 2001, while the production of fruits continued to grow throughout the years of crisis. The value of vegetable production alone grew from \$US 2.49 billion to around \$US 10 billion between 1994 and 2009 (Global Business Guide, 2012). Products which contribute the most are chillies, eggplants, shallots and potatoes (World Bank, 2007).

The total production in tons of a variety of vegetables during the period 2010-2014 is represented in table 3 together with numbers for the top nine vegetables grown in 2004 and the yield (ton/ha) in 2014. The top ten crops in 2014 were shallots, potatoes, cabbage, red/green chillies, tomatoes, bird's eye chillies, mustard greens, green onions and eggplants. The highest production per hectare in 2014 were achieved for chayote (also known as jipang or labu siam) (38.70 ton/ha), cabbage (22.86 ton/ha), potato (17.30 ton/ha), capsicum (17.28 ton/ha), carrot (16.15 ton/ha), tomato (15.96 ton/ha), radish (15.48 ton/ha). Compared to the year 2012, 12 of the 20 products listed in table 3 experienced negative growth rates in 2014, especially cauliflower (-10,49%), Tomato (-9,83%), chayote (-7,89%), spinach (-7,29%) and mustard greens (-5,99%). Products which were produced more in 2014 compared to 2012 were for example shallots (21,48%), potato (17,05%), Bird's eye chili (9,99%), capsicum (7,45%) and garlic (7,21%).

Vegetable Yield in Indonesia, 2010-2014, (Ton)

Product	Year						Ton/ha 2014	Growth 2014 over 2012 (%)
	Top 9 2004	2010	2011	2012	2013	2014		
Shallot	757,399	1,048,934	893,124	964,195	1,010,773	1,227,838	10,23	21.48
Garlic		12,295	14,749	17,638	15,766	16,903	8,75	7.21
Green Onion	475,571	541,374	526,774	596,805	579,973	577,215	10,03	-0.48
Potato	1,072,040	1,060,805	955,488	1,094,232	1,124,282	1,316,015	17,30	17.05
Cabbage	1,432,814	1,385,044	1,363,741	1,450,037	1,480,625	1,432,264	22,86	-3.27
Cauliflower		101,205	113,491	135,837	151,288	135,418	12,15	-10.49
Mustard Greens	534,964	583,770	580,969	594,911	635,728	597,674	10,09	-5.99
Carrot		403,827	526,917	465,527	512,112	494,827	16,15	-3.38
Radish		32,381	27,279	39,054	32,372	31,874	15,48	-1.54
Long Beans	454,999	489,449	458,307	455,615	450,859	440,870	6,35	-2.22
Red/Green Chili	714,705	807,160	888,852	954,360	1,012,879	1,061,428	8,37	4.79
Bird's Eye Chili		521,704	594,227	702,252	713,502	784,771	5,99	9.99
Capsicum		5,533	13,068	8,615	6,833	7,342	17,28	7.45
Tomato	626,872	891,616	954,046	893,504	992,780	895,163	15,96	-9.83
Eggplant		482,305	519,481	518,827	545,646	547,395	11,11	0.32
Green Beans		336,494	334,659	322,145	327,378	315,406	11,30	-3.66
Cucumber	477,716	547,141	521,535	511,525	491,636	471,636	9,99	-4.07
Chayote		369,846	428,197	428,061	387,617	357,042	38,70	-7.89
Water Spinach		350,879	355,466	320,144	308,477	312,411	6,19	1.28
Spinach		152,334	160,513	155,118	140,980	130,696	3,00	-7.29

Table 3: Vegetable yield in Indonesia 2004 and 2010-2014 (ton). (Own representation, source: Statistical data from Ministry of Agriculture; World Bank, 2010)

The overall increase is not only driven by a higher production but also by a rising demand for horticultural commodities for the growing domestic population as well as export markets (Arsanti et al., 2007). The domestic expenditure on fresh fruits and vegetables compared to that of rice has

risen from 50% to 75% in the decade between 1994 and 2004 and increased again to 100% in urban areas in 2007 (World Bank, 2007). The consumption of vegetables in 2010 reached 120% compared to consumption levels in 1999 (Sudaryanto, 2015). Nonetheless, the per capita consumption of the Indonesian population is still under the recommendations issued by the Food and Agriculture Organization (FAO). The average consumption amounts to 38Kg per person, while the FAO standard amounts to 66Kg (Maulana and Sayaka, 2007). With a growing middle class that will comprise 30 million Indonesians by 2015 the domestic demand for horticultural products will continue to grow, since higher income groups are more aware of health and nutritional aspects of fresh fruit and vegetable consumption. On the supply side improvements are made in the horticultural supply chains to accommodate the growing consumer demand and the growing importance of modern retail facilities and supermarkets in urban areas throughout Indonesia (World Bank, 2007).

Contrasting the rise in demand and increase in production is the actual decreasing number of farming households. Households gaining a living from agriculture decreased by 16.3% during 2003-2013, while the decrease in the number of households producing horticultural crops was even higher with 37.4% for the same period. An above average decrease could especially be observed for households engaged in the production of oranges (-69.7%), bananas (-64.1%) and potatoes (-54.4%). In comparison the number of households producing food crops such as rice, maize, soybean, groundnut, cassava, sweet potato only decreased by 5.2%. Households producing rice and sweet potatoes even increased. This development shows that the food crop sector is increasingly dominating the Indonesian agriculture in relative terms (Sudaryanto, 2015).

This contrasting development explains why Indonesia remains dependent on imports and why the country's competitiveness of the domestic horticultural sector is declining. The government is meanwhile trying to defend the agricultural sector by interventions in the form of price setting and protectionist trade policies (Global Business Guide, 2012). New regulations on horticultural imports restrict the entry of imported products to a few selected harbours, excluding the important Tanjung Priok seaport in Jakarta. Allowed entry points are Tanjung Perak Seaport Surabaya, Belawan Seaport Medan, Soekarno Hatta International Airport Jakarta, Soekarno Hatta Seaport Makassar and the Free Trade Zone comprising the islands Batam, Bintan and Karimun (Karnjanakesorn, 2013). Another new by-law stipulates that horticultural imports can only be performed by registered importers who have to apply for a permit at the Ministry of Agriculture (Anas, 2012). Firdaus and Gunawan (2012) state that government's price policies, especially those that affect the producer level, are important to ensure the stability of vegetable prices. According to the Bank of Indonesia, red chili, shallots and garlic are potential contributors to price inflation in Indonesia (Bank of Indonesia, 2012). Figure 12 below shows the price fluctuation for a number of crops for the period March 2014 until February 2015. It can clearly be observed that the prices for some products increase significantly in certain periods, especially carrots, cabbage, imported garlic, and red chillies.



Figure 12: Price fluctuation of selected horticultural crops (Source: National Statistics Agency Indonesia)

Horticulture imports grew between 1994 and 2004 from \$US 34 to \$US 78 million for vegetables and \$US 76 million to \$US 215 million for fruits (World Bank, 2007). In later years these numbers grew significantly, especially until 2011 with vegetables imports reaching \$US 443 million and fruit imports amounting to \$US 626 million (Abdi Tani, 2012). The top three vegetables that are imported were garlic (68%), shallots (18%) and onions (6%). The major imported fruits were apples (30%), pears (13%) and grapes (12%). Indonesia is furthermore importing tropical fruits from neighbouring countries that are also farmed in Indonesia, such as durian (5%) and citrus fruits (23%). Some of these imported products are therefore directly competing with fruits and vegetables grown in Indonesia, especially durian, citrus fruits, garlic and shallots. The reason for the availability of imported durian (from Thailand), garlic and shallots (from China) on the Indonesian market are according to a World Bank report (2007) the higher quality of these products. Although it is said that imported horticultural products only make up for 5% of the total amount available, the import policies on a number of horticultural commodities give rise to polemics among the public, especially amongst farmers. One example is the import of potatoes in 2011 that led the potato prices in Indonesia to drop drastically, thus creating a loss for local potato farmers. Imported potatoes were sold at Rp. 3.500/Kg, while the usual price for locally produced potatoes amounted to Rp. 6000-7000/Kg (Abdi Tani, 2013).

Vegetable exports from Indonesia decreased significantly from \$US 44.7 million to \$US 25.6 million in the period from 1994 to 2004. During this period the share of exports in the total production was still very low, even lower than the average amongst other developing countries. The export value of fruits dropped as well, however only slightly from \$US 12.8 million in 1994 to 11.8 million in 2004. Throughout this decade major horticultural crops exported were potatoes, cabbages, bananas, mangosteen, mangos, papaya and citrus fruits. Citrus fruits appear in the figures of both imported and exported products, which may refer to different types of lemon/oranges. Horticultural exports in

the year 2011 grew to a total of \$US 368 million with the share of vegetables amounting to \$US 184 million and fruits \$US 162 million (Abdi Tani, 2012). Data from the National Statistics Agency shows that the import-export balance of horticultural products shows a deficit between 2010 and 2014 (Agustine, 2014).

Within Indonesia, the three main vegetable production centres are West Java, Central Java, and North Sumatra, with West Java being the most important location with the highest production rates due to its proximity to the capital Jakarta. Java and Sumatra generate 63% and 23% of the national production respectively (World Bank, 2007). West Java alone generated 35% of the national vegetable output between 2000 and 2004 (Johnson et al., 2004, quoted from OECD, 2012). The production shares of these islands have not changed significantly over the past decade. According to Firdaus and Gunawan (2012) there are five vegetable crops that are produced in most Indonesian provinces and that can potentially reach high yields: these are shallots, red chili, potatoes, cabbage and tomatos.

4.4.2 North Sumatra and the Karo Regency

The island of Sumatra is one of the five main islands in Indonesia (Sumatra, Java, Sulawesi, Kalimantan, and Papua) and comprises itself eight provinces: these are Aceh, North Sumatra, Riau, West Sumatra, Jambi, Bengkulu, South Sumatra and Lampung (Map 5).



Map 5: Map of the Indonesian Provinces

With regard to Sumatra as a whole, the importance of agricultural production for the regional GDP has been quite constant in the period from 1990 until 2008 with a share of around 22%. In most other regions the agricultural contribution to GDP decreased gradually over time. In Sumatra the agricultural share in regional GDP of 22% is higher than the Indonesian average of around 17% (OECD, 2012).

As previously stated, North Sumatra is a very fertile region and one of the main agricultural production centres in Indonesia with an agricultural production area of 71.756 ha and a horticultural production of 1.021.736 tons in 2010. In 2013 the production was slightly lower and amounted to 982.397 tons. In terms of vegetable production North Sumatra ranks third on the national level and benefits from high production rates for chilies, tomatoes, cabbages, green onions and carrots (Table

4). North Sumatra is especially known for its important production of chilies in the vegetable category and oranges among the fruits sub-sector. The land area used for chili production was the biggest in 2012 with 19.643 ha, followed by cabbage (7.906 ha) and potato (7.203 ha) (Aryanti et al., 2014).

In the past years North Sumatra has however continued to import fruits and vegetables. In the first quarter of 2014 the central bureau of statistics (BPS) recorded an import of vegetables of as much as 36.130 tons with a value of \$US 22.993 million. This represents a significant increase of 84.8% compared to the same period in the previous year (19.260 tons with a value of \$US 12.4 million). The import of fruits decreased by 12.91% compared to the first quarter of 2013 from 10.380 tons worth \$US 9.8 million to 8.400 tons with a value of \$US 8.6 million.

Product	Year					Growth
	2009	2010	2011	2012	2013	2013 over 2012 (%)
1 Shallot	12 655	9 413	12 449	14 156	8 305	-41.3
2 Garlic	283	218	256	200	109	-45.5
3 Green Onion	13 865	16 957	9 199	12 366	12 822	3.7
4 Potato	129 587	126 203	123 078	128 965	100 736	-21.9
5 Cabbage	210 239	196 718	173 565	180 162	165 589	-8,1
6 Mustard Greens	63 911	87 757	60 471	65 215	69 820	7.1
7 Carrot	32 248	44 285	28 178	29 995	37 275	24.3
8 Raddish	7 882	10 922	6 114	8 633	7 894	-8.6
9 Red Beans	1 421	2 585	2 847	2 863	3 063	7.0
10 Long Beans	34 627	41 097	47 610	50 593	40 653	-19.6
11 Chili	154 799	196 347	233 256	245 770	198 879	-19.1
12 Tomato	90 147	84 353	93 387	112 390	114 168	1.6
13 Eggplant	35 009	49 675	67 831	76 010	67 259	-11.5
14 Green Beans	38 631	55 965	51 046	47 111	36 482	-22.6
15 Cucumber	39 767	36 426	45 975	43 430	34 225	-21.2
16 Chayote/Labu Siam	4 620	10 069	15 207	26 982	20 797	-22.9
17 Water Spinach	14 447	15 425	22 936	21 191	22 094	4.3
18 Spinach	13 704	14 466	13 700	13 864	13 463	2.9
19 Cauliflower	18 695	22 855	19 584	22 823	28 764	26.0
Total	903.882	1.021.736	1.026.689	1.102.719	982.397	

Source: BPS Provinsi Sumatera Utara/ Central Statistics Agency North Sumatra

Table 4: Vegetable production in North Sumatra (ton), 2009-2013

Unlike other provinces in Indonesia, North Sumatra has rather low production rates for garlic, shallot, tubers and green beans. These products are therefore mostly imported from China, Thailand, Vietnam or New Zealand. China is by far the most important supplier of fresh fruits and vegetables. In the first quarter of 2014 imported garlic from China amounted to 9.966 tons worth \$US 8.391 million. In the same period North Sumatra furthermore imported 161.330 tons of oranges from China with a value of \$US 122.830. Other fruits were mandarins, apples and pears (Aryanti et al., 2014).

The Indonesian population has become accustomed to consuming imported products and it is being said that imported fruits and vegetables are even preferred over locally grown products. One important factor is in many cases a lower price, but often also a better packaging compared to that of local products. As of 2012 the new regulation stipulates that horticultural products are allowed to be imported through Belawan seaport in Medan, the capital of North Sumatra (Karnjanakesorn, 2013).

An important factor that can for a large part explain the recent increase of imports to North Sumatra is the decreased local production due to the eruption of Mount Sinabung in the Karo regency, which is the most important production centre of the province. The volcano has shown high levels of activity since 2013 and has since erupted several times. In 2014 the export of products from North Sumatra decreased by 50.5%, compared to 2013 and amounted to 57.494 tons worth \$US 32,639 million. Exporters also face problems because cabbage is only produced in the Karo regency in North Sumatra and exporter thus cannot resort to the cabbage supply from another regency. Carrots, potatoes and corn can however still be supplied from Dairi regency so that exporters can fulfil their contracts with buyers (Harian Andalas, 2014a). Until June 2015, 2.785 people from 3 different villages had to be evacuated and will be relocated in a different area where currently new houses are being built to accommodate the refugees (Pinem, 2015). The agricultural land has been covered in ash so that the productivity in the region dropped drastically and led to price increases. The price for red chilies grew to Rp 100.000/Kg, approximately \$US 7.5 (Medan Bisnis, 2014). As a result the government increased the import of fruits and vegetables to stabilize the price spike and meet the demand of the population. These large amounts of imported fruits and vegetables have however had negative consequences for the farmers who were still able to produce horticultural crops since they cannot compete with the cheaper products from abroad.



Picture 2: Tomato plantation covered in ash. Picture by Dedy Sinuhaji (Source: Kompas.com)

Even though an improvement of the situation in North Sumatra is not yet in sight, production targets for 2015 have been set by the central government in Jakarta, prioritizing three horticultural crops, namely red chilies, shallots and oranges. The increase in production of chilies and shallots has priority since these commodities have contributed to price inflation in previous times as already mentioned above. The higher production of local oranges is meant to replace the imports from abroad (Harian

Andalas, 2014b). North Sumatra will therefore need the right strategy and policies to retain encourage the further development of its horticultural sector (Aryanti et al., 2014).

CHAPTER 5: HORTICULTURAL VALUE CHAINS

Q₁: How are both the domestic and international (i.e. Singaporean) value chains for horticultural products, conventional and organic, from the Karo Highlands organized? More precisely, what are the structures and governance forms of the value chains?

5.1 Domestic Value Chains

5.1.1 Conventional Value Chain Configuration – Medan

The capital of North Sumatra, Medan, is usually supplied via the trading points in Berastagi and Kabanjahe that are located in the Karo Highlands. The government of the Karo Regency has designated “Roga” market (*Pasar Roga*) in Berastagi as the centre for the trade of horticultural products in the Berastagi area. The “Tiga Panah” market (*Pasar Tiga Panah*) is another hub close to Kabanjahe.

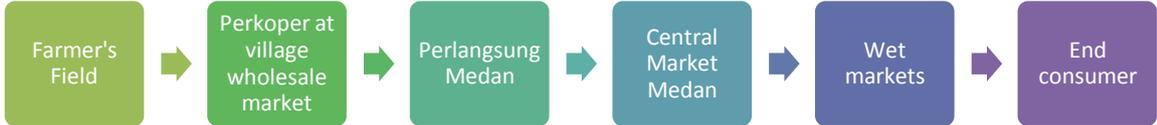
Distribution through Roga or Tiga Panah market

The farmer usually harvests the products in the morning and packages them to be brought to the nearest market, i.e. Roga or Tiga Panah. Roga market operates from around 10am until sunset at 6pm, while the Tiga Panah market is only open in the afternoon from 3-6pm. More than 42% of the farmers use local mini buses known as “*angkutan*” to bring their daily harvest to the market. At the market 70% of the farmers use the service of the “*tukang kilo*”, a person who weighs the products, to know the harvested amount and, most importantly, to get informed about the daily market prices. The *tukang kilos* have close relationships with buyers in Medan and receive the price information from the provincial capital every day. After the weighing process, the farmers sell their products to middle-men/agents known as “*perkoper*”. The *perkopers* resell the products to different clients, such as buyers who supply the Medan area or agents (“*perlangsung*”/2nd middle-man) who distribute the products from Karo to other provinces, such as Banda Aceh or the Riau islands. Some *perkoper* also work directly for a wholesaler for example in Batam and buy products on their behalf. The trade relationships between the *perkopers* and the *perlangsung*s are often on a long-term basis.

After the transactions are completed, usually starting around 3pm, the products are loaded onto trucks and are transported to Medan or another Indonesian destination, if the order came from a *perlangsung* in a different province. In the case that a *perkoper* did not find a large-scale buyer for all his products, the products will be sold to small-scale resellers at the central market in Medan (*Pasar Induk Tuntungan*). The price of the products from Karo sold on the central market is highly influenced by powerful agents/*perlangsung* in Medan, not only because they transmit the daily prices to the *tukang kilos*, but also because they know that the *perkopers* cannot store the fast perishable products. Thus, they have the ability to beat down the price of products.

The trucks loaded with fruits and vegetables from Karo arrive in the late afternoon/evening at the central market in Medan where wholesalers and sub-wholesalers start with selling the products in the early hours of the next day until dawn. The central market was only recently relocated by the government from an area in the city centre to a newly built market hall on the outskirts of Medan close to the road that connects Berastagi with Medan. The area of the new market embraces 12 ha and can accommodate up to 3.000 fruits and vegetables traders. Restaurant owners or sellers who have a stall at one of the several wet markets around Medan source their products from the central market every morning. End consumers purchase fruits and vegetables traditionally on the wet markets, which are open from dawn until 5-6pm.

It can be assumed that the majority of products that are sold through the central market in Medan are designed for the domestic regional market since most horticultural products do not last long and are therefore directly brought from Karo to the sea- or airport in Medan, if designated for the international market (see below). Inter-provincial trade often also skips the Medan-link, as will be seen in the example of Batam below. Saving time is essential to ensure the greatest freshness of the products since the export infrastructure, such as cold storage facilities, is underdeveloped.



Distribution through collectors, ex. Carrots

(With additional information from Keliat, 2008)

Sometimes products are not sold via the Roga market in Berastagi or Tiga Panah close to Kabanjahe, but directly bought by collectors at the farm gate. This configuration is a traditional value chain that was usually found in the vegetable farming areas throughout the 1990s. In the Karo highlands it can still be found for example in the case of carrots (World Bank, 2007).

In this case the carrots are sold through an auction system, where village collectors come to the farmer’s field and negotiate the price of the carrots, which have not been harvested yet, with the farmer. After a price agreement is achieved it is the responsibility of the collector to harvest the carrots and manage the post-harvest handling. After the carrots have been cleaned and packaged they are sold to a middle-man from outside Karo who picks up the vegetables at the collector’s packaging facility. Thereupon the middle-man brings the carrots to major cities in North Sumatra, for example Medan, where they are sold at the central market.



5.1.2 Organic Value Chain Configuration – Contract Farming

In the village Merek in the Karo regency lays Taman Simalem Resort (TSR), whose owners have decided to promote the production of organic horticultural products in the surrounding area both for the use in the resort restaurants and the onward sale. The intention is contribute to the welfare of the farmers by paying a price premium for the organic products, while also educating and training them in sustainable eco-friendly farming practices.

The resort provides all the farming inputs such as seeds, compost, organic fertilizer and biological control agents. The German Organization for International Cooperation (GIZ), as part of the ASEAN Sustainable Agrifood Systems program, assists TSR with research, receiving certification, applying Good Agricultural Practices and analysing market issues and replication strategies. The products grown by the farmers receive official organic certification accredited by LeSOS (Table 1, p. 32).

TSR employees visit the farmer fields in the surrounding area on a daily basis and pick up the harvest. The products are then brought to the resort, where they are cleaned, weighed and packaged. Unlike with the other examples, the organic products at TSR are not packaged to be sold in bulk, but are packaged in serving sizes to be sold in supermarkets. Once packaged the products are directly sent to Medan (11 supermarkets), to Jakarta (1 supermarket), to Pekanbaru (4 supermarkets) or to Batam (4 supermarkets).

In accordance with a price list the farmers receive a fixed price for their products and do not make losses if a harvest fails, since they don't have expenses for buying production inputs. The only risk is that they don't receive their payment, which is usually delivered on a weekly basis.



5.1.3 Case Study Batam

Introduction

Batam Island is one of the Riau islands, which are grouped together to form one province (Map 5, p. 36). The other islands are Karimun, Bintan, Natuna, Lingga, Anambas and Tanjung Pinang. Batam itself is the most populated of the Riau islands (750,000 inhabitants) and is an important industry centre for Indonesia because it is located just 20 km south of Singapore. The travel by fast ferry only takes around 30 minutes. Together with Bintan and Karimun, Batam forms a Free Trade Zone (FTZ) and is furthermore part of the trinational Singapore-Johor-Riau Growth Triangle (SIJORI-GT) between Singapore, Malaysia and Indonesia (Situmorang, 2011). Due to its strategic geographical location, Batam underwent major transformations since the 1970s when swamps were drained, forests cut down and infrastructure built, to accommodate the requirements for an industrial zone and the construction of a large harbor. One factor that stands out is that the Indonesian government has revoked environmental laws for Batam, so that polluting by-products of Singaporean industries can be exported to the island (Nas, 2003). The great majority of the population is employed in services and manufacturing, while only 0.83% are farmers (Indonesian Chamber of Commerce and Trade, 2006, quoted from Situmorang, 2011). Batam has a vegetable demand of around 120-140 tons per day and has to rely on imports of 100 tons per day to fulfill this amount (Koran Batam, 2014).

After Medan, Batam is the second main distribution site for traders from the Karo Highlands (Situmorang, 2011) and according to interview data most fruits and vegetables in Batam are supplied from North Sumatra or Java. However, since the eruption of Mount Sinabung in the Karo Highlands, more horticultural products are being imported from abroad, such as China, Bangladesh, India and even Singapore (Antara News, 2014). The fact that Batam receives imports from neighbouring Singapore indicates that Singapore is re-exporting horticultural products since the city-state does not have enough own production. Many traders of horticultural products or greengrocers on the island are from the Karo Highlands and maintain strong business ties to North Sumatra. One aim during the visit to Batam was to investigate if important amounts of products from Karo are being exported to Singapore. This was however negated by all interview respondents who stated that the costs of exporting via Batam are much higher than the costs of direct exports from Medan.

