Faculty of Bioscience Engineering

Value-chain assessment of *Cinnamomum burmannii* (Nees & T. Nees) Blume, the cinnamon of Kerinci Regency, Sumatra, Indonesia

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Value-chain assessment of *Cinnamomum burmannii* (Nees & T. Nees) Blume the cinnamon of Kerinci Regency, Sumatra, Indonesia

Dutch translation

Waardeketenbeoordeling van *Cinnamomum burmannii* (Nees & T. Nees) Blume, kaneel van Kerinci Regency, Sumatera, Indonesië

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LIST OF ABBREVIATIONS AND ACRONYMS

AR	Action Research
BPS	The Indonesian National Export Development Agency
CAP	Common Agricultural Policy
CEPA	Comprehensive Economic Partnership Agreement
EU	European Union
FAOSTAT	Food and Agriculture Organization Statistical Database
GI	Geographical Indicators
GLOBAL GAP	Global Good Agriculture Practice
GHP	Good Handling Practices
IDR	Indonesia Rupiah
Kayu Manis	Indonesian Cinnamon
MoA	Indonesia Ministry of Agriculture
MoEF	Indonesia Ministry of Environment & Forestry
NTFP	Non-Timber Forest Product
SD	Sustainable Development
TAKTIK	*Tani Sakti Alam Kerinci*
USA	United States of America
VECO	Vredeseilanden Country Office
VO	Volatile oil
VCD	Value-chain Development

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Nederlandse Samenvatting

*Cinnamomum burmannii (*Nees & T. Nees) Blume is een van de boomsoorten waarvan de schors wordt geoogst, verwerkt en verhandeld als specerij op de internationale markt. Indonesië is een belangrijke producent en exporteur van kaneel. Vanwege zijn ongeëvenaarde kwaliteit, scherpe en zoete smaak en licht bittere rand, wordt kaneel geproduceerd in het Kerinci Regency, in de provincie Jambi, Sumatra, Indonesië, zeer gewaardeerd en gewaardeerd op nationale en internationale markten. Oogstmachines in Kerinci verzamelen kaneelschors door de boom om te hakken en van de wortels tot aan de hoogste tak af te pellen. De toenemende vraag en prijzen voor deze specerij hebben ertoe geleid dat het kappen van bomen en het oogsten van schors ongekende volumes hebben bereikt die de toekomst van kaneelplantages, de productie en de handel in gevaar brengen. Bovendien beperken veranderingen in weerpatronen als gevolg van klimaatverandering, met langere en meer onvoorspelbare droge seizoenen, het vermogen van de bomen om terug te groeien. Om de duurzame oogst en bijgevolg de productie op lange termijn en de commercialisering van deze specerij te garanderen, zullen de ontwikkeling van duurzame kaneeloogstpraktijken en internationale kwaliteitsnormen de kaneelwaardeketen aan de basis versterken. Dit proefschrift presenteert de resultaten van Action Research (AR) gericht op het karakteriseren van de waardeketen van kaneel in Kerinci, Indonesië. Het onderzoek begon met een veldonderzoek om de huidige benaderingen van kaneelproductie en -oogst te karakteriseren. Omdat kaneel niet alleen in het regentschap Kerinci wordt geproduceerd, is in dit onderzoek informatie meegenomen uit andere producerende gebieden in Zuid-Borneo en West-Java. Belanghebbenden in de kaneelwaardeketen, d.w.z. oogstgroepen, lokale producenten, beleidsmakers en overheidsfunctionarissen, werden ingeschakeld om informatie te verzamelen en de belangrijkste problemen bij de productie te identificeren. De resultaten van dit actieonderzoek resulteerden in twee kernacties: 1) de ontwikkeling van kaneelstandaard operationele procedures voor teelt en naoogsttechnieken met Penabulu Foundation en 2) het opstellen van een Indonesische nationale standaard SNI 8891:2020 met de steun van het ministerie van Milieu en Bosbouw (MoEF) Indonesië.

English Summary

Cinnamomum burmannii (Nees & T. Nees) Blume is one of the tree cinnamon species whose bark is harvested, processed, and traded as a spice on the international market. Indonesia is a major producer and exporter of cinnamon. Because of its unparalleled quality, sharp and sweet taste, and slightly bitter edge, cinnamon produced in the Kerinci Regency, in the province of Jambi, Sumatra, Indonesia, is very much appreciated and valued in national and international markets. Harvesters in Kerinci collect cinnamon bark by cutting the tree down to peel it off from the roots to the highest branch. The increasing demand and prices for this spice have meant that tree felling for bark harvest has reached unprecedented volumes compromising the future of cinnamon plantations, production, and trade. To ensure the sustainable harvest and, consequently, the long-term production and commercialization of this spice, developing sustainable cinnamon harvesting practices and international quality standards will strengthen the cinnamon value-chain at its basis. This dissertation presents the results of Action Research (AR) focused on characterizing the value-chain of cinnamon in Kerinci, Indonesia. The research started with a field investigation to characterize cinnamon production and harvesting approaches. As cinnamon is sourced in other areas of Indonesia, this study also included information from South Borneo and West-Java. Stakeholders along the cinnamon value-chain, i.e., harvester groups, local producers, policymakers, and government officials, gathered information and identified key problems in the production. This action research resulted in two key actions: 1) the development of sustainable cinnamon standard operational procedures and post-harvest techniques and 2) the establishment of an Indonesian National Standard SNI 8891:2020 with the support of the Ministry of Environment and Forestry (MoEF) Indonesia.

CHAPTER I

GENERAL INTRODUCTION

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1.1 BACKGROUND

Indonesia is a spice-producing country. It has been a major exporter of various spices such as cinnamon, nutmeg (*Myristica fragrans*), clove (*Syzygium aromaticum*), and black pepper (*Piper nigrum*) for centuries (Anggrasari, 2019; Zuhdi, 2021). In Indonesia, cinnamon is harvested from the bark of the tree *Cinnamomum burmannii* (Nees & T. Nees) Blume [family *Lauraceae*], also known as the Indonesian cinnamon tree, that grows extensively in Sumatra, Java, Borneo, the Sulawesi Islands to East Nusa Tenggara. This species' largest cultivation center is in Kerinci Regency, Jambi province, Sumatra. Two important commodities can be obtained from the cinnamon tree, i.e., cinnamon bark and oil (Barceloux, 2008; Chen, 2014; Ravindran *et al*., 2004).

The global trade value of cinnamon bark and oil was $685 million in 2018 (TRADEMAP 2018). The average contribution of Indonesian cinnamon from 2015 to 2016 reached 19.1%. This contribution has made Indonesia the fourth-largest cinnamon-exporting country in the international market after China, Sri Lanka, and Vietnam. The market share of these four countries in the international market reaches 82.7%. This illustrates that these four countries have an important role in the international market and shows that competition between cinnamon-producing countries in the international market can be very tight (Uncomtrade, 2022).

Each producer strives to continuously improve product competitiveness, quality, and marketing policies to increase export value. The global demand for this commodity has increased since 2015, causing overharvesting in several production areas in Indonesia. With this situation, the high commercial value of cinnamon has contributed to unsustainable harvesting methods and the overexploitation of wild production forests (Ranaweera, 2016).

Thousands of people are currently employed in the cinnamon sector, unaware of the unsustainable current harvesting procedures and how unsustainable sourcing and

harvesting practices put the sector they depend on at risk. Changes need to be made and conducted; otherwise, current sourcing procedures may also have consequences for international buyers focusing on sustainable sourcing of goods. One of the main trends in the global spices trade is the increase in the required certification standards (CBI, 2020), in which sustainable production criteria are a priority for importing to the EU and US markets. Therefore, cinnamon production must adapt to the spices market requirements by developing sustainable harvesting practices that positively impact the environment. Gains in environmental awareness by harvesters and other stakeholders along the value-chain can bring sustainable values to the many who depend on this commodity as a spice's product. This PhD thesis focuses on this important commodity, in need of characterizing the cinnamon value-chain and developing harvesting procedures that ensure tree regeneration and guarantee the spice's future commercialization.

1.2 *CINNAMOMUM BURMANNII* (NEES & T. NEES) BLUME

Cinnamomum is a genus of evergreen aromatic trees belonging to the laurel family, the Lauraceae*,* many of which are used as spices (Shan et al., 2007). Genus *Cinnamomum* comprises about 250 species indigenous to Asia-Pacific and tropical America, with 12 species growing in Indonesia, i.e., *C. loureiroi, C. cassia, C. xanthoneureum* Blume, *C. zeylanicum* Blume, *C. cebuense, C. citriodorum, C. cullilawan, C. aromaticum, C. bodinieri, C. glanduliferum*, *C. sumatranum,* and *C. burmannii* Blume with many others growing in tropical and subtropical areas like in Vietnam, Cambodia, Sri Lanka and Malaysia (Purseglove, 1981; Richard, 1991).

Among the list of species mentioned above, there are four economically relevant which are 1) *C. burmannii*, 2) *C. cassia* (Chinese cinnamon), 3) *C. zeylanicum* (Sri Lankan or Ceylon cinnamon), and 4) *C. loureiroi* (Vietnamese or Saigon cinnamon). The most distributed cinnamon is sourced from *C. burmannii* (Figure 1.1).

From an economic point of view, the most important cinnamon species in Indonesia is *C. burmanii* which is native (indigenous) to Indonesia and Southeast Asia (Wagner *et al*., 2009; Starr *et al*., 2003). This study will focus on the *C. burmannii*, which has gained

worldwide attention due to its culinary uses and medical values (Pallavi & Rathai, 2015; Moher MD, 2018).

1.2.1 *Cinnamomum burmannii* (Nees & T. Nees) Blume taxonomy

Kingdom	*Plantae*
Subkingdom	*Tracheobionta*
Superdivision	*Spermathophyta*
Division	*Magnoliophyta*
Class	*Magnoliopsida*
Superorder	*Magnolianae*
Order	*Laurales*
Family	*Lauraceae - Laurels*
Genus	*Cinnamomum Schaeff. - Cinnamon*
Species	*Cinnamomum burmannii* (Nees & T. Nees) Blume

Table 1.1. Taxonomic position of *Cinnamomum burmannii* (Nees & T. Nees) Blume.

C. burmanni is a small to medium-sized evergreen tree native to the moist, tropical forests of southern China and Southeast Asia. The tree can grow up to 20 m tall and 12–30 cm in diameter. It generally occurs in tropical or subtropical to wet climates. *C. burmanni* is typically planted as a forest tree. Trees can produce fruit within four years after germination, producing an average of 33,760 fruits per tree (Blume CL, 1825). The Indonesian commerce of cinnamon is mainly focused on the dried inner bark of the tree. Its cultivation is concentrated in Sumatra, Java, and Jambi islands, extending to Timor. The tree grows at sea level to an altitude of up to 1,300 m. Indonesian cinnamon is a widely used spice, mainly in the USA; it also has medicinal uses (Dugoua JJ, *et al*., 2010).

Figure 1.1 Cinnamon tree, source: Rana Menggala.

According to the World Atlas (Misachi, 2017), the South Asian archipelago produces 43% cinnamon, with an annual market value of about $85 million. According to the Directorate of plantations, the Ministry of Agriculture of Indonesia, *C. burmannii* plantations in Indonesia cover 99,541 ha, involving 153,893 smallholder harvesters (Fig. 1.2).

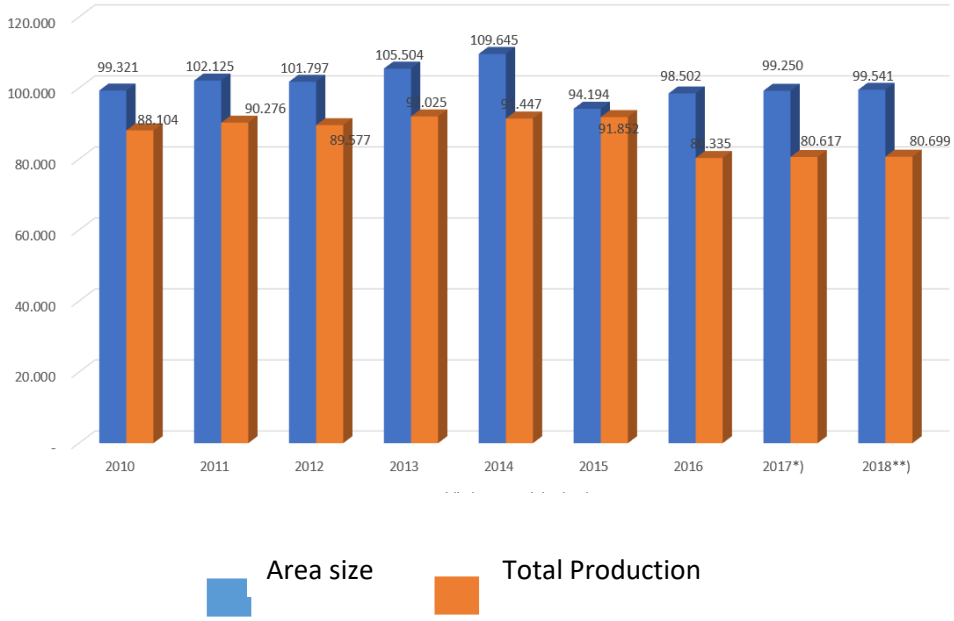


Figure 1.2 Area and total production of cinnamon (2010-2018)
Source: Directorate General of Plantations 2018, Ministry of Agriculture, Indonesia.

The largest production centers in Indonesia are in the Bukit Barisan Mountain chain that stretches from the tip of Lampung province to the end of Aceh province on the island of Sumatra, covering a range of nearly 1,700 km. The Bukit Barisan range consists primarily of volcanoes shrouded in dense jungle cover, including cinnamon trees. The highest peak of the range is Mount Kerinci (3,800 m.a.s.l.).

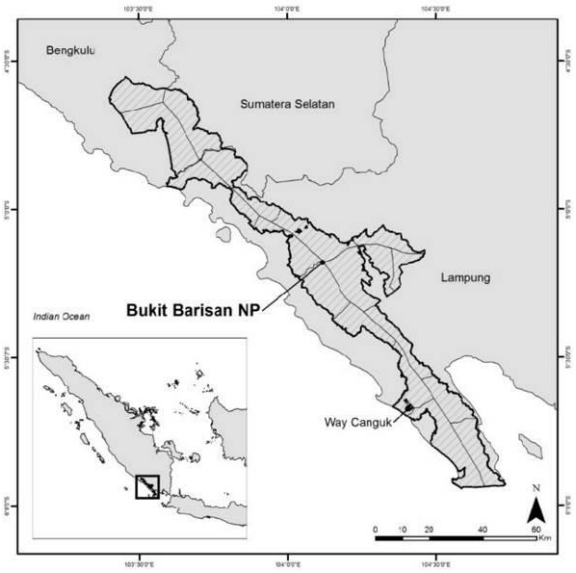


Figure 1.3 Geographical location of Bukit Barisan range, Sumatra, Indonesia.

1.2.2 Ecology

Cinnamon, a typical tropical tree, grows best in warm areas with high humidity and average temperatures reaching approximately 24 - 27°C. The trees can grow in different soil types, but the highest quality bark is obtained when trees are grown in soils rich in humus, moist but well-drained soils (Ravindran *et al*., 2004). Sandy soils allow cinnamon to produce the most fragrant bark. In the lowlands, trees grow faster than in the highlands, but the bark is thinner, and taste and wood aromas are less appreciated. At high altitudes, growth is slower, but the bark is thicker and of better quality (Permadi *et al*., 2021). Therefore, tree planting guidelines recommend cinnamon trees growing in areas above 1,000 m.a.s.l. (Table 1.2).

Table 1.2. Characteristics of the growing areas of different cinnamon species in Indonesia

Factors	Types of cinnamon		
	C. cassia	***C. zeylanicum***	***C. burmannii***
Location height (m.a.s.l.)	>500	0 - 500	500 – 1.500
Soil texture	Latosol, podzolic, sandy loam	Sandy clay	Andosol, latosol and organosol
Drainage	Moderate - good	Moderate - good	Moderate - good
pH	5,0 - 6,5	5,0 - 6,5	5,0 - 6,5
Rainfall (mm/year)	1.300 – 3.000	2.000 – 2.500	2.000 – 2.500
Temperature °C	18 - 25	24 - 27	24 - 27
Humidity (%)	70 - 90	70 - 90	70 - 90
Sunlight	40 - 70	40 - 70	40 - 70

Adapted from: Rismunandar (1995); Ridwansyah (1998); Starr *et al*., (2003)

Andosols, latosols, and organosols present at Kerinci are optimal for tree growth and the bark's aromatic qualities (Siswoputranto, 1976). These soils are fertile, loose, have good drainage, and are rich in organic matter where trees can grow optimally (Aumeeruddy & Yildiz, 1993). However, many smallholder forest plantations are located on steep hillsides where soil development is poorer and less suitable for producing high-quality bark (Hasanah *et al.*, 2003). According to local harvesters, the cinnamon trees grow best on 30 - 45% slopes facing indirect sunlight (Figure 1.3).

Figure 1.3. Trees growing on a sloop in Batang Merangin, Kerinci, source: Rana Menggala.

1.2.3 Cinnamon bark harvesting

Cinnamon bark is harvested twice a year, in January and July. August and September are the busiest periods for cinnamon trading as in this period, cinnamon mills and processors start building stocks to prepare for the Christmas demand (Fig. 1.4).

Figure 1.4. Production Cycle of Cinnamon in the year 2019

- January – April: first harvesting period (collection of bark)
- July – August: second harvesting period (collection of bark II)
- August – September (I): packaging and selling (farmer to the collector)
- August – September (II): Selection of bark and repackaging based on buyers' criteria
- October – November: shipping overseas (international market)
- December – Processed into consumers goods

For harvesting, harvesters cut down the whole tree to peel the bark from the bottom to the twigs. The outer bark is peeled off, revealing an inner bark, the cinnamon, which curls into a quill as it dries.

Figure 1.5 Peeling the bark, source: Rana Menggala.

1.2.4 Cinnamon use

The cinnamon tree can be used for various needs (Figure 1.6). Two trade commodities can be obtained from the cinnamon tree, i.e., cinnamon bark and essential oil. This study focuses only on cinnamon bark which is primarily used as a seasoning and flavoring ingredient and is frequently used to make pastries, chocolate, spicy candies, tea, hot cocoa, and liqueurs. Furthermore, cinnamon has many other beneficial qualities that are also exploited by the food-, pharmaceutical and nutraceutical, cosmetics, and chemical industries (Abeysinghe *et al*., 2009; da Silva, 2019).

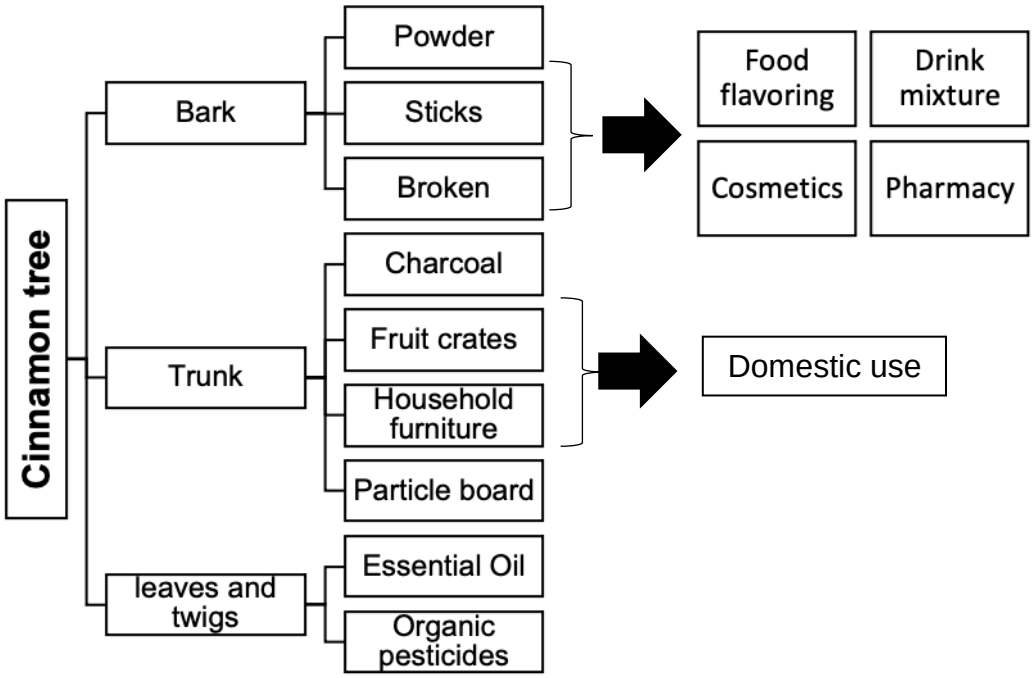


Figure 1.6. Overview of industrial uses of the cinnamon tree.

C. burmanni is often used as a tonic and stimulant and, in Indonesia, is considered a medicinal plant used for treating various ailments (Ravindran, 2017). Dried bark, twigs, and leaves are used in local and traditional medicine. The therapeutic effect of the bark is believed to be due to the phenolic compounds, as well as tannins and condensed tannins present in the bark.

Table 1.3. Overview of cinnamon benefits (Ravindran, 2003)

No	Parts of Trees	Benefit(s)
1	Cinnamon bark	1. Spices 2. Health care: rheumatism, diarrhea, colds, intestinal pain, heart disease, and high blood pressure 3. Beauty care: mouthwashes, fresheners, aroma soaps, detergents, lotions, perfumes, and face cream
2	Leaves	Food wrappers & filler cushions (traditional/indigenous)
3	Sawdust bark	Biofertilizer
4	Tree trunk	Furniture & house foundation

1.2.5 Cinnamon grades

Indonesian cinnamon bark quality is classified and graded according to the part of the tree from which it is coming and its thickness (Darwanto, 2020). The category of exported cinnamon grades is (Fig. 1.7):

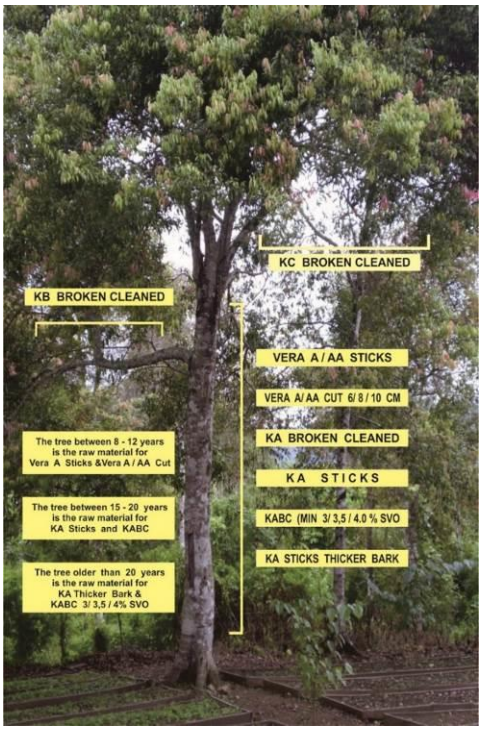


Figure 1.7. Classification of cinnamon grades, source: Rempahsari.com.

The Ministry of Trade in Indonesia classifies the cinnamon export commodities according to a Harmonized System (HS) where a unique code is assigned to each commodity:

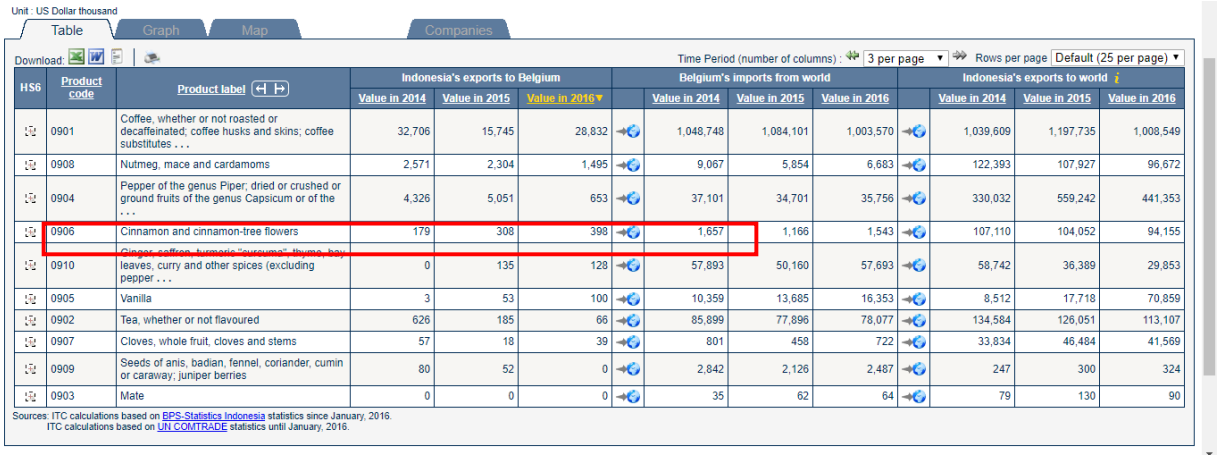
- Cinnamon (incl. flowers), not crushed, not ground (HS code 0906XX);
- Cinnamon and cinnamon-tree flowers (excluding cinnamon "*Cinnamomum zeylanicum* Blume" and crushed and ground cinnamon) (HS code 090619);
- Cinnamon and cinnamon-tree flowers (excluding crushed and ground) (HS code 090610);
- Crushed or ground cinnamon and cinnamon-tree flowers (HS code 090620).