Traditional Value Chain (Transport by Boat)

According to interview data gathered during the field visit to Batam, horticultural imports to the island are sold via the wholesale market “Pasar Induk Jodoh” located close to one of the ferry terminals on the island. The area of Jodoh market where vegetables are sold opens every day, except national holidays, from dawn until 11am. The fruit market is open until 5-6pm.

Wholesalers at Jodoh order products directly from an agent/perkoper in Karo, for example at Roga market in Berastagi. These relationships are already long-established and in some cases there exist family relationships between wholesaler in Batam and perkoper in Karo. In general most wholesalers in Batam originate from Karo, as stated by interviewees. The wholesaler in Batam places his offer usually two to three times per week and the perkoper buys the required products in Karo. The products are then loaded onto trucks and are brought to the harbor in Dumai in the Riau province. The distance is approximately 530km, but the trucks need around 1.5-2 days to cover the distance. From Dumai the boxes, plastic bags and baskets full of fresh fruits and vegetables are transferred onto a ferry and shipped to Batam, which takes around 6 hours.



The total time for the transport from Karo to Batam indicated by different respondents varies: One wholesaler interviewed stated that the whole transport takes “one day and one night”, while another interviewee says that the products leave Karo for example Saturday morning and arrive in Batam on Monday evening, so almost 2.5 days.

At the Jodoh wholesale market products are bought for instance by restaurant owners, retailers or private individuals. Retailers resell the fruits and vegetables at different markets around Batam, for example at Pasar Sentosa Perdana or Pasar Kaget Simpang Bareleng (see examples below), where individuals go grocery shopping. Usually 10% of the products which arrive in Batam have to be thrown away, because they are damaged by transport. The numbers below only include products from Karo and do not take costs into account that are incurred for renting a stall at Pasar Jodoh or employees. The remaining amount after rejecting damaged products will in fact also be smaller.

a) **Price example: Rasmulianta**

Rasmulianta who works as a wholesaler at Pasar Jodoh and who is from Karo receives new products from Karo every 2 days, at the moment mostly bananas and rose apples. Usually also oranges, but the supply is very restricted at the moment due to fruit flies and the prices too high. The oranges sold in Batam currently mostly come from Kalimantan. Besides these products, Rasmulianta also sells other products from other Indonesian provinces. Usually Rasmulianta will receive oranges, rose apples and bananas every 2 days.

The purchase/sales prices are as follows:

Product	Amount	Purchase price Karo	Selling price Pasar Jodoh Batam
Oranges	5 tons	12.000 Rp/Kg	16.000 Rp/Kg
Rose apple	1 ton	10.000 Rp/Kg	15.000 Rp/Kg
Banana	2 tons	4.000 Rp/Kg	8.000 Rp/Kg

Profit Calculation:

Costs of purchasing products in Karo:	
Oranges:	$5000\text{Kg} \times 12.000 \text{ Rp/Kg} = 60.000.000 \text{ Rp}$
Rose apple:	$1000 \text{ Kg} \times 10.000 \text{ Rp/Kg} = 10.000.000 \text{ Rp}$
Banana:	$2000 \text{ Kg} \times 4.000 \text{ Rp/Kg} = 8.000.000$
Total costs for products:	$= 78.000.000 \text{ Rp}$
Transport costs (2.500/Kg):	$8000 \text{ Kg} \times 2500\text{Rp/Kg} = 20.000.000$
Income from Sales:	
Oranges:	$16.000\text{Rp/Kg} \times 5000 \text{ Kg} = 80.000.000$
Rose apple:	$15.000 \text{ Rp/Kg} \times 1000 \text{ Kg} = 15.000.000$
Banana:	$8000 \text{ Rp/Kg} \times 2000 \text{ Kg} = 16.000.000$
Total income from sales:	$= 111.000.000 \text{ Rp}$
Profit every 2 days:	
$111.000.000\text{Rp} - 78.000.000 -$	$= 13.000.000 \text{ Rp/2 days}$
$20.000.000$	
Profit per week:	$13 \text{ million} \times 3 = 39 \text{ million/week}$

b) Price example: Agus

Besides the wholesale market in Jodoh, some Karonese wholesalers work independently at other locations and sell the products received through their agent in Karo to resellers in Batam. One individual wholesaler, named Agus, receives 3 tons of fruits twice per week from his agent in Karo. The transport costs vary: if the transport costs are directly paid for in cash in Karo they amount to 1.550 Rp/Kg. If the transport costs are settled in Batam there is a price difference of 300 Rp/Kg, namely 1.850 Rp/Kg.

The purchase/sales prices are as follows:

Product	Purchase price Karo	Sales price Batam
Bananas (price for Bananas is always constant, low risk)	3.600 Rp/Kg	6.300 Rp/Kg
Sirsak (high risk, sometimes 30-40% are bad upon arrival)	4.000-5.000 Rp/Kg	15.000 Rp/Kg
Avocado (high risk)	3.000 Rp/Kg	8.000 Rp/Kg

Profit Calculation:

Assumed average purchase costs in Karo:	4000 Rp/Kg*6000 Kg = Rp. 24.000.000
Transport costs if paid in Karo:	Rp. 1.550*6.000 = 9.300.000
Transport costs if paid in Batam:	Rp. 1.850*6.000 = 11.100.000
Average transport costs:	Rp. 10.000.000
Assumed average sales price of Rp. 10.000:	10.000 Rp/Kg*6000Kg = Rp. 60.000.000
Profit:	60.000.000 – 24.000.000 – 10.000.000 = Rp. 26.000.000/week

c) Example of reselling at Pasar Sentosa Perdana:

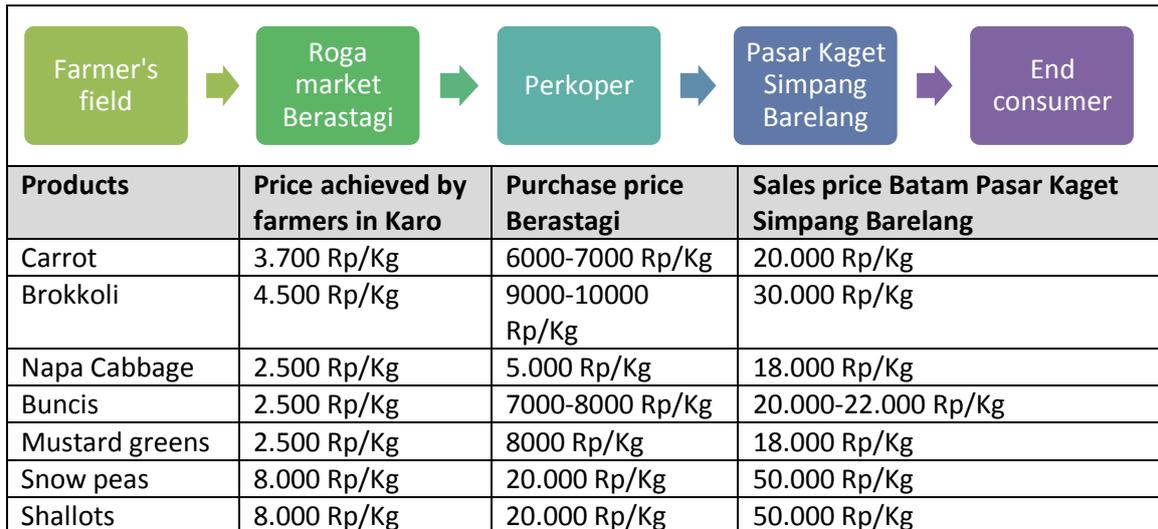
Price development:

Products	Price achieved by farmers in Karo	Price achieved by agent	Sales price at Pasar Jodoh	Sales price Pasar SP
Tomato	4.000 Rp/Kg	6.000 Rp/Kg	9.000-10.000 Rp/Kg	11.000-12.000 Rp/Kg
Potato	3.500 Rp/Kg	5.000 Rp/Kg	7.500 Rp/Kg	9.000-10.000 Rp/Kg
Cabbage	600 Rp/Kg	2.000 Rp/Kg	3.300-5.000 Rp/Kg	6.000 Rp/Kg
Cauliflower	4.000 Rp/Kg	10.000 Rp/Kg	25.000 Rp/Kg	30.000 Rp/Kg
Green Beans	2.000 Rp/Kg	7.000 Rp/Kg	11.000 Rp/Kg	13-14.000 Rp/Kg
Napa Cabbage	2.000 Rp/Kg	5.000 Rp/Kg	9.500 Rp/Kg	12.000 Rp/Kg
Chayote	3.000 Rp/Kg	4.000 Rp/Kg	5.000 Rp/Kg	7.000 Rp/Kg

Short Value Chain (transport by airplane):

In another case, a Karonese stall owner at “Pasar Kaget Simpang Bareleng” receives vegetables every day by airplane cargo from his wife, who lives in Medan. Each morning at 9am his wife sends 10 kotak (ca. 200Kg) by airplane to Batam. His wife buys the products from a perkoper in Berastagi and packs them to be sent to Batam. Amongst vendors in Batam this business model is unusual and the interviewee was this only one at the market using this supply system. All other stall owners get their products at the wholesale market Pasar Jodoh in Nagoya.

Each day around 13-14 different types of vegetables are sent, but mostly:



Profit calculation:

Assumed average purchase price in Berastagi:	10.000 Rp/Kg
Costs of buying products:	10.000 Rp/Kg * 200Kg/day = 2.000.000 Rp/day
The transport costs for airplane cargo only:	6.600 Rp/Kg
Price when all transports costs added up:	9.000 Rp/Kg
Transport costs/day:	9.000 Rp/Kg * 200Kg/day = 1.800.000 Rp/day
Assumed average sales price:	30.000 Rp/Kg
Income from sales/day:	30.000 Rp/Kg * 200Kg/day = 6.000.000 Rp/day
Profit:	Rp 6.000.000 – Rp 2.000.000 – 1.800.000 = 2.200.000 Rp/day

5.2 International Value Chain

5.2.1 Export market – Singapore

Singapore is a city-state located in the heart of Southeast Asia and has a strategic geographical location to be a centre for economic activities in the region. North Sumatra is situated in the East across the Strait of Malacca (Nasir, 2012). Singapore is the most wealthy country within the ASEAN region with a per capita GDP of \$US 52,000 (Kong, 2012). The domestic population amounts to only 5 million people, however due to the small land surface and low agricultural production, Singapore is one of the biggest importers of food products with a need of 1000 tons of fresh vegetables per day (Fresh Fruits and Vegetables Importers and Exporters Association Indonesia (ASEIBSSINDO), 2014). Around 95% of fresh fruits and vegetables are supplied to Singapore from abroad, while only 5% are produced locally (Chin, 2005). In 2011 agri-food imports amounted to \$US 12.1 billion. The country is furthermore a re-export hub for food products that are sold to other countries in Asia. The majority of the population is highly educated and belongs to the middle income group, which is very aware of quality requirements for the food products (Kong, 2012).

Numbers for 2014 estimate the daily amount exported from Indonesia to Singapore at 60 tons (of 1000 tons needed, see above) (ASEIBSSINDO, 2014). The total export volume from North Sumatra to Singapore amounted to 344,049 tons in 2005 with a worth of \$US 207,383 million. These numbers indicate that most Indonesian products, which enter the Singaporean market, come from North Sumatra. The amount of exports from North Sumatra to Singapore is however still considerably low compared with the sum of all exports from North Sumatra. In 2005 it reached only 4.54 percent (Nasir, 2012). Most products sold in Singapore originate from China or other ASEAN countries, as well as the USA, Australia New Zealand and Europe. 35% of potatoes are imported from China, while only 9% come from Indonesia (Bangladesh 22%, USA 13%). Even though broccoli and cauliflower are also produced in North Sumatra, 85% of these products are imported from China and 10% from Australia. Large imports from Indonesia to Singapore are only achieved for coffee (15%) and tea (25%) (Kong, 2012).

There exists thus a great potential for the export of horticultural products from North Sumatra to Singapore, especially due to the strategic geographical location. The Indonesian Ministry of Agriculture is well aware of this fact and is planning to increase the horticultural production and the production of high value added products in North Sumatra in order for the province to become more competitive against international contesters (Agustine, 2014). This potential has also been identified by the Singaporean side. The Foreign Minister of Singapore officially asked the North Sumatran government to increase its vegetable exports (Harian Orbit, 2012).

The Karo Highlands are one area in North Sumatra from which products have been exported to Singapore for a long period of time already. But unfortunately, the export of agricultural products through the traditional marketing channel does not create a benefit for farmers. This is due to the fact that Singaporean business men directly buy the products from the farmers in Karo at local market prices and thus capture the gains from selling the products in Singapore (detailed description in section 5.2.2) (Poloan, 2010). Faiq (2011) mentions some cases in which vegetable growers chose to withdraw from their contract with exporters because they made losses. The price determination is described to be entirely in the hands of the exporters. During an interview with Fitria Kurnia, the head of the export department from the chamber of industry

and trade of North Sumatra (DISPERINDAG), this condition was confirmed and Kurnia stated that this practice has been in place since the 1950s/1960s. Already in 2010 the head of the department of agriculture Muhammad Roems drew attention to these grievances and explained that the chamber of commerce and industry and the local quarantine office failed to coordinate and supervise the trade (Poloan, 2010). According to the chairman of the Indonesian Fresh Fruits and Vegetables Importers and Exporters Association (ASEIBSSINDO) the Indonesian government is still weak in establishing and promoting areas for horticultural production. Most needed are improvements in the quantity and continuity of the fruits and vegetables production for the international market (Agustine, 2014). According to Haryanto Tan, an interview respondent who has founded Sunrose Agri in Medan, a contract farming business for organic horticultural products, there exist five criteria which cannot be fulfilled and thus hamper exports to neighbouring countries, especially to Singapore. These are: 1) quality, 2) quantity, 3) continuity, 4) packaging, and 5) price.

By and large Singaporean authorities do not pose great barriers to international suppliers of fruits and vegetables since the country is dependent on large quantities of food imports. The city-state permits a free import of agri-food products to ensure that the high demand of imports can be met. The Singaporean government has however established strict regulation systems to guarantee food safety and compliance with hygiene requirements. The two main bodies supervising the food trade are the Agrifood and Veterinary Authority of Singapore (AVA) and the Food Control Department. AVA currently has no bans on the import of horticultural products, but importers need to observe regulations and have to apply for a special licence (Chin 2005). The Control of Plants Act states that products should be free of any prohibited pesticides and that the pesticide or chemical residue should not exceed a certain threshold (Hawksford, n.d.). In the early 2000s horticultural products from the Karo Highlands were refused to be imported to Singapore and Malaysia because pesticide residues exceeded the allowed amount. In the past decade several exporters from Karo therefore had to step out of business due to bankruptcy. Out of approximately 70 exporters from Karo only 7 were still active by 2010. Khaerudin and Rinaldi (2010) describe that some exporters started anew as farmers or drastically reduced the amount exported to Malaysia and Singapore. While one exporter previously exported 30-40 tons of cabbage per day, he later only exported 3-4 tons per week. Another exporter had to reduce the amount of 100 tons of potatoes per day to 6 tons every three days. As a response to the admittedly true accusations of pesticide contamination the government of North Sumatra introduced more stringent tests and the horticultural products are now checked twice per month. The head of the Department of Agriculture of the Karo Regency alleges that the issue of pesticide residues is a mere political instrument of Singapore and Malaysia to cause the prices of vegetables from Karo to drop (Khaerudin & Rinaldi, 2010). The impact of this past issue still burdens the trade relations until today and the amount of exports from Karo to Singapore has not recovered yet despite efforts by the governments to revive the trade, as mentioned above. One interesting fact is for example that messages from government representatives of all major trade partners of Singapore (U.S., China, Australia, Vietnam, Israel, Turkey, Philippines, Malaysia, South Africa, Thailand) are published on the website of the Singapore Fruits and Vegetables Importers and Exporters Association (SFVA) but that there is no official statement of an Indonesian representative (SFVA, 2015). This reinforces the impression that bilateral relations with regard to horticulture trade are not very good.

Another issue described by interview respondents and that has also been mentioned in Indonesian newspapers is related to the re-exports of Singapore and Malaysia. It is described that products that

originate from Indonesia and that are exported to the two neighbouring countries are repackaged as higher quality products and sent back to Indonesia (Muhardi, 2011; Daulay, 2012).

5.2.2 International Value Chain Configuration

Even though the exports of horticultural products from the Karo Highlands to Singapore or Malaysia have plunged since the issue of pesticide residues in the early 2000s, there still exists some trade of fruits and vegetables between the neighbouring countries. The value chain configuration from the farmer's field in Karo to the importer for example in Singapore is fairly simple:

Farmers either have direct contracts with exporters or sell their products to so-called collectors (*pengumpul*). Collectors usually buy products from farmers to help exporters meet their quotas. In both cases the products are picked up at the farm gate. Exporting and collecting companies thus work together to meet the export demand. Collectors receive the order from an exporter to search for a certain commodity directly at the farmers' fields. These products are for example cabbage, cauliflower, potatoes, mustard greens, carrots and broccoli. In order to ensure the availability of agricultural products for the exporting companies, collecting firms often buy up the harvest of farmers before the actual harvesting date, usually three weeks to one month prior to the harvest.

Collection system for export markets

One farmer grows for example cabbage on 0.2 ha of land with an estimated yield of 6 tons. If he agrees to sell to a collector, he will receive a price lower than the market price of the product on that day. If the current market price is for example Rp. 2000/Kg, the proposed price from the collector could be around Rp. 1500/Kg. Upon agreement the farmer will receive the full amount of money for the estimated 6 tons of later harvest. Sometimes collectors also provide fertilizer so as to increase the later output. If the yield at harvest time is higher than the agreed amount, the collector is entitled to receive the full surplus. The same applies for the price: if the market price is higher than the price market price on the day of agreement, all additional benefits go to the collector.

The next step carried out by the collector is to deliver the harvest to the warehouse of the exporting firm. Exporting companies are often located around Berastagi or Kabanjahe. The products are weighed and the collector receives an agreed lump sum on delivery. The exporter is then in charge of sorting, cutting and packaging the products which fulfil the quality standards for the export market. Cabbages that are rejected can still be sold on the local market at the current market price.

According to the interview with Fitria Kurnia, the head of the export department from the chamber of commerce and industry of North Sumatra (DISPERINDAG), most exports are transported to destination by sea through the Belawan Seaport located approximately one hour from Medan.

For several other products, for example mustard greens, asparagus, but according to survey data also for cabbages, farmers have contracts with exporting firms.



Contract farming for exporter

As in the previous example the farmer and the exporter agree on a certain amount of products that has to be delivered at a later date. The farmer gets paid in advance, but the price is usually below current market prices. This configuration can be like a contract farming scheme where all inputs (seeds, pesticides, fertilizers) are provided and the farmer only grows the products until harvest. In other cases the contract is only an agreement about an amount to be delivered at a later date and the farmer has to buy the inputs himself. Even though the price paid for the harvest is in most cases lower than the market price, the farmer has also lower costs, when inputs are paid for by the exporter. Upon harvesting time the exporter picks up the agreed quantity at the farm gate. In case the harvest is insufficient, the farmer can use the money previously paid to buy the remaining amount at the local market in order to fulfil the quota. The next steps are the same as already described above.



5.3 Conclusion

Q₁: How are both the domestic and international (i.e. Singaporean) value chains for horticultural products, conventional and organic, from the Karo Highlands organized?

The analysis of different **domestic value chains**, conventional, organic-contract farming, and inter-provincial-Batam, shows that the price development of the horticultural product differs significantly. The farmers however mostly receive the same low prices because they sell their products at the local village market to buyers/middle-men who resell the products to other middle-men. The farmers have to accept the prices that the *tukang kilo* or the buyer offers and are vulnerable to the pressure of buyers since the products are perishable and cannot be stored easily. With regard to the organic value chain the contract farmers get paid a fixed price for their organic products that is higher than the market price for conventional crops. Farmers in this chain are not involved with subsequent chain sequences like packaging and selling; they only grow the crops with the inputs that are provided by TSR and harvest the products. The comparison of these three chains shows that the contract farming scheme is the most convenient configuration for the farmers since they do not bear the costs for inputs and have the certainty to sell the products above market prices. They are thus not exposed to the uncertainty and pressure that they face when dealing with a *perkoper* or collector.

For the farmer there is furthermore no difference between participation in domestic or **international value chains**, because they either sell their products to a collector or directly sell to an exporter whose function is comparable to that of a *perkoper* on the local village market. The international value chain additionally comprises a special structure where “big buyers” from Singapore directly get their supply of horticultural products in Medan. In this configuration that resembles a trading house system, the Indonesian side does not receive benefits, except airline or shipping companies who transport the products to Singapore.

Figure 13 on the following page represents the different domestic and international value chains discussed throughout this chapter.

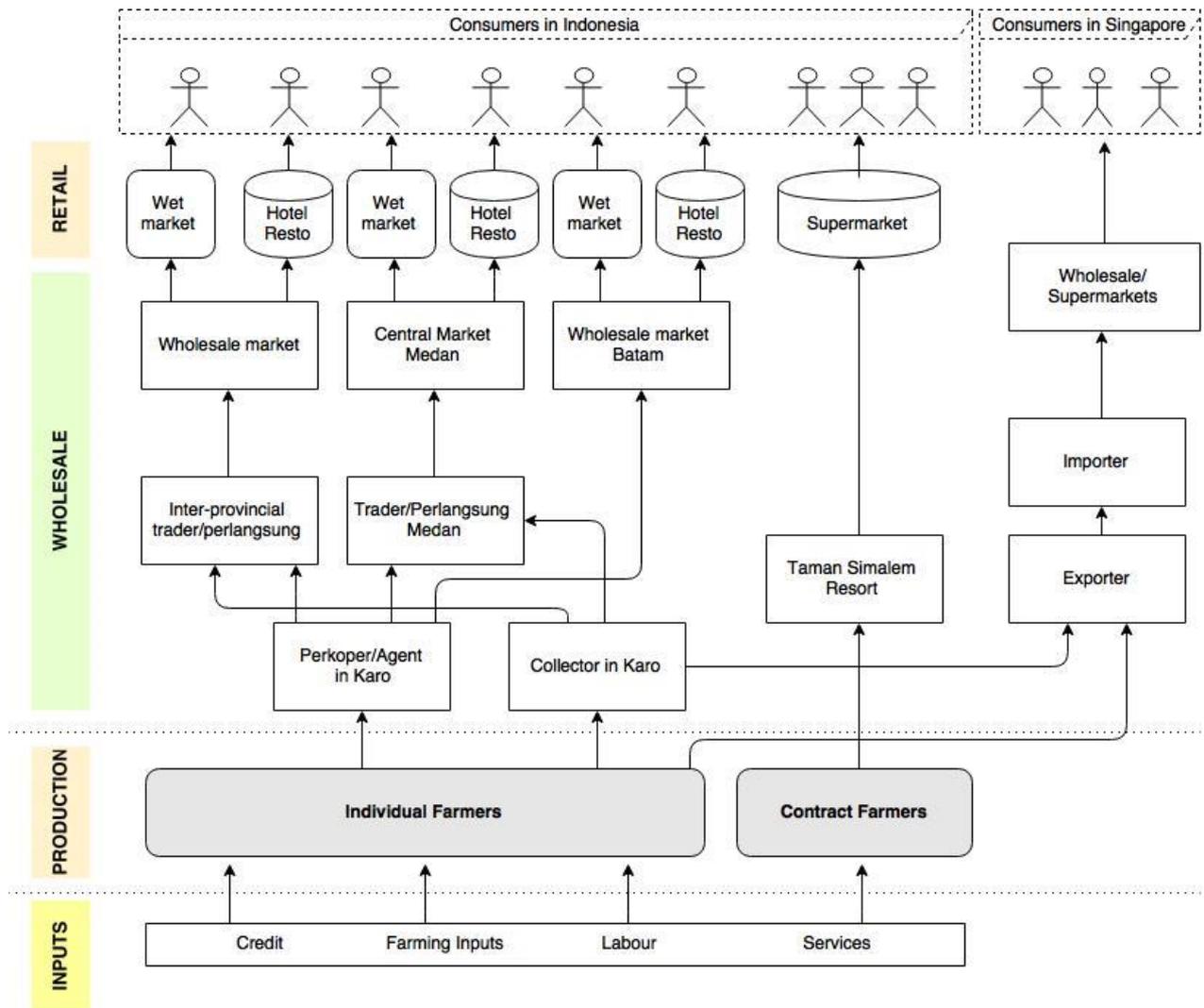


Figure 13: Value Chain Configuration of Horticultural Products from North Sumatra

5.4 Governance Types and Upgrading

Q₁ continued: What are the governance forms of the value chains?