Customs officials use this system worldwide to identify products when determining tariffs and taxes and to collect data.

1.2.6 Global market overview of Indonesian cinnamon

Cinnamon bark is the world's 982nd most traded product, with a total trade of $685 million. Between 2017 and 2018, the exports of cinnamon grew by 12,7%, from $608 million to $685 million. Indonesia is one of the top exporters globally, with a total transaction of $143 million, outranking other cinnamon-producing countries such as India and Vietnam. Asia-Pacific is the world's leading cinnamon-producing region, with Indonesia alone responsible for almost 40% of global production. In 2018, the global cinnamon market was $760 million (COMTRADE, 2019).

Figure 1.8. Indonesian cinnamon Global trade, 2016 (Source: Trademap.org)



Unit : US Dollar thousand

Table | Graph | Map | Companies

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HS6	Product code	Product label	Indonesia's exports to Belgium				Belgium's imports from world				Indonesia's exports to world		
			Value in 2014	Value in 2015	Value in 2016		Value in 2014	Value in 2015	Value in 2016		Value in 2014	Value in 2015	Value in 2016
	0901	Coffee, whether or not roasted or decaffeinated; coffee husks and skins; coffee substitutes . . .	32,706	15,745	28,832		1,048,748	1,084,101	1,003,570		1,039,609	1,197,735	1,008,549
	0908	Nutmeg, mace and cardamoms	2,571	2,304	1,495		9,067	5,854	6,683		122,393	107,927	96,672
	0904	Pepper of the genus Piper; dried or crushed or ground fruits of the genus Capsicum or of the . . .	4,326	5,051	653		37,101	34,701	35,756		330,032	559,242	441,353
	0906	Cinnamon and cinnamon-tree flowers	179	308	398		1,657	1,166	1,543		107,110	104,052	94,155
	0910	Ginger, saffron, turmeric (curcuma), thyme, bay leaves, curry and other spices (excluding pepper . . .	0	135	128		57,893	50,160	57,693		58,742	36,389	29,853
	0905	Vanilla	3	53	100		10,359	13,685	16,353		8,512	17,718	70,859
	0902	Tea, whether or not flavoured	626	185	66		85,899	77,896	78,077		134,584	126,051	113,107
	0907	Cloves, whole fruit, cloves and stems	57	18	39		801	458	722		33,834	46,484	41,569
	0909	Seeds of anis, badian, fennel, coriander, cumin or caraway; juniper berries	80	52	0		2,842	2,126	2,487		247	300	324
	0903	Mate	0	0	0		35	62	64		79	130	90

Sources: ITC calculations based on BPS-Statistics Indonesia statistics since January, 2016.
ITC calculations based on UN COMTRADE statistics until January, 2016.

Indonesian cinnamon is exported primarily to two market regions, i.e., Europe and the United States. In 2017, Europe's imports of cinnamon from developing countries amounted to 17,000 tons, worth $51 million (CBI, 2018). Developing countries made up 64% of European cinnamon imports, with Indonesia being the largest supplier of crushed/ground cinnamon (Figure 1.9).

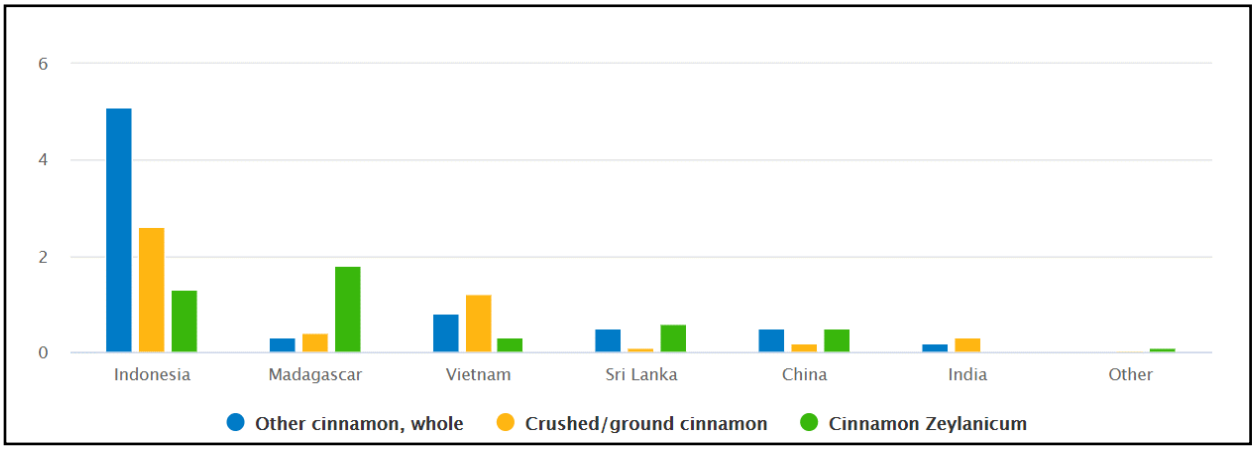


Figure 1.9. Country suppliers of cinnamon to Europe (in 1,000 metric tons), source**:** Eurostat, 2018.

In 2017, the cinnamon export to the U.S hit a record 34,185 tons (Fig. 1.9). With a 20% market share, the United States is the largest importer of cinnamon in the world, and Indonesia is one of their primary suppliers. Indonesia consistently sends over 15,000 tons of ground or crushed cinnamon to the United States, with yearly export values above $200,000.

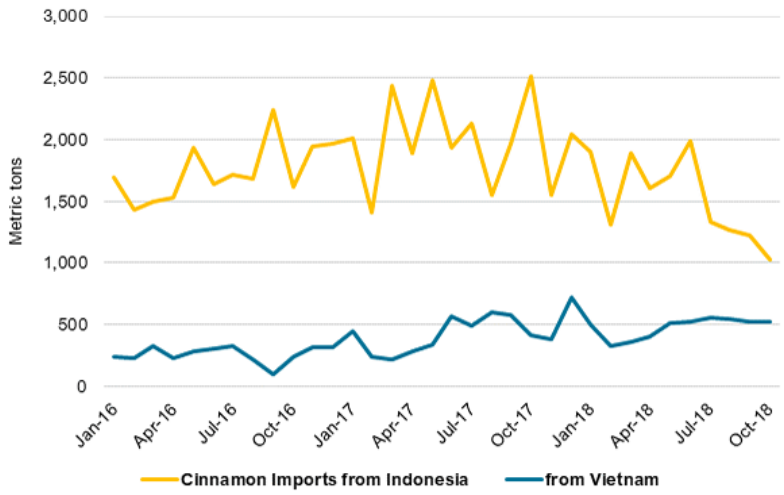


Figure 1.10. U.S quarterly import analysis of cinnamon, source: worldtrade.com 2019.

The demand in the global market for Indonesian cinnamon and the cinnamon from Kerinci is expected to increase as its quality is recognized in the market, and at the same time, it is highly promoted by competent Indonesian authorities. The main quality of Kerinci cinnamon is that the *cinnamaldehyde* content is very high, around 91,88 - 94,19%, exceeding the current standard of 50%. Another advantage is the wet weight of the bark, which reaches 80 kg/tree. (Source: http://www.litbang.pertanian.go.id/info-teknologi/4094/).

Figure 1.11. Promotional campaign from the Ministry of Agriculture of Indonesia (MoA).

The challenge is selling raw cinnamon bark that meets (harvest and postharvest) sustainability criteria. Spice companies in Europe feel powerless when committing to sustainable sourcing. As a result of the stricter regulations, companies are now putting higher sustainability standards in place in primary production and industrial processes. The future of the global spice market depends on its sustainability, especially as demand continues to skyrocket. A more sustainable model will bring tangible benefits to spice businesses. Large companies and industry bodies partnering with farmers have been making progress over recent years, particularly in Indonesia, but not all have been covered, including cinnamon.

1.3 CINNAMON IN KERINCI REGENCY

Cinnamon is produced in several regencies of the Jambi province (Table 1.4).

Table 1.4. Location of cinnamon plantations in Jambi Province (Department of agriculture and plantations, Jambi, 2018)

No	Location	Area (ha)
1	Bungo	233
2	Kerinci	**40,962**
3	Merangin	5,017
4	Sarolangun	633

The Kerinci Regency is in the province of Jambi, located between 01°40' 02°26' latitude South, 101°08' and 101°50' longitude East. It stretches 3,328,14 $km^{2,}$ and more than half of this area, with a size of 1,990,890 $km^{2,}$ is the National Park of Kerinci Seblat (TNKS); 1,337,15 km^2 is used for agriculture and residential areas. The Kerinci Regency is hilly to mountainous and ranges between 500 and 1,600 m.a.s.l., with an average of 30-60 % gradients. The average rainfall is ca. 1,556 mm per year, with an average of 169.2 rain days and 80-90 % relative humidity. Most of the Kerinci's residents may trace their ancestry to the Minangkabau people of West Sumatra, and every village in the Kerinci Regency has its unique culture and linguistic history. Since

the 19th century, one of the primary agricultural practices in Kerinci was the harvest and processing of *C. burmannii*. Cinnamon agroforestry began in the 1920s (Figure 1.12) when the Dutch colonial government established the first infrastructures in the region and harvesters began planting cinnamon trees in the forest.

Figure 1.12 Cinnamon post-harvest handling, Kerinci Regency, 1920, source: Indonesia National Library.

Cinnamon production in Kerinci accounts for 63% of Sumatra's island output, and not only cinnamon bark plays a vital role in the regional economy and is a key resource for the whole country. Cinnamon contributes to the gross added value (GDP) by 6.35% and a mean of 21% of all regional exports. The Kerinci Regency provides 80 to 85% of the world's supply of cinnamon. In addition to the domestic contribution, cinnamon harvest, and processing is the main livelihood for 13,000 families. The population of Kerinci Regency consists of 238,600 people, and 75% of the population lives in the agricultural

sector and has specialized in smallholder cinnamon for decades (Jambi provincial statistic agency). The area of cinnamon plantation in the hands of smallholders is 40,962 ha spread into 16 subdistricts and in 287 villages-forest borders (Figure 1.13).