Q₂: Which upgrading strategies exist and are most promising for smallholder farmers?

5.4.1 Discussion of Governance Types

Analysing the governance structure and services helps to understand the rules and the distribution of power between different actors in value chains. The term governance that was introduced by Gereffi (1994) describes a broad framework that includes the coordination, the control and the value addition along the value chain. It is presumed that the relationships between value chain actors are not random and that there exists a certain organization, which regulates the production, processing, handling and trading of a product from the producer to the end consumer. Governance analysis thus is an important factor in order to understand who the most important internal and external value chain actors are and in the present study, which issues exist for smallholder farmers in the Karo Highlands to enter chains and/or secure their positions and upgrade within chains.

According to Van den Berg (2004) it is useful to separate three dimensions when analysing the governance structure of value chains, which are 1) Rules and Regulations, 2) Enforcement and 3) Services. Rules and regulations can be both formal and informal and can be determined by actors within and outside of the chain. Enforcement describes the methods used to monitor compliance with the rules and regulations and sanctions can be imposed if rules are not observed; Incentives can promote the compliance with rules. Actors within and outside of the chain can offer services to value chain actors to assist them in fulfilling the required rules and regulations.

Domestic Value Chain Governance

There currently exist different value chain configurations for the national market as could be seen in section 5.1. A fixed channel that brings the horticultural products from the farmers' fields to the end consumers in Indonesia does not exist. Some farmers sell their products directly from their fields to collectors while others transport their harvest to the nearest bulk market. The number of chain actors involved also differs greatly and can range from a minimum of four links for the organic value chain (farmer – Taman Simalem Resort – Supermarket – end consumer) to 6 or even more links, depending on the number of middle men and sub-traders involved.

Conventional Value Chain

Let us first analyse the most important actors who enforce formal rules and regulations that play a role in the chain governance, for example Indonesian government bodies. The ministry of agriculture has offices in most Indonesian regencies since the decentralization efforts in the post-Suharto era took place (since 1999). In 2005 the Indonesian government launched the "Revitalization of Agricultural Extension", which defines three types of extension workers that are supposed to assist farmers in increase their agricultural production and at the same time improve their livelihoods. These are government extension workers (*penyuluh pegawai negeri sipil*), private extension workers (*penyuluh swasta*) and independent extension workers (*penyuluh swadaya*). 28.000 government extension workers are employed throughout Indonesia to assist the farmers in achieving the goals set in government policies (Lubis, 2012). Of concern for this study is the branch office in Kabanjahe, the capital of the Karo regency that is obliged by law to organize the agricultural extension activities on the district level. Agricultural extension workers are supposed to increase the access to information, the capacity of cooperatives, the community knowledge and access to government

services, the marketing network, the social capital and last but not least the income of farming families. In theory they can thus play an important role within the value chain of horticultural products. However, according to Lubis (2012) these government efforts are not sufficient; hence the enforcement of the rules and regulations is not functioning. The local governments lack the political will to bring about agricultural development, since this sector does not directly contribute to the revenues of the local government. The priority is therefore put on manufacturing and non-agricultural industries. Furthermore, it is said that the coordination of activities is not always clearly administered since the decentralization took place.

Survey results indicate that only 14 out of 33 respondents already received visits from government extensionists. Among the farmers who receive visits, the frequency differs greatly: 2 farmers receive visits on a monthly basis, while 7 farmers meet extension workers only once a year. The other 5 farmers receive visits 2-4 times per year. 10 farmers describe the advice received as “good”, while the others are not satisfied. Since not even half of the farmers interviewed had contacts with government extensionists it can be concluded that the government is not very important in assisting farmers with the production of horticultural products. The government consequently plays a weak role in governing the value chain.

Informal rules and regulations can be social norms that are generally accepted by a group of people and such rules can be observed within the horticultural value chain analysed. For example as described above, farmers who use the conventional way of selling their products through the Roga or Tiga Panah markets, comply with a set of rules: They usually use the services of a *Tukang Kilo* to weigh their products and receive price information and have to accept the fact that both the quantity and the price indicated are potentially manipulated. It is long-established that the price information comes from big buyers in Medan who will try to beat down the prices. Farmers therefore have to experience “behavioural uncertainty” that arises when information is undisclosed or distorted (Martinez, 2002). It is furthermore a general rule that there exists a middle-man (*perkoper*) directly at the market that takes care of the distribution to the next chain link. Even though farmers know that they don’t get high prices for their products and that resellers will receive much more, they comply with this system and bring the harvest to the wholesale market every day instead of seeking different ways to market the products. Survey results show that farmers cannot wait for higher prices to sell their products since the horticultural products are perishable, but also because farmers need money, because there is pressure of the buyer/no negotiating power or because there are storage problems. As a matter of fact farmers who are members of cooperatives also use this traditional value chain system instead of using the strength of the group to directly find a buyer in Medan or another Indonesian location. Farmers who sell their harvest directly from their fields to collectors will even receive a lower price than at Roga or Tiga Panah markets but can indeed save the transportation costs to bring the products there. It seems that farmers sell their products to middle-men/collectors because it is their habit and because their neither have the skills nor the knowledge to avoid the price-making power of buyers in Medan and other provinces. These informal rules for participating in the traditional value chain are thus “enforced” and the sanction for farmers who don’t comply will ultimately be to drop out of the chain. The horticultural value chain governance is thus clearly buyer-driven since big buyers exert control over the chain. According to Gereffi et al. (2005) the transactions on the village wholesale market represent a typical spot market, where linkages are not imperatively temporary, but can continue over time with recurrence of transactions. The main characteristic is that switching costs, i.e. the costs of entering new trade partnerships, are low for

both sides. A farmer can easily find another buyer/*perkoper* to sell the products to and a *perkoper* in turn can buy products from another farmer without problems. Indeed, the survey reveals that the relationships between farmers and *perkoper* are volatile. Approximately half of the farmers sell to the same buyer less than 50% of the time. 25% sell to the same buyer half of the time and 25% have a persistent partnership with one buyer and do not switch to possibly receive a better price.

Organic Value Chain

To monitor the production of organic products the Indonesian government developed the first national certification body “BIOcert” and the national standard for organic food products (SNI 01-6729-2002). The certification of products is regulated by third-party organizations. In the normal case products which enter the value chain with an official certification seal should therefore be genuinely organic. In the contract farming scheme for organic products described above, the enforcement system that controls compliance is twofold. First, Taman Simalem Resort (TSR) monitors the farmers in their production of organic fruits and vegetables and second, LeSOS, an accredited third-party certification body, verifies the compliance with organic standards every year. With regard to the type of crops grown and prices paid, the farmers are bound to their contracts and receive fixed prices for their products without having negotiating power. If a farmer does not comply with the rules, TSR can sanction him and revoke the contract. Taman Simalem Resort can however also offer incentives for farmers, since the payment is calculated on the basis of amount produced. The relationship between farmers and TSR is obviously dominated by the price-maker, TSR. The governance structure between TSR and the supermarkets is less clear-cut. As described in the theoretical framework supermarkets are gaining more and more power in horticultural value chains and often source their products from only a few suppliers to reduce transaction costs. Suppliers have to demonstrate their ability to supply high quality products in a consistent way and at the cheapest cost possible (Bamber et al., 2014). Taman Simalem Resort has contract with some of the biggest supermarket chains operating in Indonesia, for example Carrefour, Brastagi, Hipermart or Indomaret. It can thus be assumed that TSR has to abide by a set of rules as well. However, since the production of organic fruits and vegetables is still scarce in Indonesia, the competition between suppliers is very limited. The fact that TSR products are sold in 4 different Indonesian cities shows that TSR has a strong position within the value chain and can manage outlets in different provinces. In conclusion it can be said that the so-called “supermarket revolution” has not yet started in the niche market of organic products and that the value chain is not only governed by the supermarkets. The actors who can exert power and are able to govern the organic value chain nevertheless lie in the mid- and downstream parts of the chain. Farmers in the upstream part are still price-takers.

Export Value Chain Governance

In the international value chain for horticultural products both the Indonesian and the Singaporean government play an important role in setting rules and regulations for the trade of fruits and vegetables from Indonesia. Since trade reforms took place in the mid-1990s the ASEAN founding members (Indonesia, Malaysia, Philippines, Thailand and Singapore) agreed upon introducing the ASEAN Free Trade Area (AFTA) and the Common Effective Preferential Tariff (CEPT) that stipulates the decrease of intra ASEAN tariffs to a maximum of 5 per cent. As a consequence Indonesia experienced a liberalization of its economy. Import duties amongst the member states and quantitative restrictions were eliminated by 2010 (WTO, 2003). These agreements are supposed to boost inter-regional trade and could therefore also benefit the export of horticultural products from North Sumatra to Singapore. Services offered by both governments are for example organizing

meetings to bring both parties together as with the Indonesia-Singapura Agribusiness Working Group Meeting (AWG) and The Task Force Meeting for Promoting Fruits and Vegetables Export from Indonesia to Singapore held in June 2014. The Ministry of Trade and Industry is establishing marketing offices in other Asian countries to promote horticultural products from Indonesia, for example in Taiwan, South Korea and Hong Kong, which represent non-traditional export markets. The traditional export markets Singapore and Malaysia are still important outlets for Indonesian products, but trade relationships are difficult as described below, so that finding new trade partners may be easier than changing long-established structures. There exist thus disparities in what the Indonesian and Singaporean governments agree upon during meetings and what they actually undertake to improve the value chain. The reality is that they are not successful in trying to change the rules of the game so that fair trade relationships have not developed yet between Singapore and Indonesia.

The increased awareness of food safety and hygiene standards and a discerning consumer demand have led to strict sanitary and phytosanitary (SPS) measures that are regulated and controlled by state authorities, such as the agri-food and veterinary authority of Singapore (AVA). This organization has the competence to prohibit the import of products that do not comply with the country's standards. Sanctions can have tremendous negative impacts on the trade of horticultural products between Indonesia and Singapore as could be observed a decade ago, when Karonese products were rejected due to excessive pesticide residues. Out of approximately 70 exporters from Karo only 7 were still active by 2010 (Khaerudin and Rinaldi, 2010). Government agreements and services as well as regulations that can imply sanctions for non-compliance are an important factor for shaping the export value chain.

Informal rules in the export value chain are imposed by powerful importers from Singapore who have been in the horticultural trade for several decades. They have a very good knowledge of the local wholesale prices in Indonesia and in fact buy their products directly in Medan that is just a one hour flight away. This trading house system concedes a powerful position to the Singaporean side because Indonesian exporters cannot export products at local prices without profit margin and find it difficult to compete. The head of exports at the chamber of commerce and industry in Medan calls this configuration the "*kartel hortikultura*", which disadvantages the Indonesian side and leads to a situation where "in many ways, they [Indonesian exporters] cannot compete". Singaporean importers are furthermore in the position to resort to the supply from other countries if Indonesia fails to produce the adequate amount or quality. Thus, Indonesian exporters and Singaporean importers do not operate on the same level and there clearly exist power disparities.

In section 2.2 (Value chain approach to economic development and poverty reduction) it was stated that in general the support of an external actor is required to assist the farmers in overcoming obstacles. Aid agencies can play an important role in facilitating the establishment of new value chains and link producing countries to markets. The ASEAN sustainable agri-food systems project carried out by the German Organization for International Cooperation (GIZ) aims at mediating between the different parties in order to improve the market linkages and promote sustainable cross-border value chains while incorporating the private sector. Taman Simalem Resort (TSR) is for example supported with its contract farming scheme and the production and marketing of organic products. For 2016 TSR is planning to start exporting organic products to Singapore. These value chains have however not been established yet, but this study seeks to analyse the current situation and give advice for future interventions. As actor outside of the value chain that is acknowledged by

both Indonesia and Singapore, the GIZ may be able to act as intermediary and help to establish the contacts between both sides.

Taking the rules and regulations imposed by different actors of the export value chain into account leads to the conclusion that the traditional value chain is clearly governed by Singaporean traders to the detriment of Indonesian exporters and farmers who cannot achieve higher prices with entering the Singaporean market. The governments of both countries that are intending to boost the exports from Indonesia should be powerful enough to change the status quo, but until now no efforts have been undertaken to improve the trading system. Therefore it can be said that the export value chain for fruits and vegetable products from North Sumatra is governed by powerful Singaporean traders.

5.4.2 Upgrading Framework

The previous sections describe different national and one export value chain for fruits and vegetables produced in the Karo Highlands. What these chains have all in common, except for the organic value chain, is that the products are all produced in the same way, even if in the end they enter different markets and are sold with different packaging or with no packaging at all. The prices paid to farmers for conventional products are consistently low, but the sales prices differ greatly depending on the outlet for the products.

The question is therefore to ask what measures can be undertaken by farmers to capture more of the products' value. Since value chains are highly dynamic, actors of the chain can engage into activities that improve their positions within the chain and promise higher returns. Changing the chain position is referred to as "upgrading" strategy and Humphrey & Schmitz (2002) defined four different types that were already mentioned in the conceptual framework.

- Process upgrading, is the use of new technologies to increase the efficiency of the production;
- Product upgrading is the move towards the production of a higher value product;
- Functional upgrading entails the acquisition of new functions, which requires new skills; and
- Chain or Inter-sectoral upgrading describes the move into a different industry that is however still related to the core industry

In the following the possibilities for changes in the horizontal and vertical coordination, as well as upgrading opportunities for smallholder farmers from the Karo Highlands will be discussed.

Horizontal coordination

Horizontal coordination refers to the increased organization in one node of the chain, for example in the areas of production and processing, where a certain group structure ensures that the task of the node is accomplished. In agricultural value chains this is often a farmer cooperative. This type of upgrading through the formation of producer group is very important for poor farmers, because the coalition enables them to realize economies of scale in the supply of inputs and to reduce transaction costs. For development interventions improving the horizontal coordination is often the first of several phases to achieve market access. It is furthermore essential for other types of upgrading. Implementing horizontal coordination measures will only be successful if certain entry rules to join groups exist and if the management of the group is well implemented (Mitchell et al., 2009). In the survey conducted all farmers knew about farmer groups and 13 out of 33 farmers said that there exists a farmer cooperative in their village. However, only 7 farmers interviewed are members of a

cooperative. 4 farmers are not interested in joining a cooperative because they don't see the benefit in doing so. One farmer explicitly mentioned that he is not interested because the farmer group only helps with providing subsidized fertilizer, but does not assist with the marketing of the products. One farmer only recently moved to the village and one farmer did not specify the reason for not joining the cooperative in his village. A study from 2006 by the Indonesian Center for Agricultural and Socio Economic and Policy Studies (ICASEPS) shows similar results: even though the majority of farmers know of the existence of farmer cooperatives only a few farmers (less than 20%) acknowledged any benefit from being a member of a farmer group (ICASEPS, 2008).

However, a previous study on the marketing channels for potatoes and cabbage from Karo destined for the export market clearly showed that being a member of a farmer group (*Gabungan kelompok tani, Ga-pok-tan*) can be beneficial and increase the profit made, but only if the Gapoktan is taking up an active role in the marketing process so that the products are brought by the farmers to the Gapoktan and are further sold to an exporting firm. If the Gapoktan is not involved in the marketing of products, the products are picked up by collectors and then sold to an exporter. When potatoes are marketed through the cooperative, the cooperative achieves a higher profit margin than the exporter. This is however not the case for cabbage. When the products are distributed through a collector, either the collector (for potatoes) or the exporter (for cabbage) realized higher margins than the Gapoktan (Sihaloho et al., 2014).

Vertical coordination

Vertical coordination describes the change from one-time spot market transactions to long-term relations between two or more nodes of the chain. This is for example the case with contract farming where farmers have contracts to produce for processors or exporters. This type of upgrading offers farmers the certainty about future incomes and is therefore an important scheme for poor value chain participants. Implementing vertical coordination structures is in practice not easy since it requires the establishment of trust relationships between producer and buyer. Farmers will be inclined to sell their products on the village market and thus break the contract if the market prices are higher than the contractual ones.

The contract farming scheme implemented by Taman Simalem Resort is one example from the Karo Highlands, where farmers have a formal contract that links them to a buyer. However none of the 11 farmers who have a contract works 100% for TSR. 5 farmers receive less than 50% of their income from organic contract farming, 4 farmers generate approximately 50% of their income through contract farming and 2 farmers receive 70% or more through the contractual agreement.

When asked about their personal assessment of their financial situation compared to 5 years ago, 4 respondents answer that the situation is now better, 4 farmers say that it is the same and 3 farmers describe it as being worse. However, when looking on the financial data provided by TSR that indicates the monthly and yearly incomes paid do the farmers since 2013 (most farmers however started in 2014), the pessimistic judgements cannot be confirmed. As can be seen in Figure 14 the income of organic farmers has considerably grown between 2013 and 2015. The data furthermore indicates that, based on 2015 estimates, the income from organic farming is growing at a compound annual growth rate above 180% since 2013 (Figure 15).

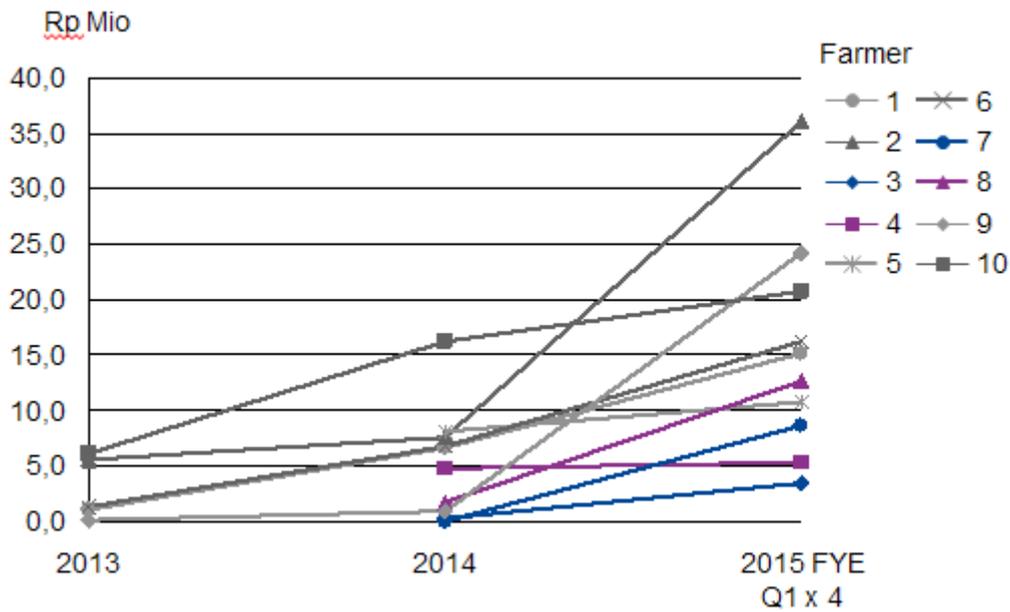
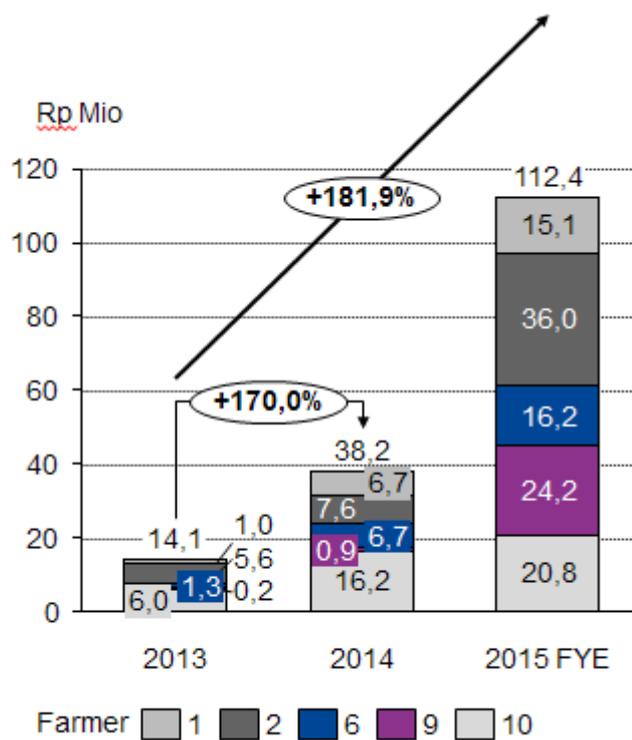


Figure 14: Income of organic farmers 2013-2015 (source: own survey and TSR)



Source: Own interviews; only farmers with income data for 3 years shown

Figure 15: Compound Annual Growth Rate (CAGR) based on 2015 estimates

From the examined contract farming example it can be seen that, even though the personal opinions are partially not too positive, the contract farming for TSR has contributed to the improvement of the farmers' economic situation. An upgrading of the vertical coordination is thus beneficial and leads to higher incomes. If a farmer is now financially worse off than five years ago according to his opinion, it

is probably not related to the organic contract farming, but to negative development with regard to the conventional farming.

Indeed, of all farmers interviewed, 17 farmers complain that the soil fertility has decreased in the past 3 years. From 13 farmers who answered that they now produce less of a crop than 3 years ago, this was mostly the case for chili (8 farmers produce less chili), for tomatoes (5 farmers produce less or stopped production), cabbage (3 farmers produce less) and eggplant (3 farmers produce less or stopped production). These negative developments with regard to conventional farming indicate that there is a great need for upgrading strategies. The most obvious improvement strategy is process upgrading.

Process upgrading

One of the most important measures that can be undertaken in the area of process upgrading is to improve the production techniques of the farmers through the consistent availability of high quality seeds, fertilizers, and other farming inputs. All except one farmers interviewed indicated that they already seek ways of improving their production. The reason for not engaging in improvement measures was simply the lack of money. 30 respondents mention that they try to get better fertilizer, 29 respondents try to obtain better seeds and 28 respondents search for better pesticides. Even though the great majority of farmers recognize that these inputs are important for their production, only 12 out of 33 farmers are able to save money to invest in larger amounts of inputs for production. The most important inputs that these farmers want to buy are seeds (mentioned 11 times), fertilizer (10x) and pesticides (6x)². 29 farmers use all out of the four insecticides, herbicides, pesticides and insecticides that they purchase in village shops. 31 farmers had to fight pests and other plant diseases on their plantations and 29 farmers experienced crop failures in the past 2 years. These survey results imply that the use of production inputs is not optimal.

The most common irrigation system used for the fields is a rainwater sump (26 farmers), three farmers use groundwater, two farmers use water from the river, one farmer fills up his sump with water that he purchases and one farmer has to rely on rainfall to irrigate the plants. 31 out of 33 farmers answered that they experienced a period of drought in the past years. There is thus great potential to improve the production and achieve higher yields by installing better irrigation systems. Furthermore none of the farmers in the sample used greenhouses to have more controlled growth conditions for their crops.

Furthermore, the tools used for farming the land are very basic. 30 of the 33 farmers only use a hoe to work the soil and the other 3 farmers sometimes additionally rent a plough or a tractor. Consequently there exist many opportunities for farmers to increase the efficiency of working the land and liberate time for other activities that can add value to the product.

Another focal point that can be added to the category of process upgrading, but that is also important for all other upgrading trajectories, is training in the production of horticultural products. The frequency of crop failures indicates the need for outside interventions to assist the farmers. Another indicator in favour of trainings is that the quality requirements possibly demanded by buyers are not known by all farmers. 3 farmers answered that they don't any of the requirements that they could choose from in the questionnaire, which were "variety", "taste", "size", "texture", "colour", "moisture" and "clean". 16 farmers answered that they 100% of these criteria, 9 farmer could name all except one, four farmer could still name 4 attributes and one farmer was aware of two characteristics. Only 13 out of 33 farmers have already joined trainings on agricultural production

² Respondents were allowed to give multiple answers

that were mostly offered by government extensionists (11 respondents). Other farmers joined a training conducted by organizations such as the Indonesian Citrus Society (*Masyarakat Jeruk Indonesia*) or USAID (3 respondents) and two farmers followed a training by a farmers' cooperative. 3 farmers participated in more than one training session. The experiences are described as beneficial by 9 farmers and as "sometimes beneficial" by 4 farmers. These trainings followed by some farmers are however insufficient. Farmers themselves largely express that they need training, for example in the following activities: prepare land (24x), maintenance (28x), use of fertilizer, (28x), use of pesticides (29x). Assisting farmers with process upgrading measures would certainly be of great help to improve the efficiency of the value chain by increasing the yield and reduce the costs per output unit.

Product upgrading

Product upgrading refers to increasing the quality and thereby the value of the product. This is increasingly important as consumers become more quality and health conscious. The demand for product traceability and observance of sanitary and phytosanitary measures (SPS) as well as the demand for organic and/or fair trade products drives the need for product upgrading activities. Since improving the product quality often also involves improvements in the production process, process and product upgrading are closely linked.

Introducing traceability measures that indicate where the products sold in the different market outlets were produced could increase the feeling of trust of buyers. Until now, the origin of products sold in supermarkets is only indicated for imported products. Furthermore, improving labelling and administrative measures would maybe reduce re-exports of horticultural products from Karo by Singapore. To prevent these practices, one of the first measures to undertake would however be to upgrade the post-harvest handling and packaging. With regard to exports to Singapore it is described that products leave Indonesia in bulk and are re-exported cleaned and packaged. Indeed, the packaging used by Indonesian farmers/exporters is quite basic e.g. for cabbage that is exported to Malaysia each cabbage head in wrapped into newspaper and put into used cardboard boxes. Packaging used for exports to Singapore is sometimes provided by the importers in the form of cardboard boxes with the importers name on them. Achieving improvements in the post-harvest sector however requires investments into human resource development and into adequate facilities. Indeed, many of the farmers have already realized that improvements in the post-production sector are important. 14 farmers indicate that they need training in harvesting, 15 farmers want to learn about post-harvesting techniques, 11 farmers want to improve packaging and 13 want assistance to learn more about marketing. Until now the farmers only use very basic post-harvest handling and packaging to sell their products in bulk at the village wholesale market or to collectors. The products are cleaned from residual soil and external leaves are removed from leafy vegetables, but subsequently the products are only prepared to be sold on wholesale markets or to exporters who prepare the products for the international clientele. All respondents answered that they use baskets (*keranjang*) lined with newspaper (for example used for tomatoes), plastic bags (*goni*, for example used for chilies or carrots (picture 3)), plastic nets (*rajut*), rice bags (*karung*), or cardboard boxes (*kotak karton*) to transport their harvest to the nearest wholesale market.



Picture 3: Cabbage sorting facility in Tiga Panah (picture by author)/ Carrots are being weighed and packed in plastic bags (source: chahayasimanjuntak.blogspot.com)

Traceability and the certainty that products underlie regular SPS controls are also of great importance for the export markets, since imported goods often have to fulfill certain safety requirements that are not mandatory for the domestic market. As described previously, the reputation of having excessive pesticide residues still clings to products produced in North Sumatra. Holding an accredited certification to assure the quality and safety of the products could improve the image of products from Karo significantly. The most often described product upgrading strategy is the move from conventional to organic agriculture (Mitchell et al., 2009; Fernandez-Stark et al., 2011). This shift requires the knowledge about specific production techniques, the use and availability of inputs such as seeds, organic fertilizer, biological control agents and compost. Among the survey respondents, 11 farmers are supported, both with inputs and training, by Taman Simalem Resort to produce organically and 2 farmers produce organic products independently. One of the independent farmers knows about organic farming through his university studies³ and the other farmer is autodidact. 11 farmers furthermore intend to produce organically in the future. Amongst the farmers already using or interested in adopting organic farming practices, the reasons indicated are mostly that it is environmentally friendly and healthier (mentioned by 17), that it can generate a higher income (answered by 12 farmers), that it helps to increase the competitiveness (answered 7 times) or one farmer simply wants to try organic farming because it is 'something new'. The majority of those farmers who do not intend to produce organically don't know what organic agriculture is (8 respondents), or are not convinced that organic farming is possible/needed or think that the demand for organic products is not high enough (2 farmers). Multiple answers were possible. Organic products however require often costly certification to prove to the consumer that he is purchasing a safe and higher quality product. For the farmers under contract to TSR, the application for certification and the complete handling are managed by the agricultural supervisors of the resort. The farmers only grow the crops and are not involved with post-harvest or marketing activities. From the 11 TSR farmers interviewed, 7 farmers indicated that they don't know where their products are being sold. The two farmers who independently produce some organic fruits and vegetables do not have certification and therefore sell their products through the same channel as conventional products, that is to say on the local wholesale market or to agents and collectors. These farmers can hence not benefit from price premiums for their organic products. It can be concluded that the

³ Two of the 33 interviewed farmers had a Bachelor degree

knowledge of organic farming in the villages visited is still remarkably low and that trainings and technical assistance will be needed to implement product upgrading measures. However, it would be desirable that the farmers not only learn about the farming techniques but also about other important aspects like certification and post-harvest activities.

In general turning to organic agriculture could open new opportunities for exports from North Sumatra to the “difficult” export markets Singapore and Malaysia. Entering these markets with organic high-value products will nevertheless require the combined consideration of innovative marketing strategies and technical support for smallholder farmers. As a consequence, assistance from a third party will be necessary to train the farmers in upgrading strategies and connect the producers with the customer market abroad. The same applies to the domestic market, but since the GIZ aims at supporting the governments of Singapore and Indonesia with their bilateral agreement, the upgrading strategies that help the export market are investigated in more detail.

Functional upgrading

This third upgrading strategy refers to changing or increasing the functions carried out by different actors in the value chain. With regard to agricultural production the classic example is that a farmer starts to include processing activities into the production process in order to add value to the product. The simplest processing activity would be to clean the products and package them in serving sizes, like it is already done by employees of TSR in the case of organic products. Another rather simple processing step could be to clean and also to cut/slice vegetables and package them in serving sizes so that they are ready for cooking. Functional upgrading could also be to process products so that they can be canned or bottled, which demands a higher level of skills and the compliance with strict safety standards. Another functional upgrading example that necessitates a high degree of knowledge and an adequate infrastructure is the production of frozen products. According to Mitchell et al. (2009) horizontally coordinated groups are most suited to implement these value-adding activities. Ways of shortening the value chain by cutting out middle-men and administering the distribution of the products through newly established vertical relationships also have to be taken into account. As in the example of the farmer group managed by TSR, the shortening of the value chain could already be achieved (see above 5.1.2). Functional upgrading without process or product upgrading is rarely implemented by poor population groups.

Chain or inter-sectoral upgrading

Chain upgrading or inter-sectoral upgrading refers to the “use of skills and experience developed in one value chain to productively engage with another – usually more profitable – value chain” (Mitchell et al., 2009). One example for chain upgrading was already mentioned in the product upgrading section above: a more profitable chain is in many cases the export chain and the production of high quality export products instead of growing traditional crops for the domestic market can in many cases be more profitable. Chain upgrading can also be the diversification of production, for example taking up highly profitable cash crop production. In Indonesia such diversification or even complete land conversion currently often includes the move to palm oil production, which is very lucrative. Of the 33 farmers interviewed 13 indicate that they are producing coffee besides horticultural crops. Two farmers furthermore answered that they are increasing their coffee production because the price for coffee (price range between Rp. 15.000-25.000/Kg) is promising. Fernandez-Stark et al. (2011) also mention the inter-sectoral upgrading from mere production into the agro-tourism industry as one example. In the Karo Highlands Taman Simalem Resort is already offering tours on their vast property, where different fruit gardens are located.

Resort guests furthermore can participate in product tastings (tea/coffee) and buy fresh organic products on site. The farmers are however not involved in these activities and the tours are run by resort staff

“Upgrading” of the enabling environment

Even though this is strictly speaking not an upgrading strategy, increasing the competitiveness of the environment of value chains is imperative to successful operations of these chains. This means that improvements in institutional, legal and policy frameworks, as well as in support and services that are essential for the operation of value chains are very important. This area offers many opportunities for development organizations to step in in order to assist with improving the functioning of a value chain (Mitchell et al., 2009).

A first factor that has to be improved to assist farmers with the horticultural production is to improve the availability and the quality of the seeds. According to the chairman of the Fresh Fruits and Vegetables Importers and Exporters Association of Indonesia the quality of fruits and vegetable seeds available in Indonesia is lower than in neighbouring countries. He describes that on the same amount of land, neighbouring countries can for example produce 4 tons of crops, while Indonesia will only be able to produce 2 tons (Haraito, 2010). The office for agricultural research and development that belongs to the Ministry of Agriculture is aware of the situation and acknowledges the farmers’ limited access to input markets, especially high yielding seed varieties (Jamal, 2010). The government should therefore stimulate the development of a national vegetable seed industry and improve the distribution. The current decentralized seed distribution system is admittedly not well organized.

At the moment, government programs that aim at establishing farmer cooperatives or associations are guided by the purpose of creating a system at the village level that facilitates the implementation of certain policies, for example the distribution of subsidized fertilizer or rice. The OECD (2012) estimates that the national expenditure for subsidized fertilizer accounts for as much as 37% of the total budget for agricultural support measures between 2006 and 2010. For the year 2013 the government spending on fertilizer amounted to \$US 1.4 billion (Sudaryanto, 2014). The focus of government programs is much less on supporting the development of farmer groups in order to improve the horizontal coordination for simpler value chain participation. The government could use parts of the fertilizer budget and existing structures to improve the linkage of farmers to markets. As mentioned earlier, for this to happen the extension services from the local government have to be improved and made available in all villages.

Furthermore, farmer groups who are already producing organically but lack the financial resources to apply for costly third party certification should receive assistance by government extensionists or other organizations to participate in Participatory Guarantee Systems (PGS). The Indonesia Organic Alliance developed a PGS called PAMOR in 2010 that is still much unknown amongst farmers and development agencies.

Given the significance of the horticultural sector in North Sumatra it is surprising that the infrastructure is not better developed. For the production in the Karo highlands the existence of adequate access roads is essential to transport the perishable products to the distribution hub in Medan or cities in other provinces as fast as possible. However, the transport from Karo is not optimal, even though Kabanjahe is only approximately 70km away from Medan. The connecting road is a serpentine mountain road and traffic jams occur often because trucks transporting horticultural

products are overloaded and/or old and drive very slow. Disabled trucks frequently block parts of the road so that late arrivals and losses of parts of the harvest occur. Although the road was renovated a few years ago, the local government could improve the situation by enlarging the road and constructing passing lanes so that the normal car traffic can pass the much slower trucks. These circumstances are also described by Agustine (2014) and USAID (2007), which shows that not much has been undertaken in the past 8 years to noticeably improve the situation.

Furthermore, there is a lack in the development of post-harvest facilities; especially the cold chain is inadequately developed so that post-harvest losses occur due to unconditioned bulk transport of fresh products. It is the local government's task to guarantee the uninterrupted electricity supply so that cold storage facilities can be used without blackouts. The underdeveloped local supply chain leads to the fact that locally produced fruits and vegetables are more expensive than imported ones and have a lower quality and higher levels of spoilage. Therefore supermarkets often prefer to sell imported products rather than getting their supply on the local market (Word Bank, 2007). A "code of conduct" could be an option to combine private sector and supplier/farmer interests, for example compliance with contracts, prompt payments and assistance in supply chain management and logistics. Particularly the delayed payment by supermarket poses a problem for small farmers' participation in the supermarket chain. According to information received during an interview with the head of a farmer cooperative/Gapoktan, it is often impossible for smallholder farmers, even combined in a farmer group, to supply supermarkets in Medan, because the payment is only made 3 weeks after delivery.

To improve the competitiveness of local products and reduce the amount of fruits and vegetables imported from abroad (which are often cheaper), the government could introduce export subsidies in times of crisis to artificially reduce the price of Indonesian products to boost exports. Another option would be to impose an import tax policy but current free trade agreements don't allow this measure.

5.5 Conclusion

Q₁ continued: What are the governance forms of the value chains?

Q₂: Which upgrading strategies exist and are most promising for smallholder farmers?

The discussion of the governance types of value chains revealed that the conventional domestic value chain is governed by large buyers in Medan who transmit the daily prices of horticultural products to the *tukang kilos* and middle-men in the Karo Highlands. According to Gereffi's classification (1994) the value chain is therefore "buyer-driven". The governance form of the organic value chain is less obvious, but the power lies in mid- and downstream parts of the chain. TSR and supermarkets decide upon the prices and farmers in the upstream part of the value chain are still price-takers. The international value chain nowadays is dominated by large buyers from Singapore who directly purchase horticultural products in Medan at local market prices and resell the products in Singapore or even re-export the crops to Indonesia after having added value through product or functional upgrading strategies like packaging and processing. If exports are performed by exporting firms in Medan, the value chain has the same governance form as the domestic one. The buyers are the price-makers and the farmers the price-takers who do not have the power to govern the chain.

Several upgrading strategies that can be undertaken were presented so that farmer can capture more of the products' value. Actors that belong to the institutional environment, for example government bodies or development organisations, but also private sector organisations like TSR can assist smallholder farmers in implementing a horizontal or vertical coordination. For the farmers in Karo the focus furthermore has to be put on process upgrading strategies. Without high quality seeds and the consistent availability of other production inputs, as well as irrigation systems, the productivity will not increase. As stated earlier productivity increases are however needed, since the production area has reached its carrying capacity and no new areas can be developed or production (USAID, 2007). Offering trainings for farmers is imperative to improve the farming methods and make sure that the use of pesticides is not excessive. The rejection of products from Karo by Singaporean authorities has severely damaged the trade and trust relationships and reduced the exports significantly until today. Several Indonesian exporters went bankrupt and had to change the source of their livelihoods. Product upgrading in the form of switching to organic production is already done by a few farmers under the contract farming scheme with TSR. The fact that farmers learn about organic farming methods is very positive, however these farmers are not involved in the packaging and selling of the products. They are thus not actively participating in the value chain and are still dependent on the price-making of TSR. Great improvements could be made if the farmers would organize themselves in a farmer's cooperative with the help of an outside actor, produce organically and distribute their products independently to organic stores or supermarkets in Indonesia or abroad. The assistance of a supporting organization is necessary since farmers are currently locked-in in the conventional value chain structure and don't have the skills and knowledge to implement upgrading strategies by themselves This chain configuration however also needs functional upgrading (i.e. packaging) and chain upgrading in order to enter the export value chain instead of serving the domestic market. An upgrading of the enabling environment is a further prerequisite for improvements since the infrastructure like roads or cold storage facilities are not optimally developed. As described above, the government has several options in directly assisting farmers with value chain improvements but has to take a more active role in implementing them. Mitchell et al., (2009) offer a typology of upgrading strategies that very suitably sums up the measures described in this section:

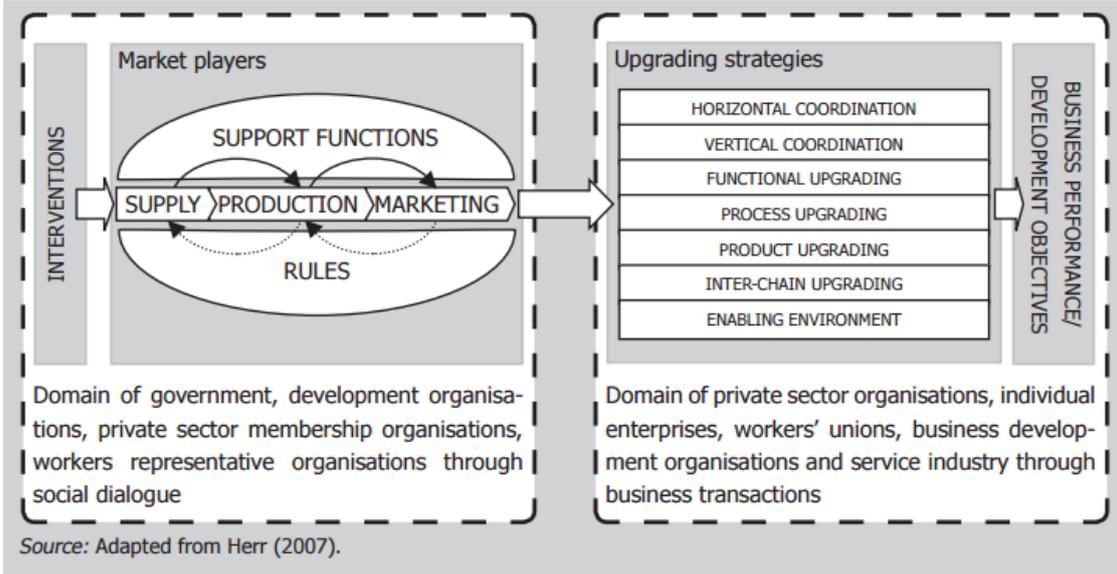


Figure 16: A new typology of upgrading strategies (Mitchell et al., 2009)

CHAPTER 6: LIVELIHOOD ANALYSIS

Q₃: How do the livelihoods of organic and conventional farmers differ, also with regard to the value chains they participate in to market their products?

6.1 Household Characteristics

Of all 33 respondents 28 household heads are male and 5 female. The average age of the respondents is 45.4 years (Figure 17) and all except two respondents are married (one single, one widowed). The average household size is 4.36 persons and in each household there is an average of 2 farmers. The average farming experience amounts to 22 years. All farmers are Christian and were born in Karo.

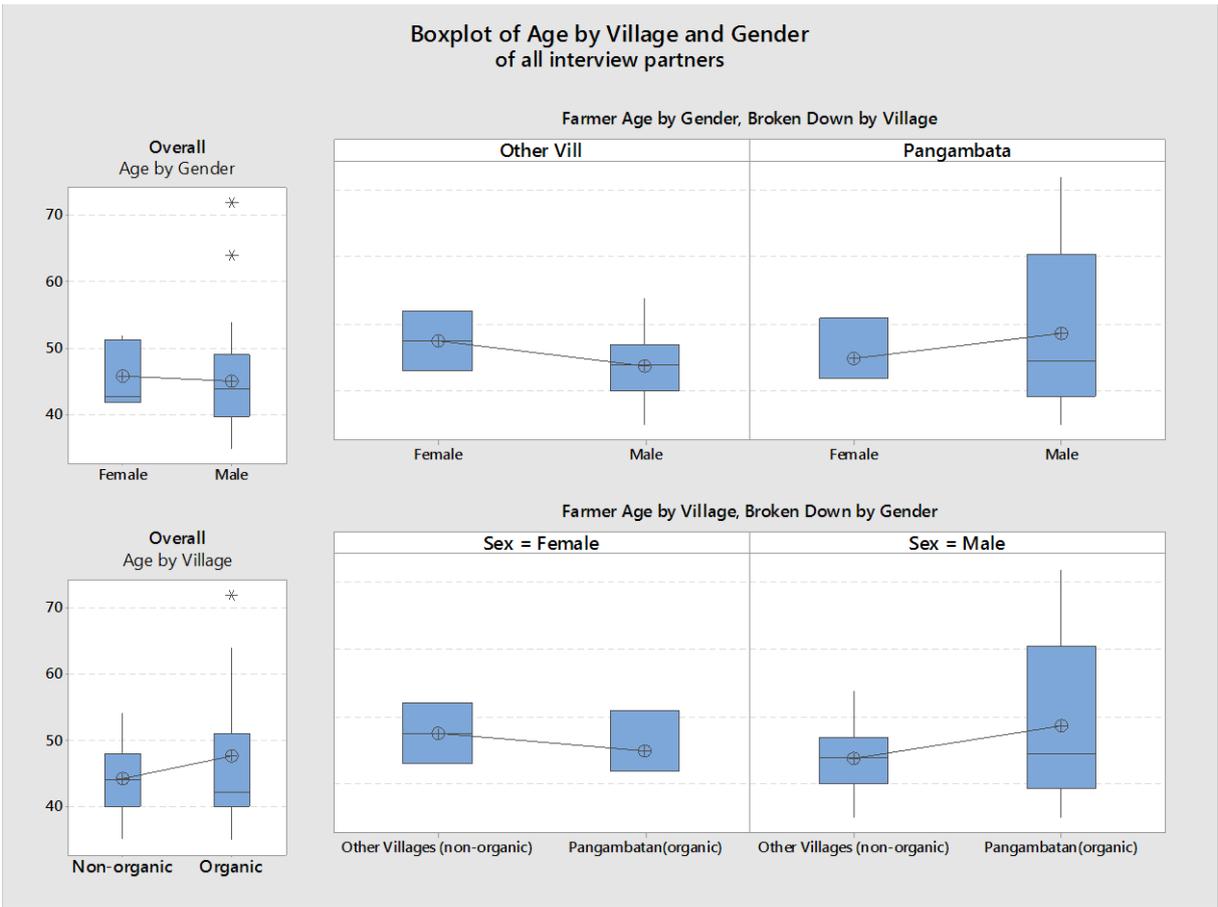


Figure 17: Differentiation of organic and conventional households by age and gender

6.2 Analysis of the 5 Livelihood Capitals

6.2.1 Natural Capital

In the context of natural assets that are relevant for horticultural farmers in the Karo Highlands, natural capital comprises land, water and livestock.

Land

The preconditions for horticultural production in the Karo Highlands are optimal due to the fertility of the volcanic soil and the moderate climate with high humidity rates. It is however reported that the production area in the highlands cannot be expanded anymore and that the carrying capacity has been reached. Therefore there have to be productivity increases (USAID, 2007). Another critical factor is that the very high pesticides use during the Green Revolution has led to the degradation of the soil quality.

The average land size farmed by farmers from the sample is approximately 1.1 ha, which is, according to the agricultural census from 2013, above the average farm size of 0.89 ha (Sudaryanto, 2014). If the two farming population, the conventional farmers (22 households) and the partly organic farmers in the contract farming scheme (11 households) are compared, it can be observed that organic farmers tend to have larger land areas. 55% of these farmers have more than 1ha of land, compared to only 5% in the conventional farming group. Conventional farmers mostly have medium land areas of 0.5-1 ha. However, one third of the organic farmers do not farm all land, compared to 5% in the other group.

	Size	Conventional		Organic	
Land Size	Large > 1ha	1	5%	6	55%
	Medium 0.5-1ha	17	77%	7	64%
	Small <0.5ha	2	9%	0	0%

The ownership structure of land also differs between the two farming groups: Some of the conventional farmers do not own land themselves, but only rent their land. In both groups there are farmers who own land but rent additional land, 27% for conventional farmers and 45% for organic farmers. Approximately half of all farmers fully own the land that they farm.

		Conventional		Organic	
Ownership	Fully rented	5	23%	0	0%
	Partially owned	6	27%	5	45%
	Fully owned	11	50%	6	55%

Amongst those who fully own their land, half of the farmers have a *Hak Milik* land certificate (Box 1). In the conventional farmer group the other half has no certificate at all, while 18% of the conventional farmers have a notarial deed.

		Conventional		Organic	
Certificate	Hak Milik	6	55%	3	50%
	Notarial deed	2	18%	0	0%
	No certificate	3	27%	3	50%

Box 1: Hak Milik – The Right of Ownership

Hak milik represents the strongest right to land and it is not limited time-wise. The right of ownership allows for the disposal, the mortgaging and the inheritance of the land by the legal heirs. Hak milik can only be hold by Indonesian citizens and as a rule it is awarded to individuals only, but there exist exceptional cases that meet certain preconditions where corporate bodies, such as state banks, cooperative associations, social or religious institutions, can receive the right of ownership. Foreign citizens are excluded and cannot own this right. Hak milik is subject to registration and the legal owner receives a certificate (*sertipikat*) as evidence of his rights.

Water

The availability of water is of course a very important factor for agricultural production. North Sumatra has a tropical wet climate with rainfall all-year round and no separate dry or cold season. For the horticultural production in the highlands it is however important that farmers can resort to possibilities of irrigation for longer periods with no or little rainfall. In order to categorize and compare the two farmer groups, it is alleged that the access to groundwater and rivers represent the securest types of irrigation and thus little vulnerability. Those farmers who use rainwater sumps or buy water to fill up their sumps have some vulnerability because they have to rely on rainfall or water a delivery service (which requires the availability of money). They have however the possibility to store water and use it on their fields if needed. The highest vulnerability level is attributed to those farmers who only rely on rainfall to irrigate the fields. If the two farming populations are compared it can be seen that the majority has some vulnerability. Indeed, the rainwater sump is the irrigation system of choice amongst all farmers. What stands out is that the organic farmers more often have access to groundwater or rivers and are thus less vulnerable.