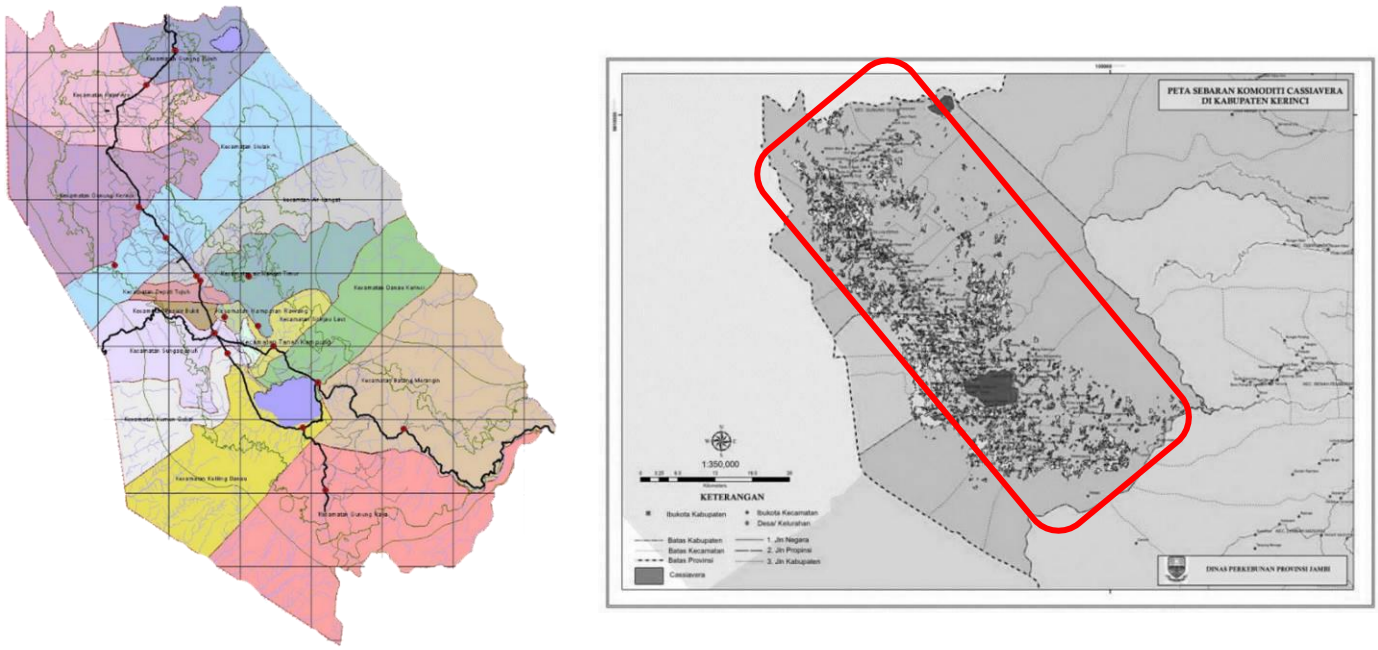


Figure 1.13. Sixteen subdistricts of the Kerinci Regency and cinnamon production areas, source: Jambi Province Plantation Service, 2017.

The villages are in the lowlands and highlands, clustered around Kerinci Seblat National Park (TNKS), a protected area of some 15,000 km^2. Cinnamon fields are spread over 16 sub-districts, with the largest production areas located in:

- Gunung Raya (2,346 ha)
- Batang Merangin (10,735 ha)
- Bukit Kerman (4,623 ha)
- Gunung Kerinci (2,788 ha)
- Kulit Aro (3,747 ha)
- Gunung Tujuh (2,361 ha)

The total production area, i.e., 40,637 ha of cinnamon plantations, is divided into three categories (Table 1.5): 1. Immature plants (TBM), 2. Produce Plants (TM), 3. Old Plants (TT/TR).

Table 1.5. Types of cinnamon plantations in Kerinci

Size (ha)				Production (tons)	No. harvesters
TBM	TM	TTM/TR	Amount		
16,061	24,173	403	40,637	53,385	12,594

TBM = *Tanaman Belum Menghasilkan* (Immature Plants)
TM = *Tanaman Menghasilkan* (Producing Plants)
TT/TR = *Tanaman Tua/Tanaman Rusak* (Old Plants/Damaged Plant)

1.3.1 Cinnamon production areas in Kerinci

From the 16 subdistricts, only 12 are identified as producing Korintji cinnamon areas. The other four subdistricts are in the lowlands, where coffee and tea plantations are found. Gunung Raya is the largest cinnamon plantation, with 11,224 ha, but the production volume is lower than Batang Merangin.

Table 1.6. Location of cinnamon forest plantations in Kerinci Regency
Source: Department of agriculture and plantations, Kerinci, 2018

No	Location	Planted Area (ha)	Yearly production (tons)	No. of harvesters
1	Gunung Raya	11,224	14,762	2,516
2	Batang Merangin	10,735	27,275	2,715
3	Danau Korintji	1,195	764	327
4	Keliling Danau	4,623	3,209	327
5	Sitinjau Laut	72	26	156
6	Air Hangat	1,365	75	1,044
7	Air Hangat Timur	1,034	646	737
8	Gunung Korintji	2,801	1,741	1,624
9	Kulit Aro	3,847	2,981	1,128
10	Depati VII	300	23	265
11	Siulak	1,405	617	983
12	Gunung Tujuh	2,361	1,248	1,021
Total		**40,962**	**53,385**	**12,843**

1.3.2 Production process of cinnamon

Production of cinnamon is the process of transforming unfinished, raw components of the cinnamon tree into completed goods (Figure 1.14). Specific production procedures are needed for each cinnamon product, e.g., cinnamon oil, cinnamon powder, tube cinnamon.

Figure 1.14. Cinnamon production process after the peeling process: 1. peeling; 2. transporting; 3. cleaning of the bark; 4. drying; 5. selection; and 6. packing.

The production starts by cutting the tree down so the harvester can peel off the bark from the bottom of the stem to the branch. Within a day, one harvester can collect up to 200 kg of cinnamon bark from a minimum of five trees (i.e., 30 – 40 kg of cinnamon bark per tree). The process is then followed by removing mosses and epiphytes of the outer bark in temporary harvest camps. A group of 4-6 bark cleaners scrubs the moss off the bark with a blunted knife. The cleaning process can take up to 5 minutes, depending on the diameter of the peeled bark. Drying the bark is the third step in the processing of cinnamon. Drying takes 3 to 5 days with full sunlight, and when the bark is dry, it will roll up, resembling a tubular pipe called a stick. Under sunlight, traditional drying occurs on the ground; harvested bark is exposed to dirt and foreign contaminants. The preferable water content for a cinnamon stick is 13 – 15%. Another important thing during the sun-drying process is to get the double coil shape of the sticks valued at higher prices than the average stick.

The final step is grading and packing. Harvesters sort out the bark based on age, size, and weight. The cinnamon is graded by its age, bark's color, and dryness. The bark's volatile oil compounds are only quantifiable through lab analysis, which processing

companies and large-scale buyers perform to determine quality and price. Oil content, water content, and purity, i.e., the presence of contaminants and insects, determine the final price in the market. These characteristics are also used to determine the grades of each production batch. The cinnamon sticks are packed and sorted in plastic fishnets or gunny bags (Figure 1.15). Cinnamon is then transported to local collectors in Kerinci or other sites, e.g., Padang or Jambi, where large processing companies and manufacturers exist.

Figure 1.15. Packing the cinnamon using a fishnet.

After packing, harvesters deliver the produce to the highest bidder. Those with a contract with a buyer must deliver the product to the processing location. The supply chain at the production level ends at this level, i.e., after going through the weighing process, testing the moisture content, and seeing the cinnamon quality with the subsequent and final price negotiation.

1.3.3 Overharvesting of the bark

In recent years, the increasing demand for cinnamon commodities has impacted the communities producing these products. The continuous demand has led to over-harvesting, bark theft, deforestation, and biodiversity loss in production areas. The massive harvesting and impact on the forest where cinnamon species occur have been a source of concern at national and international levels (Julmansyah *et al*., 2018). In

2020, the civic watchdog group Finnwatch published an article stating that unsustainable cinnamon harvesting harms Indonesia's biodiversity. Finnwatch investigated the origin and sustainability of the cinnamon sold in the Finnish market (Mette Larsen, 2020).

Additionally, this organization asked Finnish spice importers, i.e., Meira and Paulig, for data on cinnamon production. Based on the analysis of this organization with the obtained data, 80% of the world's cinnamon originates from Indonesia, namely in the Kerinci area, where unsustainable cinnamon harvesting practices are common and widespread (Figure 1.16). One of the claims put forward was that after harvesting, new trees were not planted, an action that not only implied the sector's contribution to deforestation but raised questions about the future production of the commodity.

Figure 1.16 Clear-cutting of cinnamon trees, source: Rana Menggala.

The impact of massive clear-felling was also mentioned in a working paper by the Belgian NGO Rikolto. In this assessment, the NGO pointed out that the lack of proper management after cutting was a major driver of deforestation, compromising the natural regeneration of this commodity (Firman, 2019). Consequently, Rikolto took the situation into its own hands by introducing the Payment for Ecosystem Services Program for Indonesia to tackle this problem (Rikolto, 2020).

In the aftermath of the environmental claims raised by Finnwatch and Rikolto, one action taken by the Indonesian government, through the Ministry of Environment and Forestry, was the creation of a Forest Management Unit (Kesatuan Pengelolaan Hutan or KPH) as a key body to support forest governance and management and prevent

further deforestation and degradation. At the same time, the Kerinci Forest Management Unit also initiated several actions with a similar aim. In particular, the “Social Forestry” scheme was established to manage, preserve, and restore forests and promote social, rural, and environmental development (Lata, 2020).

Cinnamon harvesters have limited skills, knowledge, and awareness of how current harvesting practices jeopardize production. Local intervention extension services in the cinnamon sector must also be aware of the current challenges to influence harvester groups and support environmental awareness. The actions supported by the Indonesian and the Kerinci Forest Management Units are insufficient to transform a sector and an area that covers more than 40,962 ha. Direct social engagement by these organizations with cinnamon harvesters is insufficient to transform the production sector. Therefore, horizontal measures affecting the entire value-chain are necessary. In this sense, establishing sustainable harvesting procedures is one of the first measures to implement. By following sustainable practices, harvesters can significantly reduce the negative environmental impacts of their activities.

1.3.4 Sustainability requirements

Spice markets shifting to sustainable sourcing, as mentioned in point 1.2.6, are getting more international, complex, and dynamic, and buyers are becoming more aware of environmental problems; therefore, the demand for environmentally friendly products is increasing. As a result, a shift toward sustainable sourcing is becoming an essential aspect of many agricultural commodities (Payne, 2021). To improve the sustainable production and sourcing of spices, a group of mainly European companies and organizations formed the Sustainable Spice Initiative in 2012. The main objective of this Initiative was to aim for fully sustainable spice production and trade. Several pepper suppliers in developing countries are members of this Initiative. These companies are making additional efforts to support sustainable production through organic production, food safety investments, and support to farmers. A notable example of the Sustainable Trade Initiative in the black pepper sector is a partnership involving Nedspice, a big spices trader from the Netherlands. In 2013, Nedspice partnered with IDH (Sustainable

Trade Initiative) to assist farmers in sustainably improving their farming practices and complying with the Rainforest Alliance standard. Within a year, over 250 farmers were Rainforest Alliance-certified. In 2021, over 2000 farmers were involved in the Vietnam Nedspice Farmers Partnership Program, and over 500 farmers were Rainforest Alliance-certified.

In the current circumstances, Indonesian cinnamon farmers' have an important role in transforming their practices. Other countries, e.g., China, India, Sri Lanka, Madagascar, Vietnam, and the Philippines, are gaining ground quickly due to improvements in their cultivation and production methods. An illustrative example of this phenomenon is what has occurred in recent years in Vietnam. Here, cinnamon production involves the implementation of sustainability standards that have resulted in cinnamon of good market quality, but at the same time, a reduction of the overexploitation of production sites in the Yên Bái province, one of the main producing areas in the country (Elmar, 2021). To comply with international sustainability standards and certifications and stop unsustainable production methods, the Vietnamese government implemented regulatory policies to support the growth of organic cinnamon. The Vietnam Administration of Forestry, part of the Ministry of Agriculture and Rural Development, assessed the current situation to find solutions to support the sustainable development of Vietnam's cinnamon industry. This was done by recognizing the urgency of developing strategic visions for this industry. Every enterprise, farmer, or farmer cooperative growing cinnamon on more than 1,000 ha receives a subsidy of US$86,683.

Figure.1.17 Sustainable harvesting of cinnamon Bark in Vietnam, source: Elmar spices – Vietnam.

Vietnam is implementing policies and supports actions at the local level focused on improving sourcing and the technical production of raw materials and developing measures that ensure product quality (Ngo Thuy Hanh *et al*., 2022). These measures have resulted in Vietnam exporting ca. 172 million dollars' worth of cinnamon, a 28.63% increase over the 134 million worth of whole cinnamon exported in 2018. Between 2017 and 2018, the price of Vietnamese cinnamon increased by ca. 30% every year (TRIDGE, 2022). The production strategy adopted in Vietnam illustrates that it could serve as an example for Indonesia to make cinnamon production more competitive in the global spices market.