		Conventional		Organic	
Available Irrigation	Little vulnerability	1	5%	4	36%
	Some vulnerability	20	91%	7	64%
	High vulnerability	1	5%	0	0%

Livestock

Livestock represents an important physical capital since it can fulfill many functions: it can firstly be a source of income; it can furthermore be an important source of proteins in the peoples' diets and the manure of the animals can be used as fertilizer for the fields. Farmers in the Karo Highlands most commonly own poultry (chicken, ducks, and geese), goats, pigs, cattle or water buffalos. From all the households surveyed, 13 have livestock. Half of the farmers who do conventional farming own livestock: 23% have a few chicken and/or goats, 14% have several livestock of medium value and 14%

have a large number of livestock with a high value. In the organic farmer group, only 2 farmers own livestock of low or medium value.

Livestock ownership		Conventional		Organic	
	A few/low value	5	23%	1	9%
Several/medium value	3	14%	1	9%	
A lot/high value	3	14%	0	0%	
No Livestock	11	50%	9	82%	

6.2.2 Physical Capital

In the household survey physical capitals like farm tools, inputs (seed, fertilizer etc.), infrastructure in terms of options of transporting the harvest to the market and a range of other household assets were inquired. The selection predominantly includes physical capitals that are important for the production and selling of horticultural crops. Some other assets are also included to differentiate the status of households.

Farming

All of the smallholder farmers interviewed use hand tools/hoes to work the soil. From the conventional farmer group 100% only use a hoe and do not rent or own other tools. A few organic farmers however, probably because they farm larger pieces of land, sometime also rent an additional plough or tractor.

Tools		Conventional		Organic	
	Only Hand tool	22	100%	8	73%
Plough (rented)	0	0%	1	9%	
tractor (rented)	0	0%	2	18%	

With regard to farming inputs, the organic farmers definitely have an advantage over the conventional farmers since they receive all the inputs from Taman Simalem Resort for their organic farming. For their additional conventional farming, they buy the inputs in shops like the other conventional farmers. From the conventional farmers, the majority (86%) is able to buy enough inputs, but three farmers (14%) could not buy enough inputs to prepare their land for production in 2014.

Inputs (seeds, fertilizer...)	Inputs provided & bought	0	0%	11	100%
	Inputs bought (sufficiently)	19	86%	0	0%
	Inputs bought (insufficiently)	3	14%	0	0%

Post-harvest

An important aspect for post-harvested processes is the packaging, but this topic has already been discussed in section 5.3.2. regarding the different upgrading strategies. Here, the area of concern will be the different options of transport to bring the harvest to the village wholesale market. Four

categories were identifies: First, the use of public transport (*angkutan*); second, the use of a rented car or pick-up truck; third the use of an own car and the fourth option is that the buyer picks up the harvest. The two groups under scrutiny here differ with respect to the transportation. While the majority of conventional farmers chooses the public transport to bring the harvest to the market, organic farmers predominantly sell their products directly to buyers who pick up the harvest. Note that this concerns the products that are not produced for TSR.

Another asset that is important after the harvest is the availability of a scale to weigh the products. From all farmers interviewed, only three organic farmers have their own scale. All other farmers have to rely on the services of the *tukang kilo* at the local market or use the buyer’s scale. Farmers without own scale are more vulnerable to be cheated and have to pay the *tukang kilo* for every service an amount of around Rp 5.000 (70approx. \$US 0.4).

	Categories	Conventional		Organic	
Transport to market	Public transport	13	59%	1	9%
	rented car/truck	2	9%	1	9%
	Own car	4	18%	0	0%
	picked up by buyer	3	14%	8	73%
Scale	Yes	0	0%	3	27%

Communication & Information

The most important mode of communication for the farmers is the mobile phone. All organic farmers and 95% of conventional farmers own a mobile phone. The advantage of having access to this communication technology is the opportunity to receive valuable market information. 13 out of 33 interview respondents indicated that they get the daily prices for horticultural products while still at home. This can influence their decision to harvest and sell the products or to delay the selling and wait for better market prices. Many farmers are furthermore in contact with several buyers and can already negotiate prices prior to bringing the harvest to the market or ask buyers to pick it up. This is a great advantage and it is thus understandable that from the additional assets this is the most favored.

Radio and television/satellite dish are furthermore important assets to receive information. Farmers who have access to information technologies can for example follow the local news. In Indonesia it is common that local news include information about agricultural commodities, especially those that can contribute to price inflation, like shallots, chili and garlic. Due to the close proximity of the farmers’ fields to Mount Sinabung it is furthermore an advantage to receive information on the seismic activities and threats of eruption.

ICT	Conventional		Organic	
Mobile Phone	21	95%	11	100%
Satellite dish	20	91%	7	64%
Radio	12	55%	5	45%
Television	20	91%	11	100%

Transport

With regard to modes of transport the conventional farmers more frequently own a bicycle, motorbike or car compared to the organic farmers. Having access to own transport is an important benefit since public transport is not developed in all rural areas. Small public buses (*angkutan*) are usually available on the main roads that connect the different villages to the market and the main road to Medan.

		Conventional		Organic	
Bicycle	Yes	7	32%	1	9%
Motorbike	Yes	17	77%	6	55%
Car	Yes	6	27%	1	9%

Other household assets

Owning a generator can be very useful when living in a rural area in Indonesia since power blackouts occur regularly. The data however shows that not many farmers own a generator (3 of 22) and that these farmers belong to the conventional farming group.

A refrigerator is only owned by 7 out of 33 respondents. This indicates that most farmers are not able to store fresh products safely and hygienically. This can be especially problematic in the case of fresh meat. The consumption of meat, especially pork is very common in Karo. One of the traditional dishes that people consume regularly is grilled pork (*babi panggang*).

Asset		Conventional		Organic	
Generator set	Yes	3	14%	0	0%
Refrigerator	Yes	5	23%	2	18%

6.2.3 Human Capital

In this analysis human capital includes the age of the household head, the average household size, the number of farmers in the household, the use of hired labour, the level of education, participation in trainings and the health condition of the household.

These aspects offer insights into the ability of farmers to work and the levels of productivity of individual workers. For example, two farmers who have different levels of education or training have different preconditions to work as farmers. However a long farming experience can make up for a low education level. Furthermore, health aspects also have to be taken into account since households with low health levels will not be able to be as productive as healthy workers.

To compare the conventional and the organic farmers by age, the age of the household was divided into three categories: 30-45, 46-60, >60. From the table it can be seen that the majority in both groups belongs to the first category. This means that the families are still rather young and that there are probably children in these households that are in school age. Indeed, in most households from both groups, only two household members work as farmer, husband and wife. In the group of organic farmers there are two members who are already over 60 years old. The ability to work will

thus not be as high as that of younger farmers. In terms of household size the two groups under scrutiny do not differ greatly (4-6 members), but the organic farmer households tend to be a little bit smaller. Following the ranking system used by Bishop-Sambook in a FAO livelihood study (2005) it was decided to attribute the most points to the biggest households, since each member is a possible workforce that can contribute to the horticultural production.

		Conventional		Organic	
Age	30-45	13	59%	6	55%
	46-60	9	41%	3	27%
	>60	0	0%	2	18%
HH size	≤4 members	9	41%	6	55%
	5-6 members	12	55%	4	36%
	7-8 members	1	5%	1	9%
No of HH farmers	1	2	9%	3	27%
	2	19	86%	6	55%
	3	0	0%	1	9%
	4	1	5%	1	9%

Education

The education levels of conventional and organic farmers differ: The organic farmers predominantly have elementary school levels of education. One third has finished junior high school and senior high school respectively. The conventional farmers have mostly senior high school education and two farmers even have a bachelor's degree. In this group there is however also one farmer who does not have a school education and is illiterate.

	Level	Conventional		Organic	
Education	No education	1	5%	0	0%
	Elementary School	4	18%	5	45%
	Junior High school	5	23%	3	27%
	Senior High school	10	45%	3	27%
	Bachelor	2	9%	0	0%

Farming

In both groups most farmers are very experienced and have ten to twenty years of experience. For the conventional farmers and equal amount even has more than 20 years of farming experience. 9% in both groups have started farming less than 10 years ago.

With regard to agricultural trainings received, the organic farmers do better than conventional farmers. This is due to the fact that all organic farmers receive training by TSR for their organic production. Only 27% of conventional farmers have already participated in a training session. 3 conventional farmers and one organic farmer have participated in more than one agricultural training session.

To farm their land organic farmers furthermore more often make use of hired labour: 73% compared to 41% for conventional farmers. But as seen above, organic farmers also have larger land sizes.

		Conventional		Organic	
Farming experience	≤10 years	2	9%	1	9%
	10 to 20 years	10	45%	6	55%
	more than 20 years	10	45%	4	36%
Farming training	One time	6	27%	10	91%
	more than one	3	14%	1	9%
Hired labour	Yes	9	41%	8	73%

Health

The subjective health condition of the households does not differ greatly but organic households more often describe that their health condition has improved in the past five years (55 % vs. 41%). There is furthermore no organic household that feels that the health condition has become worse, compared to 3 conventional households.

	Perception	Conventional		Organic	
Health condition of HH	Better	9	41%	6	55%
	Same	10	45%	5	45%
	Worse	3	14%	0	0%

6.2.4 Social Capital

Social assets are for example networks, membership in groups and associations, leadership roles, trust or contacts. These are important factors that strengthen households against external stresses or shocks.

Family networks

27% of conventional farmers have children who live outside of Karo compared to 45% for organic farmers. The children left the regency for education or work reasons. For those households in which children left to go studying in a different city, this can be regarded as a positive development since the next generation will have a higher education than most household members of the current generation. This however also means that these children will maybe not return to continue the farming business. But with a higher education they have better prospects of finding a job, for example in the service sector. Parts of the money earned elsewhere may be sent back to support the family in Karo in form of remittances. Households that do organic farming are more optimistic that their children will return one day.

		Conventional		Organic	
Children outside Karo	Yes	6	27%	5	45%
Will children return?	Yes	2	9%	0	0%
	No	1	5%	1	9%
	Maybe	3	14%	4	36%

Membership & Leadership

Of the conventional farmer group, 32% are members of cooperatives, but as stated earlier, these farmers only receive benefits in the form of subsidized fertilizer but do not sell their products with the group. Members of cooperatives furthermore exchange information on production and prices, share their experiences and sometimes also tools or workforce. Organic farmers, besides being contract farmers for TSR do not belong to farmer cooperatives.

Of the conventional farmers, three hold a leadership position. They are for example treasurer in a cooperative (limited role), village head or founder of a foundation (leadership role). In the organic farmer group only one person has a leadership position.

		Conventional		Organic	
Member of cooperative	Yes	7	32%	0	0%
Special position	Limited role	1	5%	0	0%
	Leader	2	9%	1	9%

Trade relationships/Trust

When comparing the two groups with regard to the relations they have with their buyers it becomes clear that organic farmers have more contacts by phone with buyers prior to selling the products. 73% receive their rice information while still at home compared to 23% of conventional farmers. Conventional farmers usually receive the price information at the market, either from a *tukang kilo* or a buyer/*perkoper*. Conventional farmers however more often sell their products to the same buyer: 27% of farmers sell to the same person every time. The majority of conventional farmers prefer to switch buyers (55%) and sell to the highest bidding person. For the organic farming group, half of the farmers also prefer to change buyer frequently, but 40% have buyers that they regularly sell products to. One farmer has a fixed buyer, because this *perkoper* is a family member.

The little repetition in trading relationships with one buyer also reflects in the frequency of contact with a buyer. The conventional farmers predominantly have seldom contact with their buyer (50%). 36% often have contact and 14% constantly. The organic farmers mostly have contact often (45%).

Trust is a very important aspect in the trade relationships between farmers and buyers. Conventional farmers trust their buyers and the price they receive a lot (55%). As stated earlier conventional farmers also switch their buyers often. It can thus be concluded that their perception of trust is high because they are choosing the buyer who is paying them the highest price possible. Organic farmers also have high levels of trust in their buyers (60%). This can be related to the frequent contact they have with their buyer. They therefore also perceive their negotiating power as good (60%). Of the conventional farmers only 14% state that they have a good or limited negotiating power. The majority gets paid the market price (73%), or what they think is the market price. Organic farmers more often receive visits at the farms from buyers and as seen earlier they also more often directly sell to buyers who pick up the harvest at the farm gate.

		Conventional		Organic	
Price Information	At home	5	23%	8	73%
	At the market	17	77%	2	18%
	No answer	0	0%	1	9%
Choice of buyer	Always same buyer	6	27%	1	10%
	More than 50% of the time same	0	0%	4	40%
	50% of the time same	4	18%	0	0%
	Less than 50% of the time same	12	55%	5	50%
Contact with buyer	constantly	3	14%	3	30%
	often	8	36%	5	50%
	seldom	11	50%	2	20%
Trust in buyer	A lot	12	55%	6	60%
	moderately	6	27%	2	20%
	Little	4	18%	2	20%
Negotiating power	Good	3	14%	6	60%
	Limited	3	14%	2	20%
	none (market price)	16	73%	2	20%
Visit from buyers	Yes	13	59%	8	73%

Other contact

64% of the organic farmers regularly receive visits from government extensionists compared to 50% of conventional farmers. Organic farmers haven't yet received visits from NGOs or development organization, but in the conventional farmer group 23% have already received visits from USAID or the Indonesian Orange Association (*Masyarakat Jeruk Indonesia*). Visits from private sector organizations like fertilizer or pesticide companies are very frequent in Pangambatan, where the organic farmers live (82%), compared to 36% who received visits in the other farming group.

Two of the conventional farmers have already sold and had contacts with end consumers, but none of the organic farmers.

Contact with		Conventional		Organic	
Government extensionists	Yes	11	50%	7	64%
Organizations/NGOs	Yes	5	23%	0	0%
Private sector (pesticide/fertilizer companies)	Yes	8	36%	9	82%
End consumer	Yes	2	9%	0	0%

6.2.5 Financial Capital

The financial assets analyzed here are the different sources of income available in a household, the amount of income, the opportunity to reinvest in the farm, the existence of savings, the access to credit, the moment of payment, and the subjective perception of the financial situation compared to five years ago.

The majority of conventional farmers has 1 source of income and only receives an income from conventional farming (55%). The organic farming group has predominantly two sources of income, namely organic farming for TSR under the contract farming scheme and conventional farming. Of the conventional farmers 41% have another source of income, for example livestock, property, kiosk/café (*warung*), massage therapy, or income from holding a leadership position. In both groups one household has three sources of income respectively. The amount of money earned differs greatly among the farmers. According to the information received, half of the conventional farmers (52%) earn less than Rp. 30 million per year, compared with 73% in the organic farming group. 33% of conventional farmers and 18% of organic farmers earn between Rp. 30-100 million. 14% of conventional farmers belong to the high-income group and earn more than Rp. 100 million per year. In the group of organic farmers only one household reaches such a high income level.

Conventional farmers receive their payment on delivery 100% of the time, while organic farmers often have to wait for their payment.

More organic farmers have savings compared to conventional farmers (55% vs. 41). It is therefore not surprising that conventional farmers more often take out a loan, namely 77% compared to 55% of the organic farming households.

All in all the majority of conventional farmers has a negative perception about the financial situation of the household compared to five years ago. 54% state that the economic condition is worse. In the organic group only 28% say that the situation has deteriorated. The perception of organic farmers is therefore better than that of conventional farmers. 36% of organic farmers see a positive development, but only 23% of conventional farmers. The same applies to those who perceive the situation as being the same over the five years.

		Conventional		Organic	
Sources of income	1 source (conv. Agriculture)	12	55%	0	0%
	2 sources	9	41%	10	91%
	3 or more sources	1	5%	1	9%
Income (in Rp)	Below 30 mio	11	52%	8	73%
	Between 30 and 100 mio	7	33%	2	18%
	Above 100 mio	3	14%	1	9%
Loan	Yes	17	77%	6	55%
Savings	Yes	9	41%	6	55%
Payment	On delivery	22	100%	6	60%
	After delivery	0	0%	4	40%
Financial situation compared to 5 years ago	Better	5	23%	4	36%
	Same	5	23%	4	36%
	Worse	12	54%	3	28%

6.3 Conclusion

Q₃: How do the livelihoods of organic and conventional farmers differ, also with regard to the value chains they participate in to market their products?

As described in the methodology section 3.5.5 points between 1 and 5 were allocated to each indicator that belongs to one of the five livelihood capitals in order to compare conventional farmers with those farmers who additionally do organic agriculture under the contract farming scheme with TSR. The following table shows the score for each capital on a ten-point scale. The detailed breakdown of the allocation of points can be looked up in appendix B.

Table 5 and the radar diagram (Figure 18) show that for all capitals the organic farmers have slightly better scores than the conventional farmers. Some critical points are that organic farmers own larger land areas and are often less vulnerable with regard to access to irrigation. They have all already joined at least one training session from TSR and are usually better connected with their buyers. They receive frequent visits from government extensionists and private sector firms and have an advantage over conventional farmers because they have at least two sources of income because they produce both for TSR and independently. Their subjective perceptions of health and economic conditions are furthermore more positive than those of conventional farmers. Even though the sample size was small it can be concluded that the participation in the contract farming scheme with TSR shows some benefits for the livelihoods of farmers. However, it cannot be ruled out that these differences are also related to the location of the different villages in which the farmers live. It may for example be that most farmers in Pangambatan (where the organic farmers live) own larger pieces of land and that this village is more remote than the villages of the conventional farmers in the survey. They therefore maybe have to be better connected to buyers, because they have difficulties of transporting their harvests to the closest bulk market. There admittedly exist many uncertainties in this analysis that make general conclusions difficult, but the differences between both groups are clearly itemized through the scoring system.

Table 5: Results of Livelihood Scoring System

	Conventional	Organic
Natural Capital	6,227272727	6,590909091
Physical Capital	4,756871036	4,989429175
Human Capital	5,744949495	6,287878788
Social Capital	4,286833856	5,048589342
Financial Capital	5,144022644	5,776223776

The participation in the system of vertical coordination managed by TSR is beneficial for farmers in as much as they receive the farming inputs from TSR and do not bear the costs. Consequently it comes as no surprise that organic farmers have a more positive attitude towards their financial situation because they have fewer expenses. While conducting the survey organic farmers also expressed that the weekly payment by TSR is a positive aspect. The farmers furthermore receive training in organic farming techniques, which is one of the product upgrading strategies. Moreover, the contract farmers have the certainty to sell their products at a certain price that is higher than the market price. Even though the organic farmers have a lower yield per hectare, the price premium makes up

for lost profit. The contract farming scheme is thus a beneficial structure for the farmers, because they have less responsibilities and a more secure income. They however have no decision making power within the value chain and totally depend on TSR for selling the products to supermarkets. Improvements in other areas of the value chain, as described in the upgrading framework, are still needed to create greater benefits for the farmers.

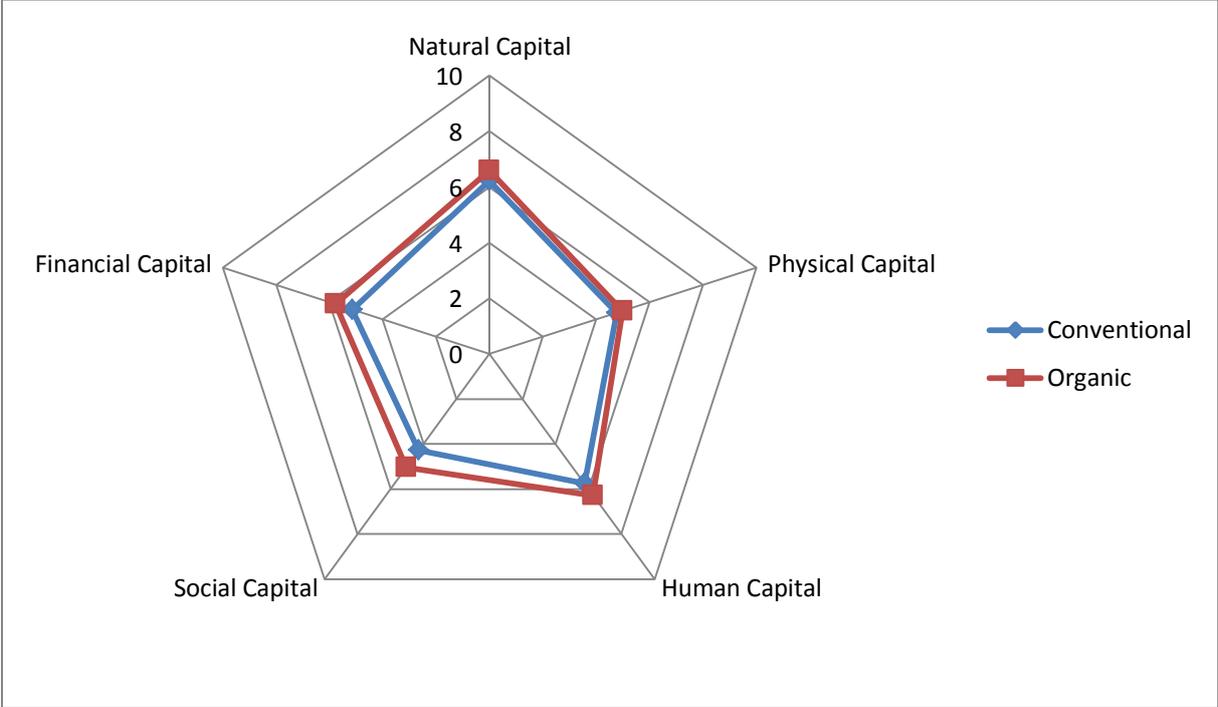


Figure 18: Radar Diagram showing the results of the Livelihood Scoring System

CHAPTER 7: CONCLUSIONS & DISCUSSION

The present study combined a value chain analysis with livelihood research so that the interactions between the participation in a certain value chain for horticultural products and the impacts on livelihoods of smallholder farmers could be examined. This thesis offers insights on how to improve value chains through upgrading strategies in order to strengthen the position of farmers within the chain. In section 7.1. the conclusions drawn throughout this thesis are combined to answer the main research question. Section 7.2. discusses how the results of this research are related to the literature presented in the theoretical framework.

7.1 Conclusions

The information gathered through the value chain and livelihood analyses in chapters 5 and 6 offer the means to answer the main research question, which was defined as follows:

In what way does the growing market for horticultural products in Southeast Asia offer opportunities for smallholder farmers from the Karo Highlands in North-Sumatra, Indonesia?

In order to clearly describe the opportunities without neglecting bottlenecks and vulnerabilities as well as already existing strengths, the following section will present the findings by using the four categories of a SWOT analysis that are strengths, weaknesses, opportunities and threats.

Strengths

One of the biggest strengths that the farmers in the Karo Highlands can profit from is the location of the production area that lies at an altitude of 700-1400m above sea levels. The fertile volcanic soil and the humid climate are optimal for the production of horticultural crops. A positive aspect for the trade of products is the fact that North Sumatra is ideally located on the Strait of Malacca that runs between Indonesia and mainland Southeast Asia and which is a long-established trade route. The capital Medan disposes of a harbor, the Belawan Seaport, and a new international airport that was opened in July 2013.

In addition to the ideal geographic location for production and trade this region is one of the traditional production areas for fruits and vegetables so that there is a large workforce that can be drawn on to further develop and improve the agricultural sector. Since many households are dependent on horticultural production to gain a living, interventions that aim at assisting them in increasing yields, the quality of the products and the value chain position in order to ultimately help them in achieving higher incomes have a fair chance to be welcome and accepted by the farmers. The long farming experience of most farmers is a valuable asset and offers a good foundation for additional trainings in Good Agricultural Practices (GAP) that is the application of “available knowledge to addressing environmental, economic and social sustainability for on-farm production and post-production processes resulting in safe and healthy food and non-food agricultural products” (FAO, 2003).

Another strength for the development and promotion of horticultural production, especially for exports, is the fact that the governments of Singapore and Indonesia have already agreed upon increasing the Indonesian exports of fruits and vegetables to Singapore. The ASEAN sustainable agri-food systems project carried out by several ASEAN member states with the assistance of the German Agency for International Cooperation (GIZ) aims at bringing together different parties in order to improve the market linkages and promote sustainable cross-border value chains while incorporating

the private sector. The political framework for a bigger amount of products exported from Indonesia to Singapore is therefore already given. In return for the supply of products for the Singaporean market the Singaporean side intends to contribute to the economic development and poverty reduction in Indonesia.

Weaknesses

The analysis of different value chains in chapter 5 has revealed that smallholder farmers do not have strong positions in the chains. The profits from selling the horticultural products are made by actors further down the chain for example the *perkoper* on the village wholesale markets or the big buyers in Medan. In the export market chain, the Indonesian side performs poorly and in many cases the profits are made by Singaporean traders.

Farmers have a weak position in the chain because the chains involve too many middle-men who have the power to take advantage over the weakest link of the chain, the smallholder farmers. Unfortunately most producers lack the knowledge to be able to find other ways of independently selling their products for example to supermarkets, hotels or other business in Medan and remain vulnerable to the pressure of buyers. Farmers are thus locked-in in traditional exploitative value chains without prospects of entering or creating new value chains without external assistance. It was also expressed that the living costs and prices of inputs increase while the prices of horticultural products decrease. It therefore gets more and more difficult for farmers to sustain their livelihoods with the income they receive from farming.

Another weakness revealed is that farmers sell their products on the village bulk market without taking prior measures that aim at adding value to the products. The prices they can achieve are thus very low. This condition opens up opportunities for Singaporean importers to getting their supply of cheap fruits and vegetables to which they subsequently add value through cleaning and packaging and later re-export to Indonesia at a higher price.

With regard to the production area it has been reported that the carrying capacity in terms of available land for production has been reached. New land areas that can be converted for the farming of horticultural crops are not available anymore. If farmers want to increase their production they thus have to increase the productivity. However, the interviews with farmers indicate that there tends to be seasonal overproduction of certain crops. The products that cannot be sold are then used as compost on the fields or as animal feed.

A last important factor is that the local government is not very supportive in assisting farmers with upgrading strategies, even though there exist official plans made by the central government of improving and increasing the horticultural production in North Sumatra. Every year a large amount of the budget for agricultural support is allocated to fertilizer subsidies but there is a lack of other input, such as high yielding seed varieties. The service of agricultural extensionists is furthermore not available in all villages to assist the farmers with advisory services and trainings. Farmers' groups are eligible to become distributors of subsidized fertilizers but do not receive other support from the government for example with regard to take advantage of the already existing horizontal coordination to assist the cooperative with improved market linkages.

Opportunities

The greatest opportunity for farmers from the Karo Highlands is that the horticultural sector is growing fast throughout Southeast Asia due to an increased demand for fresh fruits and vegetables. This increased demand is induced by an expanding middle class that is more health conscious so that traditional eating habits are changing. Nonetheless, the per capita consumption of the Indonesian population is still under the recommendations issued by the Food and Agriculture Organization (FAO). The market for horticultural products is thus far from being saturated.

The health consciousness of consumers is furthermore driving the demand for high quality products, which fulfil sanitary and phytosanitary standards. Buyers with increased spending power also increasingly demand certified organic products. Locally produced organic crops are currently sold on the domestic market in their unprocessed natural forms. Processed organic products are imported from abroad.

Opportunities for horticultural products arise in both the conventional and the organic sector. The market for organics is particularly promising since these products have a higher value than conventional ones and can be sold at higher prices. The example of the domestic value chain that supplies Batam shows the enormous price increases of conventional products from the Karo Highlands. Those who currently benefit are however not the farmers but the middle-men in Karo and the wholesalers in Batam. Hence, the opportunity for smallholder farmers lies in establishing direct trade relationships with sellers in Batam without making use of intermediaries.

The change to organic agriculture is one of several upgrading strategies that aim at improving the position of farmers in value chains. Other upgrading strategies are described in section 5.4.2 and will not be discussed in detail here. Measures can be taken with regard to process product, functional and change upgrading. With the assistance of an external actor many of these strategies seem very promising for farmers from the Karo Highlands.

The example of the contract farming scheme introduced by TSR is one good example of how horticultural products can gain value through the upgrading to organic production and how the value chain can be shortened. This improved high-value value chain however still leaves room for improvements because farmers still not fully benefit fully because they are not involved in the processing and marketing of the products. Even though TSR is paying a price premium to the farmers, the farmers could earn more if they would also sell the products themselves, for example through a cooperative. The TSR value chain only has a strong vertical coordination, but no horizontal coordination that could strengthen the position of the farmers. The comparison of the livelihoods of conventional farmers and those farmers who also farm in an organic way for TSR by using the scoring system, described in section 6.2., shows that the contract farmers perform better in all five livelihood capitals, especially the indicators for the social capital.

The detailed description of the Singaporean export market chain and the system of direct provisioning in Medan by Singaporean importers suggests that the participation of smallholder farmers in this chain is more difficult. Breaking down old structures that have been in place for decades will be extremely challenging for farmers even with assistance of government or development agencies. Previous attempts by the Singaporean government to attract more imports from North Sumatra in times when imports from China decreased due to unfavourable climate conditions failed. Instead of trying to compete on the one hand with long-established horticultural

traders in Singapore and on the other hand with cheap products from China, the niche market of high value organic products may offer the most promising opportunity for smallholder farmers. In order for these farmers to benefit the most, a cooperation with Singaporean buyers that is based on Fair Trade or direct trade principles would offer the greatest opportunities.

Threats

A very acute threat for farmers in Karo is the eruption of Mount Sinabung that already led to the destruction of harvests through volcanic ash and, even more severely, the resettlement of more than 2700 people from three villages in the surroundings of the volcano. Generally, the farmers are very vulnerable to natural conditions such as the climate and weather, because they predominantly use basic farming techniques without elaborated irrigation systems or greenhouses. Excessive rainfall or prolonged periods of drought can therefore destroy the livelihood sources of farmers.

With regard to the production of horticultural crops the excessive use of pesticides represents another threat that already had great negative impacts on the export of products from Karo to Singapore. Several exporters went bankrupt and the amount of exports plummeted as a result of the rejection of imports by Singaporean authorities. The reputation of fruits and vegetables has suffered a lot and is not restored yet, ten years after the incident.

These reduced sales led to lower incomes for farmers whose financial situations have decreased in the past years, as stated several times while conducting the household survey. The farmers are often left in the dark about the reasons for the aggravated conditions. The farmers cannot invest as much as before in their farms anymore and have difficulties in saving money.

Another threat is the competition of other producers of horticultural products in Asia, with China leading the way. But Malaysia, Thailand and the Philippines, as well as non-Asian producers like the US or Australia, are also very important producing countries. Smallholder farmers face difficult conditions since imported products, for example from China, are sold at lower prices than domestically produced ones. Vegetables and fruits grown in Indonesia can only become more competitive if prices decrease through higher productivity, if producers switch to the production of high value-added products or if the Chinese products become more expensive as labour costs in China increase.

<p>Strengths</p> <ul style="list-style-type: none"> • Geographic area & climate • Long tradition of horticultural production and trade • Favourable institutional environment/ agreement between Singapore and Indonesia to increase trade + external support 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Weak VC position of farmers/profits are made elsewhere • Export chain dominated by Singaporean buyers • Farmers are “locked-in” in traditional VC • Low value of bulk products/ no value addition • Carrying capacity reached • Lack of support from local government
<p>Opportunities</p> <ul style="list-style-type: none"> • Growing demand for horticultural products throughout Southeast Asia. • Growing middle class increases demand for organic products • Several upgrading strategies for improved VC e.g. contract farming • Domestic market e.g. Batam • Export of high-value organic products to Singapore 	<p>Threats</p> <ul style="list-style-type: none"> • Natural disaster e.g. volcano eruption • Vulnerability to climate change and extreme weather conditions • Excessive use of pesticides • Reduced exports/lower incomes/less investments • Competition/ imported products are cheaper

Figure 19: SWOT Analysis

7.2 Discussion

The present thesis offers an extensive analysis of the horticultural value chains for products from Karo and provides a livelihood comparison between conventional farmers and farmers who produce organically in a contract farming scheme. The aim was to combine both approaches in order to draw conclusions about the impacts of participation in a certain value chain on the livelihoods of farmers. This discussion will relate the findings of this research to the theoretical framework in chapter 2.

All in all it can be said that the value chain conditions found in the Karo Highlands correspond to a large extent to the theoretical debate portrayed in chapter 2. As Trienekens (2011) described, power relations and information asymmetries are a major factor in global value chains. Dolan & Humphrey (2000) as well as Talbot (2002) and Fromm (2007) analyzed the power relations with regard to agri-food systems, and pointed out that the governance form not only greatly influences power structures, but also the resource allocation in value chains. These factors are indeed important in the export value chain to Singapore that is dominated by powerful buyers in Singapore who take advantage of their possibility to directly procure fresh fruits and vegetables in Medan without the involvement of an equal Indonesian counterpart. In the domestic chain the power is unequally distributed as well, with middle-men and buyers benefitting from information asymmetries and the capability of exerting pressure on smallholder farmers. The governance structure of value chains that was first introduced by Gereffi (1994) is therefore an important aspect that was also very important for this analysis. This study revealed that the value chains for products from Karo are clearly buyer-driven. Kaplinsky & Morris (2001) however point out that coordination does not imperatively require that only one dominant actor governs the whole chain. This holds true in respect of the organic value

chain that was established by TSR. In this value chain that can also be described as buyer-driven, TSR holds a strong position and determines the prices paid to farmers, as well as the type of crops grown and the quality requirements. Even though the supermarket link had to be neglected due to time constraints, this analysis comes to the conclusion that supermarkets indeed have powerful positions in the current horticultural sector. There exists thus not only one powerful actor, but both TSR and supermarkets have the power to influence actors in other chain links. The horticultural value chains analyzed in North Sumatra exclude producers from coordinating function, which was also described by Dolan and Humphrey (2000).

Kaplinsky and Morris (2001) describe that upgrading strategies are particularly important for developing country value chains and were in effect a valuable framework for orientation during this analysis. For producers in the Karo Highlands all four upgrading strategies seem promising and offer opportunities for farmers to strengthen their positions in chains and improve their livelihoods.

The comparative advantage of cheap labour and productive land mentioned by Bamber et al. (2014) only applies to a limited extent to the present case study area. The soil fertility has been decreasing due to excessive production and pesticides use in the past decades and the labour costs in Indonesia are also higher than in other Asian countries. Indonesia therefore has lost ground in the trade of horticultural products and China, Thailand, Malaysia and the Philippines are strong competitors who produce at lower costs. A comparative advantage could however arise if smallholder farmers engage in organic farming due to the labour-capital intensity ratio (Fernandez-Stark et al., 2012), which is already implemented to a limited extent in the Karo Highlands. The diversification that some farmers achieve through the contract farming for TSR, while also continuing conventional farming, can reduce the farmers' vulnerability to external factors. These positive outcomes of diversification on people's livelihoods have previously been studied by Ellis (1998).

For the trade of products within ASEAN many characteristics of South-South trade described by scholars are fulfilled. Escaith & Inomata (2011) state that regional trade blocks offer tariff-free movement of products, which indeed holds true for the AFTA. Furthermore, Diaz Rios & Jaffee (2008) mention that regional chains are usually less compressed and allow the participation of a greater number of suppliers. In Southeast Asia the trade of horticultural products is not yet dominated by large supermarket chains. In North Sumatra for example, most horticultural products are still traded on local wholesale markets and bought by consumers on wet markets. The "supermarket revolution" (Humphrey, 2007) is not yet taking place. Also, this analysis dissents from the argument that the standards on regional markets tend to be less strict and therefore have lower entry barriers for developing countries (Diaz Rios & Jaffee, 2008). The pesticide residues on products from Karo and the strict controls by Singaporean authorities have led to a serious deterioration of trade relations and pose a threat to the participation of Indonesia in international value chains.

Further constraints on the country level indicated by Markelova et al. (2009) as well as Diaz Rios & Jaffee (2008) and Fernandez-Stark et al. (2012) apply to North Sumatra: The infrastructure is not yet developed sufficiently and the supply of the needed inputs is not given at all times. Another important threat for Indonesian producers is the vulnerability to climate, disease and natural disasters.

7.3 Closing Remarks

Using complementary approaches for the research and analysis have been very valuable for this thesis since value chains do not exist in a vacuum and are influenced by external factors as well as personal decisions taken by value chain actors. The combination of value chain and livelihood research can therefore be highly recommended for future studies. The results from a holistic approach have higher chances to convince policy makers to tackle certain issues.

This research could unfortunately not cover all relevant aspects of horticultural value chains from the Karo Highlands, which leaves room for future research. Knowledge gaps identified concern the supermarket chain and the power distribution within these chains. Furthermore, the chain sequence that takes place in exporting countries, for example Singapore, needs to be further analyzed to fully understand the value addition to the products and the profit distribution.

Now that several upgrading strategies have been identified the question is whether government bodies, NGOs, development and private sector organizations, as well as farmer cooperatives will be willing to work together in order to revive and develop the horticultural sector in favour of the livelihoods of farmers. The expansion of organic production seems especially promising and it remains to be seen if farmers can have a comparative advantage in the export of organic horticultural products. It is to be hoped that this growing sector in combination with the creation of short value chains will generate new possibilities and the desired benefits for smallholder farmers from the Karo Highlands.

GLOSSARY

<i>Adik</i>	Younger brother, younger sister
<i>Angkutan</i>	Small bus used for public transport
<i>Babi panggang</i>	Grilled pork
<i>Bahasa Indonesia</i>	Indonesian language
<i>Bapak</i>	Father, mister
<i>Goni</i>	Plastic bag
<i>Hak Milik</i>	Right ow land ownership
<i>Ibu</i>	Mother, Woman
<i>Karung</i>	Rice bag
<i>Kakak</i>	Older brother, older sister
<i>Keranjang</i>	Basket
<i>Kotak karton</i>	Cardboards box
<i>Pasar</i>	Market
<i>Penyuluh pegawai negeri sipil</i>	Government extension workers
<i>Penyuluh swadaya</i>	Independent extension workers
<i>Penyuluh swasta</i>	Private extension worker
<i>Pengumpul</i>	Collector
<i>Perkoper</i>	First middle-man who buys products at the village wholesale market
<i>Perlangsung</i>	Second middle-man who resells the products bought from the perkoper
<i>Rajut</i>	Plastic net
<i>Sertipikat</i>	Certificate
<i>Tanah-air</i>	Land and water
<i>Terimah kasih</i>	Thank you
<i>Trimatra pembangunan</i>	Tridimensional development
<i>Tukang kilo</i>	Person who weighs the agricultural products at the village wholesale markets
<i>Warung</i>	Kiosk/café
<i>Wawasan nusantara</i>	Archipelagic concept

BIBLIOGRAPHY

- Abdi Tani (2012). Menyikapi Tren Impor Komoditas Hortikultura. (*Addressing the import trend of horticultural commodities*). Abdi Tani Magazine, Vol. 13 No. 1 Edition XLIV, January - March 2012.
- Abdussalam, A. (2015). Indonesia should protect its agricultural sector. Antara News. [9 April 2015]. Retrieved April 25, 2015, from <http://www.antaranews.com/en/news/98435/indonesia-should-protect-its-agriculture-sector>
- ADB (Asian Development Bank) (2006). Indonesia. Strategic Vision for Agriculture and Rural Development, Asian Development Bank, Philippines.
- ADB (Asian Development Bank), International Labour Organization (ILO) and Islamic Development Bank (IDB) (2010). Indonesia: Critical Development Constraints, Asian Development Bank, Philippines.
- Agustine, I. (2014). Hadapi MEA, AESBI Harapkan Peningkatan Daya Saing. (*in the face of the ASEAN Economic Community(MEA) the Indonesian Association of fruits and vegetables exporters (AESBI) expects increased competitiveness*). [29 November 2014]. Industri. Retrieved June 27, 2015, from <http://industri.bisnis.com/read/20141126/99/275484/hadapi-mea-aesbi-harapkan-peningkatan-daya-saing>
- Anas, T. (2012). Indonesia's new protectionist trade policies: a blast from the past. East Asia Forum, 18 June 2012. Retrieved June 25 2015, from <http://www.eastasiaforum.org/2012/06/18/indonesia-s-new-protectionist-trade-policies-a-blast-from-the-past/>
- Ariesusanty, L. (2011). Indonesia: Country Report . *The World of Organic Agriculture, Statistics and Emerging Trends*, IFOAM, Bonn & FiBL, Frick.
- Arifin, L.W. (2009). Introduction of eco-enzyme to support organic farming in Indonesia. *Asian Journal of Food and Argo Industry* :356-359.
- Arsanti, I., Böhme, M., & Jhanke, H. E. (2007). Evaluation of vegetable farming systems for competitiveness in upland areas of Indonesia. *Acta Hortic*,794, 49-54.
- Aryanti, F.D., Nugroho, A., Romadhon, A., Wicaksono, A., Simamora, H., Ciliani, N., (2014). Statistik Produksi Hortikultura Provinsi Sumatera Utara Tahun 2009 – 2013. (*Horticultural production statistics of North Sumatra Province 2009- 2013*). Sekolah Tinggi Ilmuh Statistik, Jakarta.
- ASEIBSSINDO (2014). Singapura Jadi Pilot Project Ekspor Buah dan Sayur. (*Singapore becomes a pilot project for the export of fruits and vegetables*). Fresh Fruits and Vegetables Importers and Exporters Association Indonesia. Retrieved 15 May, 2015, from <http://www.aseibssindo.org/index.php/component/content/article/130-singapura-jadi-pilot-project-ekspor-buah-dan-sayur-.html>
- Bacon, C. (2005). Confronting the coffee crisis: can fair trade, organic and specialty coffees reduce small-scale farmer vulnerability in northern Nicaragua? *World Development* 33 (3): pp. 497-511.

- Bank of Indonesia (2011). Monetary Policy Report Quarter IV: 2-3. Retrieved June 25, 2015, from <http://www.bi.go.id/en/publikasi/kebijakan-moneter/tinjauan/Documents/719f3971c6e2402c90d1320cab72f926MPRIV2011.pdf>
- Bamber, P., Fernandez-Stark, K., Gereffi, G., & Guinn, A. (2014). Connecting Local Producers in Developing Countries to Regional and Global Value Chains. OECD Trade Policy Paper No. 160. Trade and Agriculture Directorate. Paris.
- Batt, P. J. & Cadilhon, J.-J. (2007). Proceedings of the International Symposium on Fresh Produce Supply Chain Management. Edited by Batt, Peter J. and Cadilhon, Jean-Joseph. *RAP Publication 2007/21*. Bangkok: AFMA, Curtin University, Department of Agriculture, FAO.
- Bautista, R., Nu Nu San, Swastika, D., Bachri, S., and Hermanto (1997). Evaluating the effects of domestic policies and external factors on the price competitiveness of Indonesia crops: Cassava, soybean, maize, and sugarcane. Trade and Macroeconomics Discussion Paper 18. Washington, D.C.: International Food Policy Research Institute.
- Badan Urusan Logistik (BULOG) (2015). <http://www.bulog.co.id/>
- Batam Bisnis (2014). Data Impor Hortikultura Batam, Wortel Paling Banyak Masuk. (*Data on horticultural imports to Batam, Carrots are imported the most*). [14 May 2015]. Retrieved June 18, 2015, from <http://batam.bisnis.com/m/read/20140514/6/44677/data-impor-hortikultura-batam-wortel-paling-banyak-masuk>
- Bishop-Sambrook, C. (2005). *Contribution of farm power to smallholder livelihoods in sub-Saharan Africa*. FAO.
- Chambers, R., & Conway, G. (1991). *Sustainable rural livelihoods: practical concepts for the 21st century*. Institute of Development Studies (UK).
- Chin, A. (2005). Country report Singapore. In *Proceedings of the Asia regional workshop on the implementation, monitoring and observance of the internal code of conduct on the distribution and use of pesticide [data base on the Internet]*. FAO. Bangkok.
- CIA (2014). The World Factbook: Indonesia. Updated June 22, 2014. Retrieved July 11, 2014, from <https://www.cia.gov/library/publications/the-world-factbook/geos/id.html>
- CME (2011). Master Plan for the Acceleration and Expansion of Indonesia Economic Development 2011-2025, Jakarta: Coordinating Ministry for Economic Affairs, Republic of Indonesia.
- Cooper, M.C., Lambert, D.M., and Pagh, J.D. (1997). Supply Chain Management: More Than a New Name for Logistics. *International Journal of Logistics Management*, 8(1):1-14.
- Crawford, I. M. (1997). *Agricultural and food marketing management*. FAO. Rome.
- Daulay, F.F. (2012). Singapura Ekspor Hortikultura Asal Indonesia Lewat Pelabuhan. (*Singapore exports horticultural products originating from Indonesia through the harbor*). [5 January, 2012]. Tribun News. Retrieved May 16, 2015, from <http://www.tribunnews.com/bisnis/2012/01/05/singapura-ekspor-hortikultura-asal-indonesia-lewat-pelabuhan>

- Daviron, B., & Gibbon, P. (2002). Global Commodity Chains and the African Export Agriculture. *Journal of Agrarian Change* 2:137-161.
- Dean, G. (2003). Indonesian Land Law and Foreign Ownership of Land. Okussi Associates. Retrieved July 7, 2014, from <https://okussiassociates.com/garydean/works/indonesian-land-law.html>
- De Janvry, A., & Sadoulet, E. (2005). Achieving Success in Rural Development: Toward Implementation of an Integral Approach. *Agricultural Economics* 32 (1): 75-89.
- DFID (1999). Sustainable Livelihoods Guidance Sheets, Numbers 1–8, London: Department for International Development (also available on www.livelihoods.org).
- Diaz Rios, L. & S. Jaffee (2008). Barrier, Catalys or Distraction? Standards, Competitiveness and African Groundnut Exports to Europe. Washington, D.C.: World Bank.
- Dolan, C., and J. Humphrey (2000). Governance and Trade in Fresh Vegetables: The Impact of UK Supermarkets on the African Horticulture Industry. *Journal of Development Studies* 37(2): 147-176.
- Dolan, C., Humphrey, J. (2004). Changing Governance Patterns in the Trade in Fresh Vegetables between Africa and the United Kingdom. *Environment and Planning*, 36: 491-509.
- Dunn, E.G. (2012). Facilitating Systemic Change in Value Chains: Lessons learned for strengthening country systems. *Background paper for the USAID experience summit on strengthening country systems*. Washington, DC.
- Elias, Stephen, and Clare Noone (2011). *The growth and development of the Indonesian economy*. Bulletin December Quarter 2011, p. 33-44, Reserve Bank of Australia.
- Escaith, H., & Inomata, S. (Eds.). (2011). *Trade patterns and global value chains in East Asia: From trade in goods to trade in tasks*. World Trade Organization.
- Faiq, M.H. (2011). Rugi, Petani Sayur Mundur dari Kerjasama Ekspor (*Making losses, farmers resign from export cooperation*). [7 December 2011]. Retrieved May 8, 2015 from <http://nasional.kompas.com/read/2011/12/07/16273346/Rugi.Petani.Sayur.Mundur.dari.Kerjasama.Ekspor>
- FAO/ITC (Food and Agriculture Organization/International Trade Centre) (2001). *World markets for organic fruit and vegetables*. Rome: FAO.
- FAO (2003). Development of a Framework for Good Agricultural Practices. Committee on agriculture, Seventeenth Session, COAG/2003/6, Rome.
- Fernandez-Stark, K., Bamber, P., & Gereffi, G. (2011). The Fruit and Vegetable Global Value Chain: Workforce Development and Economic Upgrading. Durham: Center for Globalization. *Governance and Competitiveness*.
- Fernandez-Stark, K., Bamber, P., & Gereffi, G. (2012). Inclusion of Small-And Medium-Sized Producers in High-Value Agro-Food Value Chains. *FOMIN, Diciembre*.