1.3.5 Lack of adequate quality and sustainability standards

Basic trade theory establishes the supply and demand affect exports (Krugman, 1988). Exports are impacted by export pricing, domestic prices, currency rates, product quality, technology, manufacturing capacity, capital interest, labor costs, input prices, capital, and deregulation policies (exporting nations) from the supply side (Mahyus 2015). To be successful, goods and services exported to another country must adhere to industry standards. Agricultural standardization is based on principles such as simplification, unification, coordination, optimization, etc., based on science, technology, and practical

experience. Agricultural standardization aims to guide and specify agricultural planting, processing, management, and sale activities, achieve improved crop yield and quality, and promote economic, social, and ecological profits (Bingen J, 2002). The growth rate of sustainability standards development in Indonesia contributed a 14.42% positive impact on the export value from 2010 to 2018 (DG Trade, 2019). Therefore, the function of standards is essential considering economic globalization. The World Trade Organization points in this direction with the support of Technical Barriers to Trade (TBT). The TBT Agreements aim to ensure that technical regulations, standards, and conformity assessment procedures are non-discriminatory and do not create unnecessary obstacles to trade. At the same time, TBT agreements recognize WTO members' right to implement measures to achieve legitimate policy objectives, such as protecting human health and safety or the environment. Accordingly, the Indonesian government develops its national standards (Indonesian National Standard, SNI) by consulting regional and/or worldwide standards to compete successfully in the global market. The ministry of Agriculture (MoA) created three standards for derivative products to meet global market requirements:

1. SNI 06-3734-2006 Cinnamon bark oil.
2. SNI 01-3714-1995 Cinnamon powder.
3. Codex Standard: Code of Hygienic Practice for Spices and Dried Aromatic Herbs CAC/RCP 42 – 1995 Adopted 1995. Revision 2014.

However, the three standards listed above did not consider a critical issue concerning cinnamon, the sustainability of the harvesting practice.

1.3.6 Kerinci cinnamon geographical indication as start towards sustainability criteria

Geographical indicators (GI) have been proved to be an important way in the conservation of some species and ecosystems, e.g., several Mediterranean products (e.g., rice varieties in Lombardia and Emlilia Romagna, Italia) (Evans and Blakeney 2006). The quality of Kerinci cinnamon stands out from other cinnamon types produced in other regions. Because of this, and based on successful stories from other regions

and products, in 2015 (https://ig.dgip.go.id/detail-ig/43), the Geographical Indication Protection Society - Cinnamon Kerinci was created to protect the interests of Kerinci harvesters, becoming the first geographical indicator (GIs) for cinnamon in Indonesia. Before creating this Geographical Indicator, exporters would blend cinnamon produced in different areas, naming it Korintji cinnamon. Moreover, the geographical indicator involved harvesters to begin implementing sustainable harvesting practices to prevent environmental degradation by overharvesting. Nonetheless, the acceptance and impact of this measure for cinnamon producers, i.e., the establishment Geographical Indicator for Kerinci, had hitherto not been evaluated.

1.4 PROBLEM STATEMENT AND RESEARCH OBJECTIVES

Indonesia, as a top supplier of cinnamon on a global scale, has an excellent opportunity to make out of this commodity a factor of social and economic change; however, the capacity to create added value to the commodity has grown much slower than consumers' demand. Indonesia's market share from 2015 to 2016 was ca. 19%; in 2018 increased to 27%, then decreased to 18% in 2019, and in 2020 it decreased again to 15%. This worrying trend indicates no competitive ability or comparative advantage of Indonesian cinnamon (Sari & Divinagracia, 2021). Moreover, the production of cinnamon in Indonesia and the Kerinci Regency, the core area for Indonesian cinnamon's production, shows two critical weaknesses: 1) poor harvest practices and management that will affect future production and compromise commercialization; 2) inconsistent quality standards to meet international markets.

Based on what was exposed above, this PhD had the following research objectives:

1. To identify all key actors involved in the value-chain of cinnamon in Indonesia, particularly the Kerinci Regency, and describe their characteristics, activities, and linkages.
2. To identify sustainable harvesting strategies from indigenous harvester groups across Indonesia to create tailor-made standards that meet international quality and environmental criteria.

3. To evaluate the effect of the Geographical Indication on value creation along the value-chain.
4. Based on the previous three points: formulate measures to strengthen the cinnamon value-chain, create added value, and overcome the current production constraints. Here two actions were considered:
    A) Establishing sustainable cultivation, harvest, and post-harvest procedures, i.e., developing “Standard Operating Procedures for Cinnamon Cultivation.”
    B) The creation of Indonesian quality standards for cinnamon bark (*Cinnamomum burmannii* (Nees & T.Nees) Blume) harvesting and production.

1.5 ACTION RESEARCH APPROACH FOR THIS DISSERTATION

Action research (AR) is generally applied in the social sciences (Reason *et al*., 2001). It seeks transformative change by researching and acting, i.e., studying, and characterizing problems while simultaneously proposing actions and changes to the actors engaged by linking them through critical reflection (Aboelela, 2007; Barry and Born, 2013). The AR approach encourages widespread engagement and change during the research process to provide more than just an assessment of the state-of-the-art a topic. AR blends theory and practice (as well as researchers and practitioners) by enacting change and introspection on a pressing issue within a shared ethical framework. By emphasizing collaboration between researchers and practitioners, action research represents an ideal method for developing the cinnamon industry and bridging the gaps between social, market, and ecological concerns. Given the problems the cinnamon production sector faced, a purely descriptive approach was considered unsuitable as it would only delay changes in a critical sector of the country. Therefore, action research was conducted to share the experiences of different actors, propose actions supported by key stakeholders and improve the value-chain development of cinnamon harvesting and production.

This research involved a combination of field expeditions to cinnamon-producing areas, various workshops with different actors and stakeholders, focus group discussions on gathering information, creating a shared understanding of the challenges faced, and ultimately creating tailor-made standards in cinnamon production. The action research conducted generated two sets of data and information sources. The first information set consists of data collected from harvesters involved in cinnamon production in the Kerinci Regency. The second data was collected from extension agencies responsible for potential value-chain development interventions. Other data were obtained from reviewing and analyzing relevant scientific documents and regulations.

1.6 THESIS OUTLINE

This dissertation presents the results of Action Research (AR) focused on developing a pathway to prevent environmental degradation and ensure sustainability in the production and value-chain of cinnamon in Kerinci, Indonesia. This AR involved stakeholders along the cinnamon value-chain, i.e., local producers, potential change agents (cinnamon harvesters), policymakers, and government officials. The research started with a field investigation to characterize cinnamon production and harvesting. The traditional harvesting system in the region ensures sustainable production and therefore became a goal as a national standard for production. At the same time, multiple engagements and learning activities were conducted to transfer the knowledge to the targeted change agents (i.e., cinnamon harvesters). Cinnamon is not only produced in Kerinci, but the study also involved other producing areas, which resulted in the development of Standard Operational Procedures applicable to different farming groups, which allowed the establishment of an Indonesian National Standard SNI8891:2020 and the subsequent adoption by different groups of cinnamons harvesters. The PhD thesis is therefore structured in the following way:

Chapter 1: this chapter provides a general introduction to the topic, botanical descriptions of cinnamon, information on the research location, production methods of

cinnamon, and the problem statement leading to research objectives and research questions.

Chapter 2 presents action research and the activities conducted with Indonesian cinnamon growers and stakeholders. This chapter deals with the methodology applied to tackle the first objective of the research, i.e., identifying all key actors involved in the value-chain of cinnamon in Indonesia and of the Kerinci Regency and describing their characteristics, activities, and linkages.

Chapter 3 shows the results of the cinnamon value-chain analysis in Kerinci. Firstly, the roles and interests of the different value-chain actors are presented. This chapter deals with the second objective by identifying different sustainable harvesting strategies from indigenous harvester groups across Indonesia to create tailor-made standards that meet international quality and environmental criteria.

Chapter 4 analyzes the effect and acceptance of the standing geographical indication for Kerinci (GI) on cinnamon harvesters. Therefore, the effect of the Geographical Indication on value creation along the value-chain is evaluated. This chapter focuses on the third research objective.

Chapter 5 analyzes how sustainable harvesting can be an added value in the value-chain in the Kerinci Regency and the importance of environmental protection for developing Standard Operating Procedures. This chapter deals with the final research objective to put forward measures to strengthen the cinnamon value-chain, create added value and overcome the current production constrains.

Chapter 6: presents a general discussion, the overall conclusions and formulates directions for future research.

CHAPTER II

ACTION RESEARCH FOR INDONESIAN CINNAMON AND VALUE-CHAIN DEVELOPMENT

2.1 BACKGROUND

Indonesia is one of the leading exporters of cinnamon in the global market. However, the export of this spice is losing a competitive advantage over other cinnamon-exporting countries. The demand for some spices, including cinnamon, is decreasing due to environmental concerns by consumers aware of unsustainable harvesting practices that lead to environmental degradation and deforestation. Intensive harvesting from 2015 – 2018 in the Kerinci Regency of cinnamon bark raised serious allegations from international non-governmental on unsustainable practices during cinnamon bark sourcing. This has led to a decrease in the demand and export of this commodity compared to previous years. As consumers become aware and demand a sustainable production and harvest of cinnamon and other forest products, sustainable practices must be incorporated and prioritized in the value-chain. To implement sustainable practices in the production and export of this spice, the first step is to characterize current harvesting practices, identify the different stakeholders involved, their needs and limitations, and propose realistic solutions that can be adopted by harvesters and the communities involved in its production. A purely descriptive approach to characterize the value-chain was discarded as changes in the production of this key spice are urgently needed. A mere description of the state of matters would not result in any short-term change. Therefore, an action research approach was adopted. With action research, I refer here to studies carried out during an activity or occupation to improve, at the same time, the methods and approach of those involved in the activities. *In concreto,* action research was conducted in Kerinci and other important cinnamon production areas in Indonesia to find alternative harvesting practices to reduce the impact of cinnamon harvest, consequently ensuring the long-term productivity of cinnamon trees. This chapter explains the Action Research (AR) adopted by (1) linking

research and local development and (2) by interdisciplinary approaches implemented to create a sustainable harvesting mechanism in Kerinci Regency as added value in the value-chain process that led to the first Indonesian cinnamon Indonesia National Standards on Raw Material production.

2.2 THE VALUE-CHAIN DEVELOPMENT

The World Bank defines value-chain as the full range of value-adding activities required to bring a product or service through the different production phases, including procurement of raw materials and other inputs. Value-chain analysis puts forward the diverse actors involved in the activities from production to consumption and their dynamic relationships for establishing value creation and market linkages (Ayele *et al*., 2012). For other authors, value-chain can be considered a sequential mechanism to accumulate resources within a manufacturing system, turn them into goods and products, and eventually deliver produced goods to markets (Webber and Labaste (2009).

The value-chain can be considered a sequential mechanism used to accumulate resources within a manufacturing system, turn them into goods and products, and eventually deliver produced goods to markets. Each sequence depends on the product type and where added value activities are carried out in the supply chain. Value addition has been described as the most significant strategic step to gaining a higher market share in the international spice trade. Value-adding is improving or transforming a commodity from its original state to a more valuable one.

Value-chain development is used for interventions to improve the value-chain's functioning. VCD aims to improve a particular value-chain's productivity or efficacy by minimizing the cost of transactions between various stages and supporting the chain's actors. The value-chain's development is about satisfying the customer (ILO, 2007). If suppliers cannot meet their buyers' needs (or specifications, tastes, and desires), the buyers may turn to another supplier sooner or later. Therefore, supply chain growth is a market-oriented technique. All operations of a specific chain are developed toward

consumer needs. It is also necessary to recognize that stakeholders in a specific value-chain must collaborate and coordinate their activities to meet the end users' needs. The overall value-chain's competitiveness is threatened if one weak link exists. This is particularly true in a business climate where local businesses increasingly compete with international firms in the domestic and export markets. It usually includes institutional agreements, interlinked contracting, agricultural cooperatives, and vertical integration (OECD, 2013). These ideas for creating the value-chain will reduce transaction costs and encourage farmers to implement the technology required to meet buyers ' needs (Swinnen and Kuijpers, 2019). Many market imperfections are constraining agricultural production and farmers' welfare in Kerinci. In direct sales, buyers expect them to comply with strict quality and food safety requirements (Maertens *et al*., 2012; Pingali *et al*., 2005; Reardon *et al*., 2009; Svensson and Yanagizawa, 2009).

As a market-based policy instrument that can potentially address the multiple binding market constraints on agricultural productivity in an integrated way, value-chain development (VCD) has received significant attention (Christiaensen and Vandercasteelen, 2019; Fuglie *et a*l., 2019). In the case of Indonesian cinnamon, value-addition is paramount to benefit from the global importance of this commodity. Therefore, applying value-chain development in cinnamon production interventions is an opportunity to enable inclusive smallholder innovation and enterprise development and contribute to broader development outcomes (Bolwig *et al*., 2011; McCullough *et al*., 2008; Seville *et al*., 2011). This also solves environmental and social performance (Seville *et al*., 2011; Devoux *et al*., 2016; Humphrey and Navas-Alemán, 2010).