- Firdaus, M., & Gunawan, I. (2012). Integration Among Regional Vegetable Markets in Indonesia. *Journal of ISAAS*, 8(2), 96-16.
- Fitriani, E. (2013). More Than Half of Indonesia's Organic Farms Lack Certification. [April 16, 2013]. The Jakarta Globe. Retrieved June 27, 2015, from <http://thejakartaglobe.beritasatu.com/news/more-than-half-of-indonesias-organic-farms-lack-certification/>
- Fromm, I. (2007). *Upgrading in Agricultural Value Chains: The Case of Small Producers in Honduras*, GIGA Research Programme: Transformation in the Process of Globalization, GIGA WP 64/2007.
- Gantina, A. and Sulaeman, A. (2006). *Consumer perception on nutritional and health aspects of organic foods*. Department of Community Nutrition. Faculty of Human Ecology. Bogor.
- Gereffi, G., (1994). The Organization of Buyer-Driven Global Commodity Chains: How U.S. Retailers Shape Overseas Production Networks, in G. Gereffi and M. Korzeniewicz (eds), *Commodity Chains and Global Capitalism*, Westport: Praeger, pp. 95–122.
- Gereffi, G. (1999). International Trade and Industrial Up-Grading in the Apparel Commodity Chain, *Journal of International Economics* 48(1): 37-70.
- Gereffi, G., & Kaplinsky, R. (2001). *The Value of Value Chains*. Special Issue of IDS Bulletin, 32(3).
- Gereffi, G., Humphrey, J., & Sturgeon, T. (2005). The governance of global value chains. *Review of international political economy*, 12(1), 78-104.
- Gibbon, P., (2003). *Commodities, Donors, Value-Chain Analysis and Upgrading*. Danish Institut for International Studies, Copenhagen, November 2003.
- Global Business Guide Indonesia (2012). *The Rise of Modern Retail Outlets*. Retrieved June 24, 2015, from http://www.gbgingonesia.com/en/services/article/2011/the_rise_of_modern_retail_outlets.php
- Grunert, K. G. (2006). How changes in consumer behaviour and retailing affect competence requirements for food producers and processors. *Economia Agraria y Recursos Naturales* 6(11).
- Handriana, E. (2014). Pertumbuhan Pangan Organik Nasional Hanya 5 Persen. (*Horticultural production only grows by 5%*). Suara Merdeka [12 June 2014]. Retrieved April 13, 2015, from <http://www.suaramerdeka.com/v1/index.php/read/news/2014/06/12/205492/Pertumbuhan-Pangan-Organik-Nasional-Hanya-5-Persen>
- Haraito, G. (2010). AESBI: Kualitas bibit sayur dan buah Indonesia rendah. (*Fresh Fruits and Vegetables Importers and Exporters Association of Indonesia: The quality of Indonesian fruits and vegetable seeds is low*). [28 October 2010]. Kontan.co.id., Retrieved June 13, 2015, from <http://industri.kontan.co.id/news/aesbi-kualitas-bibit-sayur-dan-buah-indonesia-rendah-1>
- Harian Andalas (2014a). Erupsi Sinabung Pengaruhi Ekspor Hortikultura Sumut. (*Sinabung eruption influences the horticulture exports from North Sumatra*). [29 December 2014]. Retrieved June 26, 2015, from <http://harianandalas.com/kanal-ekonomi/erupsi-sinabung-pengaruhi-ekspor-hortikultura-sumut>

- Harian Andalas (2014b). 2015, Sumut Prioritaskan 3 Jenis Tanaman Hortikultura. (*2015 North Sumatra prioritizes 3 types of horticultural products*). [29 December 2014]. Retrieved June 26, 2015, from <http://harianandalas.com/kanal-ekonomi/2015-sumut-prioritaskan-3-jenis-tanaman-hortikultura>
- Harian Orbit (2012). Singapura Minta Sumut Tingkatkan Ekspor Sayuran (*Singapore asks North Sumatra to increase vegetable exports*). [9 August 2012]. Retrieved June 20, 2015, from <http://www.harianorbit.com/singapura-minta-sumut-tingkatkan-ekspor-sayuran>
- Hawksford (n.d.). Importing Food Products into Singapore. Retrieved June 14, 2015, from <http://www.guidemesingapore.com/industry-guides/restaurant/importing-food-products-into-singapore>
- Heryani, E., & Grant, C. (2004, October). Land administration in Indonesia. *3rd FIG Regional Conference*. Jakarta.
- Hill, Hal (2000). *The Indonesian economy*. Cambridge, UK: Cambridge the University Press.
- Humphrey, J. (2007). The supermarket revolution in developing countries: tidal wave or tough competitive struggle?. *Journal of Economic Geography*.
- Humphrey, J. & Schmitz, H. (2002). How Does Insertion in Global Value Chains Affect Upgrading in Industrial Clusters? *Regional Studies*, 36: 1017-1027.
- ICASEPS (2008). *Livelihood and gender impact of rapid changes to bio-security policy in the Jakarta area and lessons learned for future approaches in urban areas*. Rome, ICASEPS in collaboration with Food and Agriculture Organization.
- Inawati, L. (2010). Indonesia Organic Alliance officially launches PAMOR Indonesia. *The Global PGS Newsletter*, Vol.1 No. 5, IFOAM. Retrieved December 13, 2014, from http://www.ifoam.bio/sites/default/files/page/files/2010-02_pgs_newsletter.pdf
- Irawan, P.B., & Romdiati, H. (2000). *The Impact of the Economic Crisis on Poverty and its Implications for Development Strategies*. Paper presented at Widyakarya Nasional Pangan dan Gizi VII (National Workshop on Food and Nutrition VII) at LIPI, Jakarta, 29 February–2 March 2000.
- Jahn, G., Schramm, M. and Spiller, A. (2004). The trade-off between generality and effectiveness in certification systems: A conceptual framework. In: *Dynamics in Chains and Networks*. Proceedings of the sixth international conference on chain and network management in agribusiness and food industry. Edited by H. J. Bremmers, S. W. F. Omta, J. H. Trienekens and E. F. M. Wubben. , 335-343. The Netherlands: Wageningen Academic Publishers, Ede.
- Jahroh, S. (2010). Organic farming development in Indonesia: lessons learned from organic farming in West Java and North Sumatra. In *ISDA 2010* (pp. 11-p). Cirad-Inra-SupAgro.
- Jamal, E. (2010). *Role of improved seed in transforming agriculture in Indonesia*. Institute for Agricultural Research and Development, Ministry of Agriculture.
- Joshi, P. K., Gulati, A., Birthal, P. S., & Tewari, L. (2004). Agriculture diversification in South Asia: patterns, determinants and policy implications. *Economic and Political Weekly*, 2457-2467.

- Kaplinsky, R. (2000). Globalisation and Unequalisation: What Can Be Learned from Value Chain Analysis. *Journal of Development Studies* 73(2):117-146.
- Kaplinsky, R., & Morris, M. (2001). A handbook for value chain research (Vol. 113). Ottawa: IDRC.
- Karnjanakesorn, C. (2013). *Indonesia Regulations on Agricultural Products*. Office of Agricultural Affairs, Royal Thai Embassy Jakarta, Indonesia. Retrieved June 25, 2015, from <http://www.biotech.or.th/TH/images/stories/TU/2013-02/choomjet.pdf>
- Keliat, S. (2008). Analisis Sistem Pemasaran Wortel. (*Analysis of the carrot marketing*). Universitas Sumatra Utara, Medan.
- Khaerudin and Rinaldi I. (2010). Residu Pestisida Masih Jadi Masalah. (*Pesticide residue is still an issue*). [5 July 2010]. Kompas.com. Retrieved online June 29, 2015, from <http://health.kompas.com/read/2010/07/05/04452441/Residu.Pestisida.Masih.Jadi.Masalah>.
- Kiemen, A., & Beuchelt, T. (2012). *Certification as an upgrading strategy for small-scale farmers and their cooperatives: a value chain analysis for Nicaraguan coffee*. Discussion Paper No. 2/2010, Universität Hohenheim.
- Kong, B. (2012). Singapore Retail Foods. Global Agricultural Information Network (GAIN). USDA Foreign Agricultural Service. Singapore.
- Koran Batam (2014). Kebutuhan Sayur Di Batam Mencapai 100 Ton Perhari. (*The demand of vegetables in Batam reaches 100 tons per day*). Retrieved June 29, 2015, from <http://koran-batam.blogspot.de/2014/01/kebutuhan-sayur-di-batam-mencapai-100.html>
- Lazzarini, S.L., F. R. Chaddad and M. L. Cook (2001). Integrating Supply Chain and Network. *Journal on Chain and Network Science* 1(1): 7-22.
- LEI Wageningen UR (2013). Factsheet Horticulture – Indonesia. Retrieved June 19, 2015 from <http://www.greenporthollandinternational.nl/wp-content/uploads/Factsheet-Indonesia.pdf>
- Lie, H., Rich, K. M., Kurwijila, L. R., & Jervell, A. M. (2012). Improving smallholder livelihoods through local value chain development: a case study of goat milk yogurt in Tanzania. *International Food and Agribusiness Management Review*, 15(3).
- Lubis, D.P. (2012). *Agricultural extension in Indonesia: Current Status and Possible Ways to Meeting Emerging Challenges*. Department of communication and community development. Bogor Agricultural University.
- Lucas, A., & Warren, C. (2013). *Land for the people: The state and Agrarian conflict in Indonesia*. Ohio University Press/Swallow Press.
- Magiera, S.L. (2003). Indonesia. In *WTO Agreement on Agriculture: The implementation experience. Developing country case studies*. FAO, Commodities and Trade Division. Rome: Food and Agriculture Organization of the United Nations.
- Markelova, H., Meinzen-Dick, R., Hellin, J., & Dohrn, S. (2009). Collective action for smallholder market access. *Food policy*, 34(1), 1-7.

- Martinez, S. W. (2002). Vertical coordination of marketing systems: Lessons from the poultry, egg, and pork industries. *ERS, USDA, AER*, (807).
- Maulana, M., & Sayaka, B. (2007). The features of vegetables in Indonesia and the current policy in the framework of agricultural development. *Analisis Kebijakan Pertanian*, 5(3), 267-284.
- McDermott, G. (2005). The politics of institutional renovation and competitive upgrading: Lessons from the transformation of the Argentine wine industry. In *APSA Annual Meetings, Washington, DC*.
- Medan Bisnis (2014). Akibar Erupsi Gunung Sinabung Produksi Sayuran Turun 30%. (*As a result of Mount Sinabung eruption vegetable production decreases by 30%*). [07 January 2014]. Retrieved May 7, 2015, from http://www.medanbisnisdaily.com/news/read/2014/01/07/71623/produksi-sayuran-turun-30persen/#.VZGSy_ntmko
- Ministry of Agriculture (MoA) (2010). Agriculture Development Plan 2010-2014.
- Mitchell, J., Keane, J., & Coles, C. (2009). *Trading up: How a value chain approach can benefit the rural poor*. Overseas development institute (ODI).
- Muhardi, F. (2011). Buah Impor Ternyata Dari Sumatra Barat. (*Imported fruits are apparently from West Sumatra*). [14 July 2011]. Antara Riau. Retrieved online May 19, 2015, from <http://antarariau.com/berita/15024/distanbunhut:-buah-impor-ternyata-dari-sumatra-barat>
- Nas, P. J. M. (2003). Ecumenopolis in Asia. *International Institute for Asian Studies Newsletter*, No.31, July 2003, Leiden.
- Nasir, M. (2012). Analisis Keterkaitan ekspor ke Singapura terhadap pertumbuhan ekonomi Sumatera Utara. (*Analysis of the linkages between exports to Singapore and economic growth In North Sumatra*), Jurnal Mediasi, Vol. 4 No.1 Juni 2012. Medan.
- OECD (2010). *The economic importance of agriculture for sustainable development and poverty reduction: Findings from a case study from Indonesia*, Global Forum on Agriculture 29-30 November 2010, Policies for Agricultural Development, Poverty Reduction and Food Security, Paris.
- OECD (2012), *OECD Review of Agricultural Policies: Indonesia 2012*, OECD Publishing, Paris.
- Pinem, R. (2015). Percepat Relokasi Warga Korban Sinabung. (*Accelerate the relocation of Sinabung victims*). [June 20, 2015]. Sindonews. Retrieved June 26, 2015, from <http://daerah.sindonews.com/read/1014987/191/percepat-relokasi-warga-korban-sinabung-1434805279>
- Poloan, N. (2010). Sumut Potensial Ekspor Langsung Sayur Mayur ke Singapura. (*Potential of direct vegetable export of North Sumatra to Singapore*). [12 December 2010]. Republika. Retrieved June 15, 2015, from <http://www.republika.co.id/berita/breaking-news/ekonomi/10/12/12/151764-sumut-potensial-ekspor-langsung-sayur-mayur-ke-singapura>
- Ponte, S. (2002). The "latte revolution"? Regulation, markets and consumption in the global coffee chain. *World Development*, 30(7), 1099–1122.

- Pray, C. E., & Fuglie, K. O. (2001). *Private investment in agricultural research and international technology transfer in Asia*. US Department of Agriculture, Economic Research Service.
- Rafani, I. (2015). Strategic Plan of Indonesian Ministry of Agriculture: 2015-2019. Indonesian Center for Agriculture, Socio Economic and Polic Studies (ICASEPS), Ministry of Agriculture. Retrieved May 10, 2015, from http://ap.fftc.agnet.org/ap_db.php?id=416
- Raikes, P., Jensen, F.M. and Ponte, S. (2000). Global Commodity Chain Analysis and the French Filière Approach: Comparison and Critique, *Economy and Society* 29(3): 319-417.
- Raynolds, L. T. (2004). The globalization of organic agro-food networks. *World development*, 32(5), 725-743.
- Reardon, T., Barrett, C. B., Berdegue, J. A., & Swinnen, J. F. (2009). Agrifood industry transformation and small farmers in developing countries. *World development*, 37(11), 1717-1727.
- Rock, M.T. (2002). Exploring the impact of selective interventions in agriculture on the growth of manufacturers in Indonesia, Malaysia, and Thailand, *Journal of International Development*, Vol. 14 No. 4, pp. 485-510.
- Saptana, S., Siregar, M., Mayrowani, H., Sadikin, I., & Friyatno, S. (2001). Analisis Keunggulan Kompetitif Komoditas Unggulan Hortikultura. (*Competitive Advantage Analysis on Potential Horticulture Commodity*). Pusat Penelitian dan Pengembangan Sosial Ekonomi Pertanian. Departemen Pertanian. Bogor.
- Schwentesius, R. & Gómez, M. A. (2002). Supermarkets in Mexico: impacts on horticultural systems. *Development Policy Review*, Vol. 20 No. 4, pp. 487-502.
- Shepherd, A. 2007. *Approaches to linking producers to markets, a review of experiences to date*. Rome: FAO.
- Sihaloho, R.O., Lubis, S.N., Darus, M.B. (2014). Analisis Pemasaran Kentang Dan Kubis Untuk Tujuan Ekspor Pada Tingkat Gabungan Kelompok Tani (Gapoktan) Kabupaten Karo. (*Analysis of the marketing of potatoes and cabbage for export markets by farmer cooperatives (gapoktan) in the Karo regency*). *Agribusiness E-journal University of North Sumatra*, Vol. 3, No.1.
- Singapore Fruits and Vegetables Importers and Exporters Association (SFVA) (2015). <http://www.singaporefva.com/>
- Situmorang, K. C. (2011). *The Organisation of Trade in North Sumatra: Batak Traders and Trading Networks* (Doctoral dissertation, Universitäts-und Landesbibliothek Bonn).
- Solesbury, W. (2003). *Sustainable livelihoods: a case study of the evolution of DFID policy*. Overseas Development Institute.
- Springer-Heinze, A. (2013). *Themeninfo: Landwirtschaftliche Wertschöpfungsketten*. Abteilung Ländliche Entwicklung und Agrarwirtschaft. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. Eschborn.

- Stanton, J. V., & Burkink, T. J. (2008). Improving small farmer participation in export marketing channels: perceptions of US fresh produce importers. *Supply Chain Management: An International Journal*, 13(3), 199-210.
- Sudaryanto, T. (2014). *The frame of agricultural policy and recent major agricultural policies in Indonesia*. Ministry for International Cooperation, Ministry of Agriculture, the Republic of Indonesia. Retrieved June 22, 2015 from http://ap.fftc.agnet.org/ap_db.php?id=256&print=1
- Sudaryanto, T. (2015). *Structural Change of Indonesian Agriculture: Evidence from Agricultural Census 2003-2013*. Indonesian Centre for Agriculture, Socio Economic and Policy Studies, Ministry of Agriculture. Retrieved June 25, 2015 from http://ap.fftc.agnet.org/ap_db.php?id=398
- Sulaeman, I.A. (2012). *Analysis of organic food regulations and its impact on organic supply chain in Indonesia*. The International Symposium on Marketing and Finance of the Organic Supply Chain. 23-26 September 2012, Seoul, Korea.
- Surasakjinda, D. (2014). *Ensuring Food Security in ASEAN through "Sustainable Agrifood Systems"*, Newsletter of Bangkok-based projects by GIZ and PARTNERS, Issue 31 October-December 2014.
- Surono, J. I. (2007). *Country Case Study of Indonesia*, Regional Conference on Organic Agriculture in Asia 12-15 December 2007, Bangkok, Thailand.
- Suryahadi, A., & Hadiwidjaja, G. (2011). The role of agriculture in poverty reduction in Indonesia. *Jakarta: SMERU Research Institute*.
- Syaukat, Y. (2008). Socio-economic assessment of organic farming in Bogor, West Java, Indonesia. *J. ISSAAS* Vol. 14, No 2:49-60.
- Talbot, J. M. (2002). Tropical commodity chains, forward integration strategies and international inequality: Coffee, cocoa and tea. *Review of International Political Economy*, 9(4), 701-734.
- The Jakarta Post (2012). OECD calls on Indonesia to reform agricultural policy [October 11, 2012]. Retrieved June 20, 2015, from <http://www.thejakartapost.com/news/2012/10/11/oecd-calls-indonesia-reform-agricultural-policy.html>
- Tribun Medan (2012). Pasar Produk Organik Tak Kenal Inflasi. (*The market for organic products does not know inflation*). [12 Juli, 2012]. Retrieved June 28, 2015, from <http://medan.tribunnews.com/2012/07/12/pasar-produk-organik-tak-kenal-inflasi>
- Trienekens, J. H. (2011). Agricultural value chains in developing countries a framework for analysis. *International Food and Agribusiness Management Review*, 14(2).
- UNComtrade (2011). Exports of Fruits and Vegetables. <http://comtrade.un.org/>
- UNIDO (2009). *Agro-Value chain analysis and development*. The UNIDO Approach. A staff working paper. United National Industrial Development Organization. Vienna.
- United Nations (2015). Population, Consumption and the Environment 2015, Department of Economic and Social Affairs, Population Division, UN. Retrieved June 20 2015, from

<http://www.un.org/en/development/desa/population/publications/pdf/environment/PopulationConsumptionEnvironment2015.pdf>

- USAID (2007). *A Rapid Assessment of the Horticulture Vegetable Sector in Indonesia*. AMARTA, USAID: Jakarta.
- USAID (2010): USAID Country Profile: Indonesia. Property rights & Resource Governance. Retrieved July 11, 2014, from http://usaidlandtenure.net/sites/default/files/country-profiles/full-reports/USAID_Land_Tenure_Indonesia_Profile_0.pdf
- Uzzi, B. (1997). Social Structure and Competition in Interfirm Networks: the Paradox of Embeddedness. *Administrative Science Quarterly* 42: 35-67.
- Van den Berg, M. (2004). *Making value chains work better for the poor: A toolbox for practitioners of value chain analysis*. Asian Development Bank, [Vietnam Resident Mission].
- Van Der Meer, C.L.J. (2006). Exclusion of small-scale farmers from coordinated supply chains, in Ruben, R., Slingerland, M. and Nijhoff, H. (Eds), *Agro-food Chains and Networks for Development*, Springer, Amsterdam.
- Voon J.P., Ngui, K.S., and Agrawal A., (2011). Determinants of Willingness to Purchase Organic Food: An Exploratory Study: Using Structural Equation Modelling, *International Food and Agribusiness Management Review*, Vol. 14, No 2.
- Weinberger, K. and T.A. Lumpkin (2007). Diversification into Horticulture and Poverty Reduction: A Research Agenda, *World Development*, 35(8): 1464-1480.
- World Bank (2007). *Horticultural Producers and Supermarket Development in Indonesia*, Rural Development, Natural Resources and Environment Sector Unit. Report No. 38543-ID. Retrieved June 24, 2015, from http://siteresources.worldbank.org/INTINDONESIA/Resources/Publication/280016-1168483675167/Holtikultura_en.pdf
- Worldometers (2015). Population Indonesia. Retrieved June 22, 2015, from <http://www.worldometers.info/world-population/indonesia-population/>
- WTO (World Trade Organization) (1998). *Trade policy review Indonesia*. Report by the Secretariat. WT/TPR/S/51.
- WTO (World Trade Organization) (2003). *Trade policy review Indonesia*. Report by the Secretariat. WT/TPR/S/117.
- Yussefi, M.& Willer, H. (Eds.). (2003). *The world of organic agriculture*. Tholey-Theley, Germany: IFOAM.

Appendix A – Household Survey

ID	Number:	
01	Date of interview:	
02	Area/ Village:	
03	Name of HH head	Name:

A. Demographics/ Human Capital

A1	Sex	1. Male	2. Female					
A2	What is your age?	Years:						
A3	What is your highest completed education level?	1. SD	2. SMP	3. SMA	4. SMK	5. S1	6. S2	7. S3
A4	What is your marital status?	1. Married/in a relationship		2. Single				
		3. Divorced		4. Widowed				
A5	What is your religion?	1. Muslim		2. Catholic				
		3. Protestant		4. Other, specify...				
A6	How many persons does your HH consist of?	Number:						
A7	What is their status and occupation?	Status:		Occupation:				
A8	How many of them help you with farming?	Number:						
A9	For how long have you been primarily responsible for farm management?	Years:						
A10	Do you have a child/children living outside of Karo?	1. Yes	2. No					
A11	Why did your child/children move away?	1. Education		2. Work				
		3. Other, specify						
A12	Are there plans for your child/children to move back to Karo?	1. Yes	2. No					
A13	If no, why not?	Specify:						
A14	If yes, does your child/do your children have plans to work as farmers?	1. Yes	2. No					
A15	Have there been illnesses in your family in the past 3 years?	1. Yes	2. No					
A16	How has the health condition in your HH changed over the past five years?	1. Worse	2. Same	3. Better				

B. Financial Capital

B1	Did you need additional capital to run your farming business in 2014?	1. Yes	2. No	
B2	Did you take out a credit/loan?	1. Yes	2. No	
B3	What was the purpose of the loan/credit?	1. Working capital	Yes	
		2. Buying Inputs	Yes, namely	
		3. Hiring labour	Yes	
		4. Buying new technologies	Yes, namely	
		5. Renting land	Yes	
		6. Pay of outstanding loans/taxes	Yes	
		7. Investments	Yes, namely	
		8. Other, specify		
B4	From whom did you receive the credit?	1. Relative	2. Trader	3. Bank
		4. NGO	5. Microfinance institution	6. Credit Union
		7. Friends	Other, specify:	
B5	Do you have savings	1. Yes	2. No	
B6	If you own savings, in which form are they?	1. Cash	2. Bank deposit	
		3. Livestock	4. Jewelry	
B7	What kind of livestock, how many do you own?	1. Amount:	2. Amount:	
		3. Amount:	4. Amount:	
B8	Can you indicate your approximate monthly income in 2014?	Rp.....		
B9	Do you pursue other economic activities, besides farming?	1. Yes, namely	2. No	
B10	Do you receive a regular inflow of money from this activity?	1. Yes	2. No	
B11	Is the amount lower, the same or higher than the amount earned through farming?	1. Lower	2. Same	3. Higher
B12	Do you regularly receive remittances from family members?	1. Yes	2. No	
B13	Do you regularly receive money from the state? (ex. pensions)	1. Yes	2. No	
B14	How much do you earn from your alternative sources of income each year?	Rp		
B15	How is your family's economic situation compared with 5 years ago?	1. Worse	2. Same	3. Better
B16	Have you experienced any of these situations in the past 2 years? If so, how did you respond/cope?			
	1. Sudden shortfall of money	Yes	Coping strategy:	
	2. Crop failure	Yes	Strategy:	
	3. Flood	Yes	Strategy:	
	4. Drought	Yes	Strategy:	
	5. Pest	Yes	Strategy:	
	6. Volcano eruption	Yes	Strategy:	
	7. Plant disease	Yes	Strategy:	
	8. Other	Yes	Strategy:	

C. Natural Capital and horticulture production

C1	How many months per year do you spend on farm activities?			..... months per year				
C2	What is your current total farm size? In are/ha			1. Own					
				2. Rented					
				3. Hanya bekerja					
				4. Total					
C3	Do you farm all the land you own? <i>(If yes, go to B6)</i>			1. Yes		2. No			
C4	What do you do with the land you do not farm?			Please specify:					
C5	(If you own land,) do you have a land certificate?			1. Yes		2. No			
C6	What kind of certificate do you have for your land?			1. Hak Milik		2. HGU			
				3. HGB		4. Adat			
				Other, specify					
C7	How many % of your total income is generating through farming?								
C8	Which crops did you grow in 2014?	How much are/ha ?	Harvest in Kg in 2014	For sale %	For consumption %	Revenue in 2014			
	1.								
	2.								
	3.								
	4.								
C9	Which of the above crops do you consider as most promising in terms of harvest and/or income for 2015?			Please specify:					
C10	Could you tell us the changes over the past 3 years of the following items: <i>(choose crops named above)</i>		area + yield			+	±	-
			area + yield			+	±	-
			area + yield			+	±	-
			area + yield			+	±	-
			area + yield			+	±	-
				Harvested amount + fertility of land			+	±	-
				Labour input			+	±	-
C11	If you produce less than the past years, what are the reasons?			Please consider the following statements					
	I allocate less land to fruits and vegetables, and more to cash crops like coffee			1. Yes		2. No			
	It is too expensive to get all the required seeds, fertilizers, pesticides year after year			1. Yes		2. No			
	The soil fertility is decreasing			1. Yes		2. No			

	The weather does not allow a constant harvest every year	1. Yes	2. No	
C12	How do you know if your products are of high or low quality?	1. Own experience	2. Compare with others	3. Advice from association/cooperative
		4. Advice from collector/buyer	5. Other, please specify:	
C13	What quality do you expect for this year's harvests	1. Low quality, because	2. Medium quality, because	3. High quality, because

D. Farm practice

D1	How was your land prepared for 2015	1. Good (<i>go to C3</i>)	2. Not good
D2	If the answer was "not good", why wasn't it prepared properly?	1. I didn't have access to fertilizer	Yes
		2. I didn't have enough labour to prepare the land	Yes
		There has been insufficient rain	Yes
		Other, please specify	
D3	Which type of irrigation do you use?	1. Well (groundwater/water pump)	2. Well (collected rain water)
		3. Well (bought water)	4. Lake
		5. River	6. No irrigation, rain fed
		7. Other, please specify	
D4	Did you need additional labour for your horticultural production in 2014?	1. Yes	2. No (<i>go to C11</i>)
D5	Did you hire labour?	1. Yes	2. No (<i>go to C10</i>)
D6	If yes, from which regency did your hired workers come from?	Please specify:	
D7	If yes, what was the daily wage?	.....Rp	
D8	If no, why didn't you hire extra labour?	1. Too expensive	2. Neighbours/friends/family helped out
		3. Other, specify	
D9	Did you store some products that do not perish quickly?	1. Yes	2. No
D10	Why did you store some of your harvest?	1. Expected a higher price later	Yes
		2. Lack of market demand	Yes
		3. Saving strategy	Yes
		4. Transportation problem	Yes
		5. Other, specify	
D11	What packaging do you use to transport your products	1. Plastic bags	Yes
		2. Baskets	Yes
		3. Other, please specify	Yes

E. Improvements

E1	Are you looking for ways to improve your farm practices	1. Yes (<i>go to D3</i>)		2. No
E2	Why not?	1. No reason		2. Lack of money
		3. Lack of time		4. Lack of training
		5. Other people obstruct my improvement efforts		6. Other, specify
E3	What do you do to realize improvements in your production?	1. I join trainings from extentionists		Yes
		2. I ask for help from advisors		Yes
		3. I try to get improved seeds		Yes
		4. I try to get better fertilizer		Yes
		5. I try to get better pesticides/biological control agents		Yes
		6. I switch to organic agriculture		Yes
		7. Other, specify		
E4	Do you feel you need training on the following activities?	1. Preparing land		2. Planting
		3. Maintenance/ weeding		4. Use of fertilizer
		5. Use of pesticides		6. Harvesting
		7. Post-harvesting/ packaging		8. Selling/ marketing
		9. Other, specify		
E5	Do you save money to invest in your farm?	1. Yes		2. No
E6	What are you planning to invest in?	Irrigation system		Greenhouse
		Fertilizer		Machinery (ex. Tiller)
		Seeds		Pesticides/Bio-agents
		Additional labour		Additional land
		Organic certification, if applicable		Other:
E7	Do you produce organically?	Yes (<i>go to D8</i>)	No	I intend to produce organically in the future
E8	If no, why not?	1. Don't know how		2. Not enough demand
		3. Difficult to get certification		4. Don't see the need
		5. Other, specify		
E9	If yes, do you have certification?	1. Yes		2. No
E10	What kind of certification do you have?	Please name:		
E11	If no certification, why not?	1. Don't know how to apply for it		2. Too expensive
		3. No demand for it		4. Other, specify
E12	Why do you (intend to) produce organically?	1. Higher income		2. Better for the environment
		3. Healthier		4. Customer demand
		5. Increase competitiveness		6. Other
E13	What gains have you achieved from organic standard implementation?	1. New knowledge		
		2. New technology		
		3. More secure position in chain		

F. Seeds, fertilizers and tools

F1	Which of the following did you use for your horticultural production in 2014	Insecticides	Yes, conventional Name:	Yes, organic Name:	No
		Pesticides	Yes, conventional Name:	Yes, organic Name:	No

		Herbicides	Yes, conventional Name:	Yes, organic Name:	No
		Fungicides	Yes, conventional Name:	Yes, organic Name:	No
F2	If any above answer was no, why didn't you use it?	1. I cannot afford it		2. It is not available (conventional)	
		3. It is not available (organic)		4. I think the risk is too big to use it	
		5. Other, specify:			
F3	If yes, where do you get your fertilizer from?	1. Store		2. Sales agent	
		3. Gov. extentionist		4. Research Center	
		5. Own production		6. Farmer cooperative	
		7. Supplied by buyer		8. Other	
F4	If yes, where do you get your pesticides from?	1. Store		2. Sales agent	
		3. Gov. extentionist		4. Research Center	
		5. Own production		6. Farmer cooperative	
		7. Supplied by buyer		8. Other	
F5	What is the source of your seeds?	1. Store		2. Sales agent	
		3. Gov. extentionist		4. Research Center	
		5. Own production		6. Farmer cooperative	
		7. Supplied by buyer		8. Other	
F6	What kind of tools do you own	Plough	Yes	No	
		Hand tools	Yes	No	
		Tractor	Yes	No	
		Other, specify:			

G. Marketing Horticultural Products

G1	When do you usually receive price information for your products?	1. While still at home From:		2. At the market (Tukang Kilo)	
		3. Other, specify			
G2	Where/ to whom do you sell your products?	1. Local wholesale market Buyer from:		2. Contract farming for agent Agent from:	
		3. Collector Collector from:		4. Pajak Sambu Medan or other city Buyer from:	
		5. Supermarket Name:		6. Exporter Name:	
		7. Cooperative		8. Other, specify	
G3	Do you sell your products to the same buyer?	1. 100% of the time	2. 50-100% of the time	3. Less than 50% of the time	
G4	If you sell to more than one buyer, how many % of your products do you sell to which type of buyer?	.....% to.....			
		.....% to.....			
		.....% to.....			
G5	How is the price determined?	1. By buyer	2. Market-price	3. Other	
G6	How do you rate your position in the negotiating process?	1. Good		2. Bad	
G7	How often do you have contact with your buyer?	1. Constantly	2. Often	3. Seldom	
G8	How much trust do you have in your buyer(s)?	1. Much	2. Moderate	3. Little	No

G9	What type of information do you receive from your buyer(s)?	1. Product specification		2. Quality standards	
		3. Market information		4. No	
G10	Can you name the quality characteristics your buyer is looking for?	1. No I cannot			
		2. Name of variety	Yes	No	
		3. Taste	Yes	No	
		4. Size	Yes	No	
		5. Texture	Yes	No	
		6. Colour	Yes	No	
		7. Moisture	Yes	No	
		8. Clean from other material	Yes	No	
		9. Other, specify:			
G11	When do you receive the payment?	1. Before the delivery of the harvest	2. At moment of delivery (<i>go to F8</i>)	3. After delivery (<i>go to F8</i>) How many days?	
G12	Are there sometimes issues with the payment?	1. Yes		2. No	
G13	Which issues do you encounter? How often?	Please specify:			
G14	If you get paid before the harvesting date, is the payment accurate with value of later harvest?	1. Below,% of the time	2. Accurate% of the time	3. Above,% of the time	
G15	Why did you choose to get paid in advance?	1. Needed money	2. Positive past experience to achieve higher price	3. Other, specify	
G16	In 2014, with regard to the average market price, did you sell below, at market price, above market price?	1. Below market price% of the time	2. at market price% of the time	3. Above market price% of the time	
G17	If you sold below the market price, what reason forced you to sell anyways?	1. Needed money		2. Pressure of buyer	
		3. Products are perishable		4. Storage problem	
		5. I have no negotiating power		6. Other, specify	
G18	Do buyers directly visit you at the farm	1. Yes		2. No	
G19	How do you usually sell your products?	1. Individually		2. With an informal group	
		3. With a farmer association			
G20	How do you measure the weight of your harvest?	1. Own scale	2. Tukang kilo at market	3. I use a scale from buyer	Other:
G21	Which modes of transport do you use to transport your harvest to buyer/market	1. Own car/truck		3. Own motorbike with trailer	5. Harvest is picked up by collector/buyer
		2. Rented car/truck		4. Rented motorbike with trailer	6. Public transport
		Other, specify:			

G22	Do have contact with end consumers?	1. Yes	2. No
G23	Do you directly market your products to end consumers?	1. Yes	2. No

H. Services

H1	From which organisations did extension workers come to visit you?	1. NGO		Yes Name:	No (<i>Go to G4</i>)
		2. Government		Yes	No (<i>Go to G4</i>)
		3. Development agencies		Yes	No (<i>Go to G4</i>)
		4. Private sector (pesticide/fertilizer companies)		Yes Name:	No (<i>Go to G4</i>)
H2	How many times per months from cultivation to harvest did you have contact with extensions workers?	1. NGO	2. Gov.	3. Dev. Agencies	4. Private sector
H3	Did you follow their advice?	1. Yes (<i>go to G5</i>)		2. No	
H4	If no, why not?	Specify:			
H5	How do you qualify the advice received?	1. Good		2. Bad	
H6	What else do the organizations do for you?	1. Provide fertilizer		2. Provide pesticides	
		3. Provide seeds		4. Provide technologies	
		5. Other, specify			
H7	Did you ever have training on horticultural production?	Yes, by.....		No	
H8	If yes, was the training helpful?	Yes		No	
H9	Did you ever have training on organic production	Yes, by.....		No	
H10	If yes, was the training helpful?	Yes		No	

I. Social Capital

I1	Is there a farmers' cooperative/association/union in your area?	Yes	No
I2	Are you a member?	Yes (<i>go to H4</i>)	No
I3	If no, why not?	1. I do not meet the requirements	2. I don't want to, because.....
		3. Other, specify	
I4	If yes, name of cooperative:	Name:	
I5	What is your role in the cooperative?	Role:	
I6	Do you feel that being a member in the cooperative is of benefit for you?	1. Yes	2. No
I7	Do you cooperate with other farmers in the production?	1. Yes	2. No (<i>go to H10</i>)
I8	With how many farmers do you cooperate?	Number:	

I9	If no, why don't you cooperate in the production?		Please specify:	
I10	What kind of things do you share?	1. Labour	Yes	No
		2. Land	Yes	No
		3. Information on production	Yes	No
		4. Information on price	Yes	No
		5. Tools	Yes	No
		6. Inputs (seeds, fertilizer etc.)	Yes	No
		7. Other, specify		

J. Physical capital - addition

J1	Do you own:	Genset	Yes
		Satellite dish	Yes
		Radio	Yes
		Television	Yes
		Refrigerator	Yes
		Bicycle	Yes
		Motorbike	Yes
		Car	Yes
		Small truck	Yes
Mobile phone	Yes		

We are now at the end of the questionnaire!

Do you have any suggestions and/or want to add something?

Thank you very much for your time.

Your participation will be a valuable contribution to this research!

Appendix B – Score Breakdown of Livelihood Analysis

Natural Capital			Points	Conv.		Organic		Score Conv.	Score org.
Land	Size	Large	5	1	5%	6	55%	0,227272727	2,727272727
		Medium	3	17	77%	7	64%	2,318181818	1,909090909
		Small	1	2	9%	0	0%	0,090909091	0
	Land ownership	Fully rented	1	5	23%	0	0%	0,227272727	0
		Partially owned	3	6	27%	5	45%	0,818181818	1,363636364
		Fully owned	5	11	50%	6	55%	2,5	2,727272727
	Certificate	Hak Milik	5	6	55%	3	50%	2,727272727	2,5
		Notarial deed	3	2	18%	0	0%	0,545454545	0
	Land farmed	No certificate	0	3	27%	3	50%	0	0
		All land farmed	5	21	95%	8	73%	4,772727273	3,636363636
	Partially farmed	3	1	5%	3	27%	0,136363636	0,818181818	
Water	Available Irrigation	Little vulnerability	5	1	5%	4	36%	0,227272727	1,818181818
		Some vulnerability	3	20	91%	7	64%	2,727272727	1,909090909
		High vulnerability	1	1	5%	0	0%	0,045454545	0
Livestock	Livestock ownership	A few/low value	1	5	23%	1	9%	0,227272727	0,090909091
		Several/medium value	3	3	14%	1	9%	0,409090909	0,272727273
		A lot/high value	5	3	14%	0	0%	0,681818182	0
		no livestock	0	11	50%	9	82%	0	0
			Max. points	30	Points on scale of 30			18,68181818	19,77272727
					Rating on scale of 10			6,227272727	6,590909091
Physical Capital			Points	Conv.		organic		Score Conv.	Score org.
Farming	Tools	Only Hand tool	1	22	100%	8	73%	1	0,727272727
		Plough (rented)	3	0	0%	1	9%	0	0,272727273
		tractor (rented)	5	0	0%	2	18%	0	0,909090909
	Inputs	Inputs provided&bought	5	0	0%	11	100%	0	5
		Inputs bought (suffic.)	3	19	86%	0	0%	2,590909091	0
		Inputs bought (insuff.)	1	3	14%	0	0%	0,136363636	0
Post-harvest	Transport to market	Public transport	1	13	59%	1	9%	0,590909091	0,090909091
		rented car/truck	2	2	9%	1	9%	0,181818182	0,181818182
		Own car	3	4	18%	0	0%	0,545454545	0
		picked up by buyer	2	3	14%	8	73%	0,272727273	1,454545455
Information & Communication technologies + other assets	Genset	Yes	3	3	14%	0	0%	0,409090909	0
	Satellite dish	Yes	3	20	91%	7	64%	2,727272727	1,909090909
	Radio	Yes	3	12	55%	5	45%	1,636363636	1,363636364
	Television	Yes	3	20	91%	11	100%	2,727272727	3
	Refrigerator	Yes	3	5	23%	2	18%	0,681818182	0,545454545
	Bicycle	Yes	3	7	32%	1	9%	0,954545455	0,272727273
	Motorbike	Yes	3	17	77%	6	55%	2,318181818	1,636363636
	Car	Yes	3	6	27%	1	9%	0,818181818	0,272727273
	Scale	Yes	3	0	0%	3	27%	0	0,818181818
	Mobile Phone	Yes	3	21	95%	11	100%	2,863636364	3
			Max. points	43	Points on scale of 43			20,45454545	21,45454545
					Rating on scale of 10			4,756871036	4,989429175
Human Capital			Points	Conv.		organic		Score Conv.	Score org.
Household	Age	30-45	5	13	59%	6	55%	2,954545455	2,727272727

		46-60	3	9	41%	3	27%	1,227272727	0,818181818	
		>60	1	0	0%	2	18%	0	0,181818182	
	HH size	≤4 members	1	9	41%	6	55%	0,409090909	0,545454545	
		5-6 members	3	12	55%	4	36%	1,636363636	1,090909091	
		7-8 members	5	1	5%	1	9%	0,227272727	0,454545455	
	No of HH farmers	1	1	2	9%	3	27%	0,090909091	0,272727273	
		2	2	19	86%	6	55%	1,727272727	1,090909091	
		3	3	0	0%	1	9%	0	0,272727273	
		4	4	1	5%	1	9%	0,181818182	0,363636364	
Education	Education Level	No education	0	1	5%	0	0%	0	0	
		Elementary School	1	4	18%	5	45%	0,181818182	0,454545455	
		Junior Highschool	2	5	23%	3	27%	0,454545455	0,545454545	
		Senior Highschool	3	10	45%	3	27%	1,363636364	0,818181818	
		Bachelor	4	2	9%	0	0%	0,363636364	0	
Farming	Farming experience	≤10 years	1	2	9%	1	9%	0,090909091	0,090909091	
		10 to 20 years	3	10	45%	6	55%	1,363636364	1,636363636	
		more than 20 years	5	10	45%	4	36%	2,272727273	1,818181818	
	Training	One time	3	6	27%	10	91%	0,818181818	2,727272727	
		more than one	5	3	14%	1	9%	0,681818182	0,454545455	
	Hired labour	Yes	3	9	41%	8	73%	1,227272727	2,181818182	
Health	Health condition of HH	Better	5	9	41%	6	55%	2,045454545	2,727272727	
		Same	3	10	45%	5	45%	1,363636364	1,363636364	
			Max. points	36				Points on scale of 36	20,68181818	22,63636364
								Rating on scale of 10	5,744949495	6,287878788
Social Capital			Points	Conv.		organic		Score Conv.	Score org.	
Family Networks	Children outside Karo	Yes	3	6	27%	5	45%	0,818181818	1,363636364	
		Yes	5	2	9%	0	0%	0,454545455	0	
	Will children return?	No	1	1	5%	1	9%	0,045454545	0,090909091	
		Maybe	3	3	14%	4	36%	0,409090909	1,090909091	
Membership & Leadership	Member of cooperative	Yes	3	7	32%	0	0%	0,954545455	0	
	Special position	Limited role	3	1	5%	0	0%	0,136363636	0	
		Leader	5	2	9%	1	9%	0,454545455	0,454545455	
Trade Relationships/ Trust	Selling of products	Alone	3	22	100%	11	100%	3	3	
		At home	5	5	23%	8	73%	1,136363636	3,636363636	
	Price Information	At the market	3	17	77%	2	18%	2,318181818	0,545454545	
		No answer	0	0	0%	1	9%	0	0	
		Always same buyer	4	6	27%	1	10%	1,090909091	0,4	
	Choice of buyer	More than 50% of time	3	0	0%	4	40%	0	1,2	
		50% of the time	2	4	18%	0	0%	0,363636364	0	
		Less than 50% of time	1	12	55%	5	50%	0,545454545	0,5	
	Contact with buyer	constantly	5	3	14%	3	30%	0,681818182	1,5	
		often	3	8	36%	5	50%	1,090909091	1,5	
		seldom	1	11	50%	2	20%	0,5	0,2	
		A lot	5	12	55%	6	60%	2,727272727	3	
	Trust in buyer	moderately	3	6	27%	2	20%	0,818181818	0,6	
		Little	1	4	18%	2	20%	0,181818182	0,2	

	Negotiating power	Good	5	3	14%	6	55%	0,681818182	2,727272727
		Limited	3	3	14%	2	18%	0,409090909	0,545454545
		none (market price)	1	16	73%	2	18%	0,727272727	0,181818182
	Visit from buyers	Yes	3	13	59%	8	73%	1,772727273	2,181818182
<i>Other contact</i>	Contact with consumer	Yes	3	2	9%	0	0%	0,272727273	0
	Visit from government	Yes	3	11	50%	7	64%	1,5	1,909090909
	Visit from organizations	Yes	3	5	23%	0	0%	0,681818182	0
	Visit from private sector	Yes	3	8	36%	9	82%	1,090909091	2,454545455
		Max. points	58				Points on scale of 58	24,86363636	29,28181818
							Rating on scale of 10	4,286833856	5,048589342
Financial Capital			Points	Conv.		organic		Score Conv.	Score org.
	Sources of income	1 source (conv. Agric.)	1	12	55%	0	0%	0,545454545	0
		2 sources	3	9	41%	10	91%	1,227272727	2,727272727
		3 or more sources	5	1	5%	1	9%	0,227272727	0,454545455
	Investments in farm	Yes	3	8	36%	5	45%	1,090909091	1,363636364
	Savings	Yes	3	9	41%	6	55%	1,227272727	1,636363636
	Payment	On delivery	5	22	100%	6	60%	5	3
		After delivery	3	0	0%	4	40%	0	1,2
	Income	Below 30 mio	1	11	52%	8	73%	0,523809524	0,727272727
		Between 30 and 100 mio	3	7	33%	2	18%	1	0,545454545
		Above 100 mio	5	3	14%	1	9%	0,714285714	0,454545455
	Financial situation compared to 5 years ago	Better	5	5	23%	4	36%	1,136363636	1,818181818
		Same	3	5	23%	4	36%	0,681818182	1,090909091
		Max. points	26				Points on scale of 26	13,37445887	15,01818182
							Rating on scale of 10	5,144022644	5,776223776

Appendix C – List of Key Informants

No.	Date	Name	Affiliation	Topics
1	02. March	Bobby Fauzan	External advisor for GIZ Medan	Value chains, export chains, costs
2	05. March	N/A	Buyer/Perkoper at Tiga Panah market	Prices of products, organisation of supply chain
3	05. March	Sastro	Individual farmer/Organic farmer	Organic farming, current problems, opportunities, certification
4	05. March	N/A	Tukang Kilo at Tiga Panah market	Prices of products, organisation of supply chain
5	06. March	Medi Juna Sembiring	Individual farmer/Organic farmer	Farmers' cooperatives, organic farming certification
6	12. March	Haryanto Tan	Sunrose Agri (Organic production and shop)	Organic agriculture, consumer demand, certification, current problems
7	08. April	Suparman	Taman Simalem Resort, Organic agriculture Supervisor	Organic production, know-how about organic agriculture, current problems/hurdles
8	09. April	Reslina	Taman Simalem Resort, Organic produce marketing officer	Sales, prices, distribution channels, supermarket
9	11. April	Jaya Sembiring	Chairman of GAPOKTAN/Farmer cooperative Gundaling	Farmers' groups, requirements for membership, organisation, problems, export, certification
10	14. April	Yenni Lucia	Certifier for LeSOS, Project coordinato at Yayasan Ekosistem Lestari, PPLH Bohorok Ecofarming Center	Organic certification, Third party certification Indonesia
11	07. May	Fitria Kurnia, SE, M.Si	Chamber of commerce and industry North Sumatra (<i>Dinas Perindustrian dan Perdagangan Provinsi Sumatra Utara</i>)	Exports from North Sumatra to traditional export markets (Sing/Malay) and non-trad. markets, barriers, current problems, opportunities
12	15. May	Rasmulianta Sembiring	Seller at Jodoh Market, Batam	Trade of products from Karo to Batam, Products, Prices, costs
13	16. May	Sabri Peranginangin	Seller at Pasar Sentosa Perdana Batam	Trade of products from Karo to Batam, Products, Prices, costs
14	16. May	Berta Tarigan	Seller at Pasar Sentosa Perdana Batam	Trade of products from Karo to Batam, Products, Prices, costs
15	16. May	Ibu Feby	Seller at Pasar Sentosa Perdana Batam	Trade of products from Karo to Batam, Products, Prices, costs
16	16. May	Agus Sitepu	Individual wholesaler, Batam	Trade of products from Karo to Batam, Products, Prices, costs
17	16. May	Modal Ginting	Seller at Pasar Kaget Simpang Barelang, Batam	Trade of products from Karo to Batam, Products, Prices, costs