This research aims to find improved cinnamon harvesting techniques to reduce the activity's negative environmental impact. To address the challenges of Kerinci's cinnamon industry, Action Research (AR) emerged as an opportunity to tackle value-chain improvement issues. This chapter explains the AR taken first by (1) linking research and local development and (2) by interdisciplinary approaches to create a sustainable harvesting mechanism in Kerinci Regency as added value in the value-

chain process that led to the first Indonesian cinnamon Indonesia National Standards on Raw Material production.

The research started by identifying the correct stakeholders involved in the cinnamon value-chain in Kerinci Regency to answer two fundamental questions: 1) what is the value-chain for cinnamon at Kerinci Regency, and the stakeholder involvement; 2) how added value might bring increased income to the harvesters. This chapter presents the results of a review of grey literature and the description of the way action research was conducted to improve the cinnamon value-chain in Kerinci. Data on cinnamon production were collected from Indonesian state authorities: (i) Jambi province plantation offices; (ii) the Institute for Agricultural Technology Assessment in Jambi; (iii) Rikolto Indonesia; (iv) the Kerinci Forest Management Unit (KPHP Kerinci), (v) the District Plantation and Livestock Services Office (Dinas Perkebunan dan Peternakan), (vi) the District Regional Development Planning Board Office (Kantor Badan Perencanaan Pembangunan Daerah Kabupaten Kerinci); (vii) the Provincial Central Bureau of Statistics of the Jambi Province and the Central Bureau of Statistic of Kerinci Regency.

2.2.1 Smallholder Inclusion in the Value-chain Development

The inclusion of smallholders in national, regional, and global agriculture value-chains has important consequences for poverty alleviation in rural areas of developing countries due to their potential to increase incomes and create employment (Weinberger & Lumpkin, 2007 in Gereffi and Fernandez-Stark, 2016). However, most smallholders in developing countries face constraints that often limit their ability to participate competitively in these chains. Fernandez-Stark *et al*. (2012) identified four significant constraints that limit the competitiveness of small and medium-sized producers and their entry into value-chains: 1) access to training, (2) collaboration and cooperative building, (3) market access, and (4) access to finance. These constraints are currently present in cinnamon production in Indonesia. Smallholders often work at the farm since childhood, so specific training is lacking to improve productivity and product quality. Horizontal coordination amongst producers to facilitate producer groups

or associations is also often lacking. In consequence, access to quality markets is often difficult. Finally, entry into the value-chain requires certain investments to cover infrastructure, equipment, and certifications.

2.3 METHODOLOGY: ACTION RESEARCH

The AR is now a catch-all phrase for various methodologies meant to improve complex social situations and processes (Schein, 1995; Shani and Coghlan, 2014). Action research also focuses on empowerment, community knowledge, the intersection of formal and informal knowledge systems, supporting rural livelihood systems, and the sustainable use of natural resources (Okali *et al*., 2000). As Lewin (1946) initially suggested, action research is a process for organizing change interventions and consciously learning from experience. It is a process through which practitioners try to do scientific research to assess and improve their decisions and actions or, to put it more simply, investigate the consequences or results of a proposed course of action.

This method, therefore, entails identifying a problematic issue, imagining potential solutions, testing them to determine whether they work, and implementing changes based on their viability. Consequently, interdisciplinary and action research are combined to find the most practical solution to a problem. Action research is a collaborative study made up of a spiral of the subsequent cycles of self-reflection with the following phases: 1) Making plans to start a change; 2) Putting the change into practice (doing it) and tracking its progression and effects; 3) Evaluating transformation procedures and re-planning; 4) Acting and observing; 5) Reasoning.

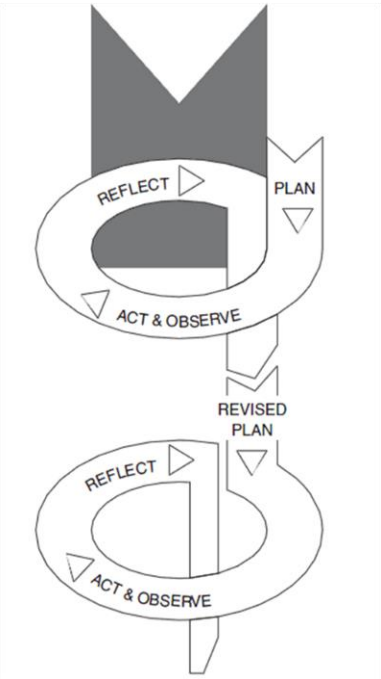


Figure 2.1. Action Research Cycle (Kemmis & McTaggart, 1990).

The benefit of the *Action Research Spiral* approach is the possibility to analyze the phenomenon in greater detail each time, leading to greater comprehension of the issue (Bryman, A. & Bell, E, 2011).

The study was conducted from January 2017 to November 2019 using a global value-chain approach from problem formulation and goal setting to creating tailor-made standards suitable for the international market of sustainable spices (Figure 2.3).

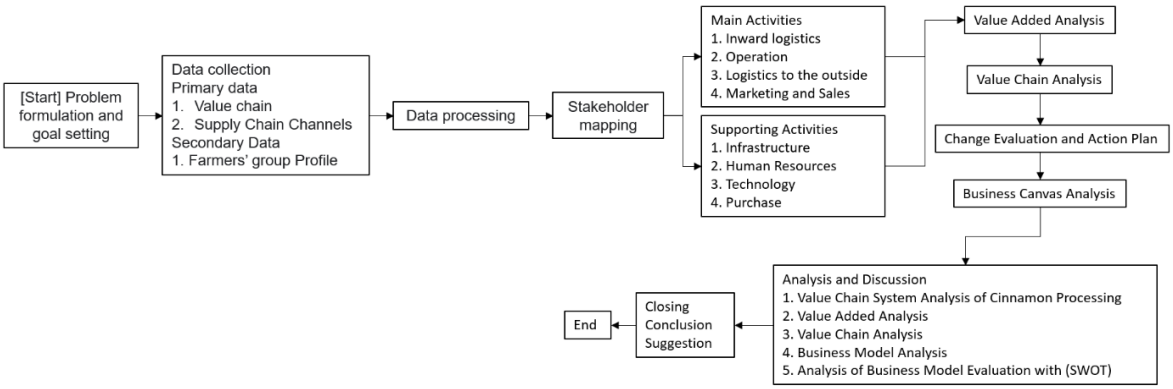


Figure 2.3 Research design.

2.5 INTERVENTION DESIGN OF ACTION RESEARCH

Interventions are designed to address the underlying causes of system constraints identified during the analysis. Depending on the environmental objective, interventions will have different targets and thus be designed to achieve different ends (Table 2.1).

Table 2.1 Intervention design

Environmental objective	**Interventions might address constraints to**	**Possible intervention areas**
Promote sustainable production	Traditional production in the cinnamon sector	Capacity building, development of key technical skills that ensure sustainable production
Improve environmental sustainability of the cinnamon sector	Environmental impacts of clear-cutting	Targeted cinnamon farmer groups, i.e., TAKTIK and Kwo Karang Bening
Increase awareness of sustainable production impact	Sustainable production adaptation	Improved access to relevant inputs and services
Promote a not-clear-cut approach	Non-clear-cut growth	Development of environmental safeguards in cinnamon production

RESEARCH TIMELINE

To take the various steps explained in Table 2.2. This dissertation required several investigations that were carried out from 2017 to 2021: 1) characterize the main barriers that hamper cinnamon bark harvesting and value-chain development, considering

traditional methods of debarking; 2) evaluate the ecological implications of unsustainable harvesting. The timeline of the action research is illustrated in Figure 2.4. The research was conducted with two AR cycles, where information was gathered and integrated from one cycle to another. After each FGD and workshop, a small group of stakeholders was randomly selected and interviewed to assess how improvements were made regarding the value-chain initial situation.

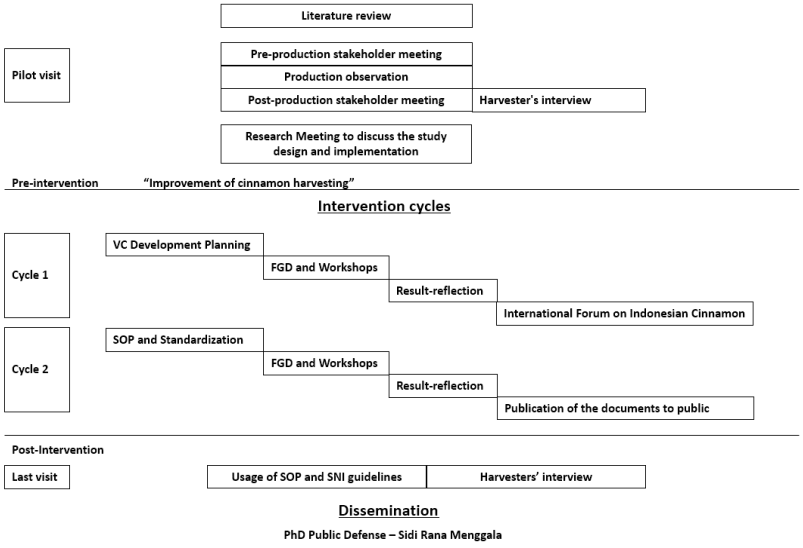


Figure 2.4. Timeline of Action Research.

The research timeline takes five years from pre-intervention until post-intervention, which leads to the research novelty of the study. At the post-intervention stage, the state-of-the-art was put into practice became the (1) SOP of Cultivation Techniques and Post-Harvest of Cinnamon, and (2) SNI 8891:2020 of Raw Material Sourcing.

Table 2.2. Timeline of the AR conducted in this PhD thesis

2017	**Step 1** January: pilot visit. September: (1) assembling research team, (2) second data collection, (3) learning and partnership development, and (4) setting up media communication among cinnamon stakeholders.
2018	**Step 2** September: (1) third data collection (cinnamon expedition across Indonesia), (2) international forum of Indonesian cinnamon.
2019	**Step 3** January: final data collection, including seminars, workshops, FGD October: (1) data compiling and forming for Indonesian National Standard and standard operating procedure cultivation techniques and post-harvest of cinnamon (2) trade mission of Kerinci Regency to Europe.
2020	**Step 4** March: publication of standard operating procedure cultivation techniques and post-harvest of cinnamon. June: Publication of the SNI 8891:2020 of Raw Material Sourcing.

2.6 ACTION RESEARCH ENGAGEMENTS

AR Engagement in the study focuses on the conscious effort to marry the object of study with community problems and opportunities. The engagements allow targeted

stakeholders to experience problem-solving and to model it for their cinnamon production improvement. The upstream of engagement reflects on the national regulations and policies committed to the sustainable development goals, including in the agriculture system. Collecting data to diagnose problems, searching for solutions, acting on promising possibilities, and monitoring whether and how well the action worked as part of the indicators that guided towards the tailormade certification/standards (Figure 2.5).

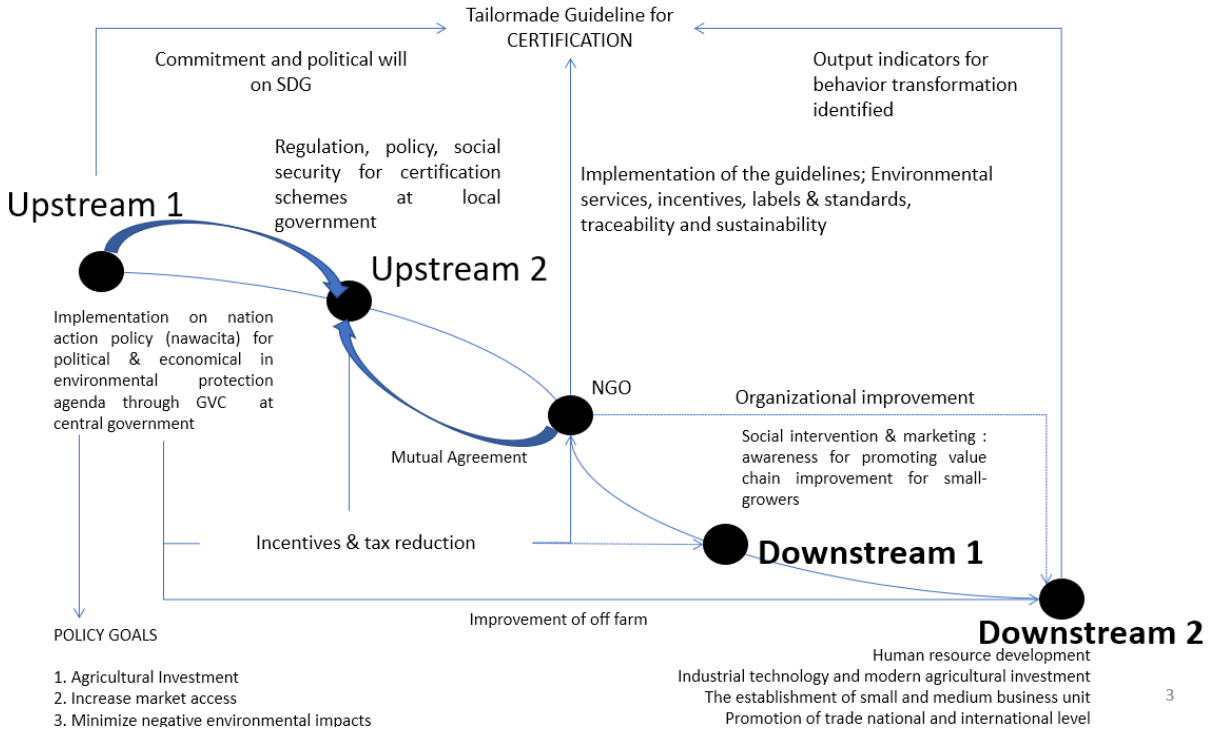


Figure 2.5. The design thinking of transforming science into action.

The goal of the AR that leads to novelty wanted to engage the cinnamon sector both at upstream and downstream levels.

From the upstream engagement, there is a need to explore alternative upstream business models that are more inclusive of the poor and more aligned with emergent green growth objectives in Indonesia's sustainable development goals (SDG) action plan, known as nation action policy, or called Nawacita.

At the downstream engagement, since the start of the research, multiple stakeholders along the value-chain have been involved in the process, from harvester groups and assistance groups to representatives of the local and central governments, international organizations, cinnamon buyers worldwide, and Indonesian diplomats. Direct interviews with key respondents, i.e., cinnamon harvester leader group of TAKTIK, NGOs (e.g., Rikolto representatives in Kerinci), the Head of Forest Management Unit (FMU Kerinci), community leaders, and the village leader of Talang Kemuning was the source of information for the creation of the research novelty.

The AR used an Influence Mapping Tool created by Mayers and Vermeulen (2005) to thoroughly examine and display the relative influence that different individuals and groups have over decision-making and how influence and cooperation change over time. Figure 2.6 describes the influencing actors in the cinnamon sector.

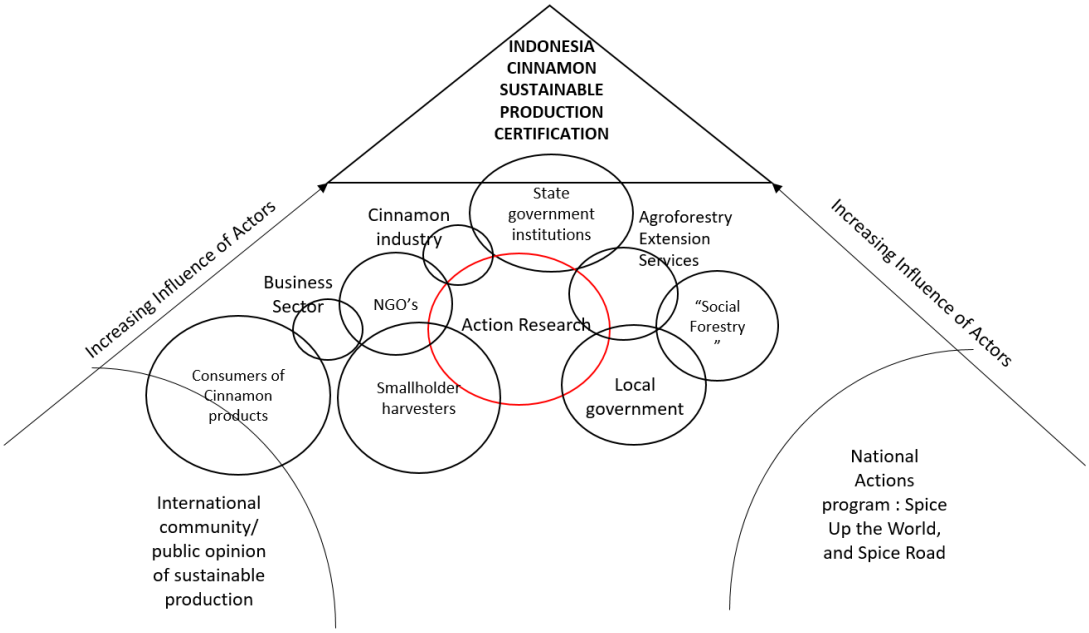


Figure 2.6. Influence of actors.

From the initial data gathering all important stakeholders were involved for the creation of an Indonesian cinnamon sustainable production certification. As explained earlier,

value-chain improvement is the basis of the research that leads to the novelty. Influencing actors (Fig. 2.6) were therefore identified, leading to the groups that may benefit from the novelty.

There are three (3) intended outcomes of the AR based on Fig 2.6:

- **Outcome 1:** Increased stakeholders involved in the improved production system.
- **Outcome 2**: acknowledge the importance of environmentally friendly production as an added value to cinnamon.
- **Outcome 3**: Increased engagement of skilled harvesters to carry out sustainable harvesting that meets the needs of social forestry approaches.

The activities that were conducted can be found in the appendix.

Chapter III

VALUE-CHAIN CONSTRAINTS AND OPPORTUNITIES

Adapted from:

Menggala, S and Van Damme, P (2018). Improving *Cinnamomum burmannii* (Nees & T. Nees) Blume Value-chains for Farmer Livelihood in Kerinci, Indonesia. European Journal of Medicine, and Natural Sciences, DOI: 10.26417/ejmn. v2i1.p23-44

Menggala, S and Van Damme, P (2018). Improving Indonesian cinnamon [*Cinnamomum burmannii* (Nees & T. Nees) Blume] value-chains for greater harvester incomes. International Conference on Climate Change: Challenges and Opportunity on Environment Degradation Research. In IOP Conference Series-Earth and Environmental Science 129.

Chapter III

VALUE-CHAIN CONSTRAINTS AND OPPORTUNITIES

3.1 BACKGROUND

Cinnamon is one of the spices exported globally from Indonesia. Although cinnamon is a major commodity in international markets, smallholders in production areas do not profit from its global dimension. Although cinnamon is a major commodity in international spices markets, smallholders in production areas do not profit from its global dimension. The first cause of farmers' low prices is the extended supply chain comprising many intermediates (Boomsma and Magnus, 2011). Smallholders' profits are also limited by poor market relations between smallholders and wholesalers and because many intermediaries profit at the cost of the harvesters benefit. The second cause of low prices is related to the production methods that do not meet the standards requested by the wholesalers. Poor peeling, scrubbing, and drying will cause the bark to mold, impacting the product quality and resulting in a low price. Besides the problems highlighted above, cinnamon harvesters in Kerinci are engaged in two traditional ways of selling cinnamon products in Kerinci, called *jual bidang* [ind,] "selling the land," and *jual hasil* [ind,] "selling the crop." This chapter wants to identify and analyze the value-chain actors in the cinnamon sector at Kerinci Regency with the following goals:

- Identifying the relationships and connections among the value-chains actors, product, service, and information flows.
- Identifying the constraints and opportunities for value-chain improvement for cinnamon harvesters in Kerinci.
- Identifying attributes of successful value-chain interventions.

3.2 METHODOLOGY

To understand the cinnamon value-chain in Kerinci as a first step to improving the livelihoods of cinnamon harvesters, action research (AR) was conducted by engaging different stakeholders. Within the framework of the conducted AR, a SWOT (strength-

weakness-opportunities-threats) analysis was done. This analysis can help to concretize actions that will help the farmers and other stakeholders to improve the value-chain.

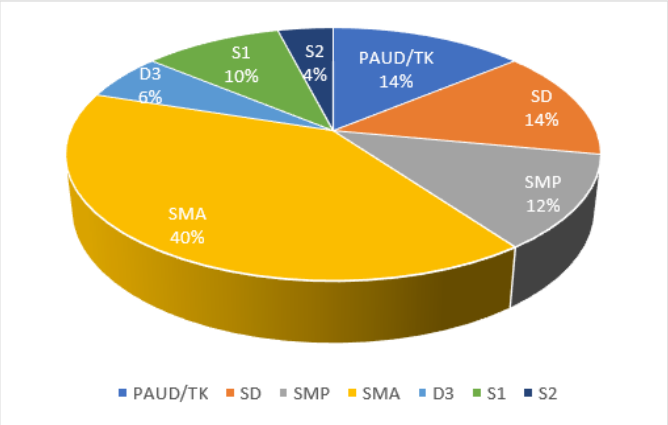
3.2.1 Study area and ethnographic background

Most Indonesian cinnamon comes from Kerinci, Jambi, in Sumatra, Indonesia. Kerinci is Indonesia's cinnamon-producing hub. Its cinnamon bark output is the biggest spices commodity produced worldwide (Wangsa & Nuryati, 2007). Covering an area of 3,808.50 km^2 (BPS Kerinci, 2016), Kerinci is the smallest regency of Jambi Province. It is located almost 400km from Jambi City, the province's capital, and is accessible by land and air transportation. The ethnic people living in this regency is called people Kerinci. Kerinci people are excellent farmers, evident from their excellent farming methods. Who are living in the foothills of the mountains plant coffee, cinnamon, and cloves. The primary forest product is cinnamon bark. The basic family unit is called the tumbi. After a man marries, he goes to live with the family of his wife. The ancestral line from the mother's side is called kelbu. The Kerinci people are decedents of an old Minangkabau tribe of South Sumatra. The value of a land property is a symbol of wealth, and land is at the heart of the operation of the cultural system. It represents life, materially and spiritually for the Kerinci.

The research was conducted in Talang Kemuning village of Bukit Kerman subdistrict, Kerinci Regency, from January to October 2017 (2 months). The village is known for its harvester group that has successfully implemented sustainable guidelines from Rikolto.

3.2.2 Research subject

Talang Kemuning village has a population of 1,200 inhabitants, i.e., 520 households. Where 90% of the community are subsistence harvesters, while 10% work as civil servants or in other sectors. In the research conducted in January 2017, it was identified that up to 40% of the community had a high school education that selected farming as a career of choice.



PAUD/TK	Kindergarten
SD	Basic school
SMP	Primary school
SMA	High school
D3	Vocational school
S1	Bachelor
S2	Magister

Figure 3.1 Education Level of Talang Kemuning Community, source: Village data 2017.

Indicating that agriculture is taught as an elective subject during school. This course offers opportunities within the agricultural sector and gives them a broader view of agriculture and the careers available, including agricultural extension, research, marketing, processing, etc. The selected research subject is the SMA (high school) graduated with a profession as cinnamon harverster.

Most of these research subjects were part of the value-chain actors, i.e., 1) the traditional cinnamon harvesters (small-growers' member of the farmer group called Kelompok Tani Sakti Alam Kerinci (TAKTIK); 2) the local cinnamon collectors' "*toke*" in Talang Kemuning; 3) the buyers in the trading channel of the harvesters. The place where the sample had been selected purposely by choosing the producer and supplier.

The research object concentrated on the harvester level in which they were affiliated with the TAKTIK farmers group. Here below are the members' conditions.

Table 3.1. The overall profile of TAKTIK cinnamon members

Education level	Junior high school
Age of harvesters	40 – 55 years
Household size	Six people
Monthly income	IDR 2,667,000
Farming practices	Traditional
Land ownership	1 ha
Price takers	Yes
Market knowledge	No
Access to market	No
Access to credit	No
Other income	Intercropping with other crops (e.g., tomatoes, potatoes, avocado), rubber labor & foreign immigrant workers
Regeneration of young harvester	TAKTIK involves youth participating in the cinnamon business

3.2.3 Data collection techniques

Data collection was conducted through participatory observation using a structured questionnaire. In January 2017, 40 respondents were selected from Talang Kemuning community who were either TAKTIK members, from RIKOLTO, village leaders, Kerinci & Jambi Province Plantation Office, and other community leaders to discuss cinnamon business in their villages. Primary questions are (1) what are the constraints of value-chain development? (2) What are some challenges faced in the cinnamon supply chain? (3) How much price breakdown does a farmer receive from the total sell price? To further explore the gap in the research, another visit to Talang Kemuning was conducted in October 2017 to have focus group discussions (FGDs). Actors participating in the FGD were selected purposively. FGDs dealt with 1) the value-chain process and the relationships between harvesters and buyers, 2) harvester perception of the market access (5 FGDs), other stakeholders that are processing the raw materials and making a derived product of cinnamon bark (8 FGDs).

3.3 RESULT

Various problems were identified, i.e., 1) the tendency of farmers to harvest cinnamon using a clear-cutting system; 2) the conversion of cinnamon land into land for annual (cash) crops; 3) land abandonment; 4) no development of cinnamon derivatives or processing of raw materials in the region; 5) the low quality of the produce to meet export demands; (6) low yield prices at the farmer level.

3.3.1 Value-chain analysis

In 2017, there were two types of primary actors in the value-chain of cinnamon identified, which are (i) direct actors, harvesters, small collectors (intermediate I), prominent collectors (intermediate II), exporters, and (ii) indirect actors (supporting function); local government and extension service agencies. Each actor has a different role and function in the value-chain, from harvesters to exporters.

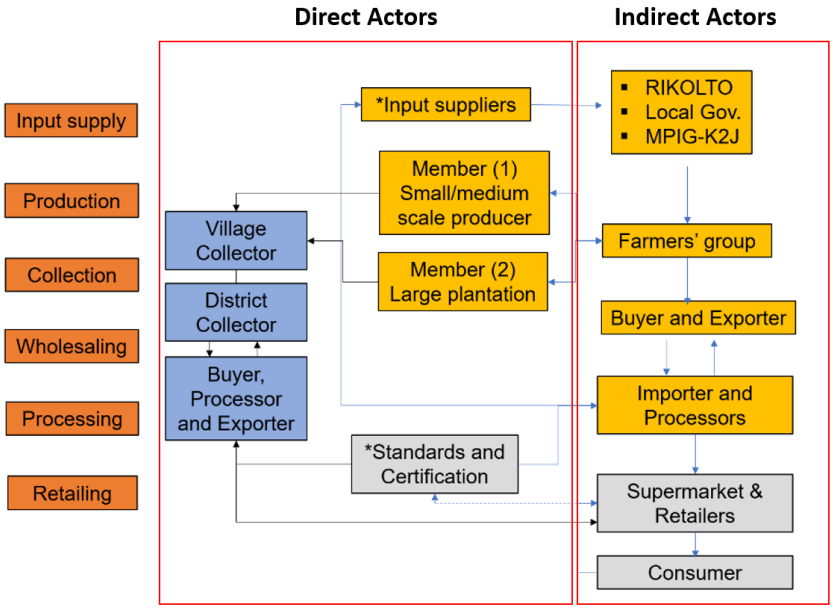


Figure. 3.2. Value-chain analysis in Talang Kemuning.

3.3.2 Value-chain actors

I. Harvesters

In Kerinci, there are two types of harvesters i.e., those that own the land where they grow the tree and benefit from their livelihood, and those agricultural laborers (farm workers) who work and get paid. The AR engagement is with the first type of community, in which they own the land and are called cinnamon harvesters. Cinnamon harvesters produce cinnamon bark, which includes all the plantings, nurturing of cinnamon trees, drying, and grading. Most harvesters do not grow cinnamon as a full-time activity, and most are part-time employed. As a result of their part-time engagement, these holders lack the proper knowledge and commitment to manage their holdings properly. Commonly, a harvester hires a team to manage the production and post-production (figure 3.3).

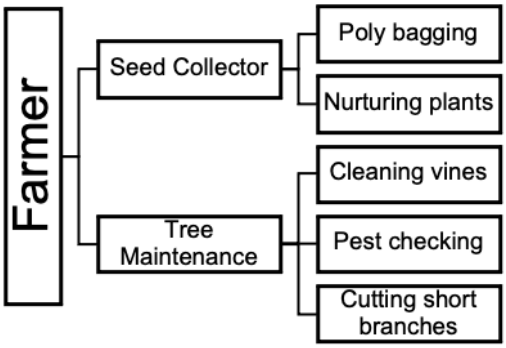


Figure 3.3. Cinnamon production processes.

A harvester grows cinnamon trees on small, remote parcels of forest plantations alongside other crops like jackfruit (*Artocarpus heterophyllus*), cacao (*Theobroma cacao*), and avocado (*Persea americana*).

The process starts with collecting the seeds from the plots putting them into polybags and nursing them for one year in nurseries. Harvesters sell seedlings for IDR 5,000 (30 cents) each as an additional source of income. When saplings reach 1 m in height, they are transplanted to forest plots. Plot sizes vary between 3 x 3m to 5 x 5m. The harvesters intercrop cinnamon trees with seasonal crops that provide shadow and coverage to the saplings. During this phase, the staff is hired to manage nurseries and forest plots, including monitoring for the potentiality presence of pests and diseases, cleaning the vines, and cutting the branches growing sideways.

During the cultivation process of cinnamon, it takes ten full-time workers about one month to harvest on a *bidang* (plot). A typical harvest yields about 450 kg of cinnamon per ha, with the calculation that a 10-year-old tree can supply 30 kg of wet bark, but production can vary greatly depending on the age of the cinnamon trees. Since plots are usually located outside villages, water buffalo transport the bark to collection points. One of the problems identified was that not all active members owned the plot. The research findings in October 2017 show that 23 harvesters rented the land from other parties yearly to the 50 respondents interviewed, as seen in Table 3.2.

Table 3.2 Sizes of plots and ownership

Type of plot	Harvesters (members of group TAKTIK)
Small (0.5 - 1 ha)	15
Medium (>1 - 2 ha)	8
Large (> 2.0 - 3.0 ha)	4
Others: Rent	23

II. Collectors

A *toke*, [ind.] refers to a person who purchases cinnamon from harvesters. *Tokes* generally work in the village and are village's residents. There are two ways for *tokes* and harvesters to buy and sell: *jual bidang* and *jual hasil*. *Tokes* are often the only link between the harvester and the markets outside their village. Because of this relationship, *tokes* have a monopoly on knowledge of market conditions for cinnamon, including stock supply and price, giving them a significant degree of influence over the farm gate price.

Since *tokes* typically have access to significant financial resources, they can buy cinnamon from several harvesters at a low price, especially when they need money. After buying the cinnamon from harvesters, *tokes* transport the product to the merchant. One of the primary reasons is that these *tokes* usually have access to substantial financial resources, and therefore they can buy it at a low price from several harvesters, mainly when they are in desperate need of capital. *Tokes* transport the commodity to the merchant after purchasing the cinnamon from the harvesters.

Figure 3.5. Local village collector in Talang Kemuning.

III. Wholesaler

A *saudagar* or a wholesaler is an individual or enterprise that buys cinnamon products from *toke*s. They usually operate at the district level and collect their supply from *tokes* in various villages within the district. Although not very common, there have been cases where *saudagars* buy cinnamon directly from harvesters. Ardi *et al*. (2015) note that wholesaler also engages in several other processes, including quality grading, lab testing, sorting, and storing, apart from buying cinnamon from toke. The wholesaler is responsible for the quality, as requested by the buyer. To meet these criteria, the wholesaler deploys its sourcing agents to the fields to ensure the production of post-harvest practices. One of the findings in data collection was that a wholesaler who operates in the city of Sungai Penuh needed to pay a penalty of a total of € 25,000 due to findings of insects in one of the cinnamon bulks exported to Europe. Wholesalers need to comply with the standards requested in the business contracts. After they complete these processes, they transport the product to the exporter.

Figure 3.6. Details of a typical wholesaler cinnamon storage plant.

The wholesaler also acts as an exporter, usually holding permits to export overseas. These wholesaler-exporters are typically located in Padang, West Sumatra. Padang has a large shipping terminal, Teluk Bayur Terminal, the gateway for incoming and outgoing goods to and from the Province of West Sumatra. Exporters also diversify their cinnamon products and perform packaging and laboratory testing to meet international requirements (Ardi et al., 2015). This company in Padang does not only receive cinnamon from Kerinci but also from other parts of Sumatra, which is why Korintji cinnamon is susceptible to fraudulent practices committed by irresponsible parties who either mix it with cinnamon from other areas or claim that cinnamon is derived from other areas comes from Kerinci. In other words, wholesalers have difficulty identifying the commodity's origin.

IV. Importer

Most cinnamon importers are located in the Netherlands. Companies like Royal Polak, Verstegen, NedSpices, Agripro Tridaya Nusantara (ATN), and Lenersan Poortman (LP). They are leading importers of cinnamon bark among other European countries. The Netherlands is importing Indonesian cinnamon in various grades and types from Kerinci constantly (Fig. 3.7).

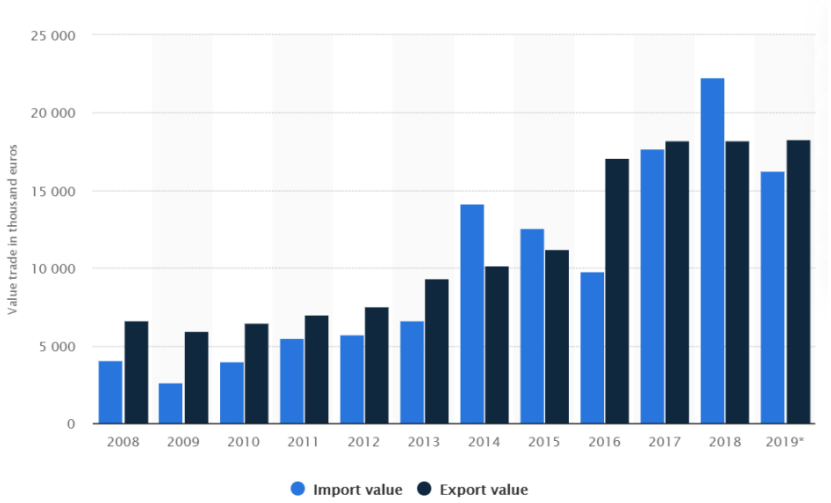


Figure 3.7. Value of the import and export of cinnamon and cinnamon tree flowers in the Netherlands from 2008 to 2019 (in $ 1,000), source: STATISTICA (2020).

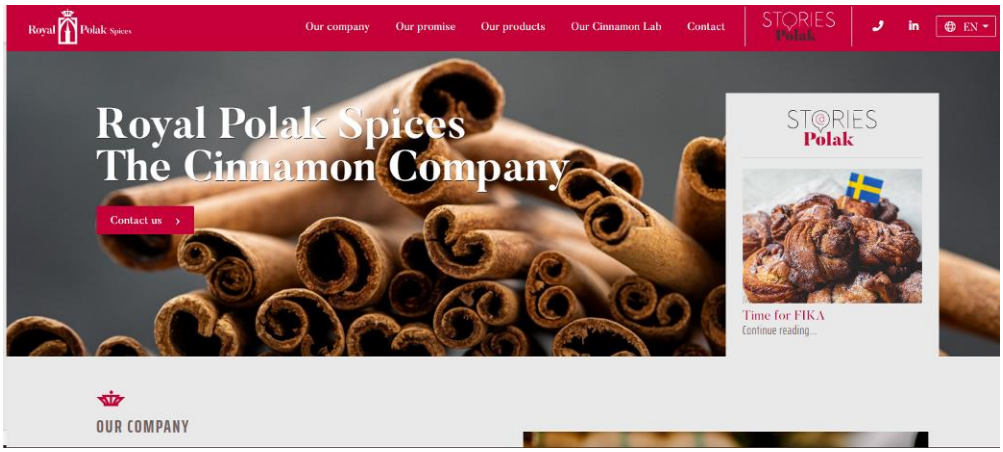


Figure 3.8. Royal Polak Spices – the Cinnamon Company.

In value terms, Indonesia constituted the largest supplier of cinnamon to the Netherlands, comprising 54% of total imports. The second position in the ranking was held by Vietnam, with a 17% share of total imports. It was followed by Madagascar, with a 7.1% share (INDEBOX, 2021)

Value-chain - indirect actors with supporting functions

I. Non-Profit organizations and agroforestry agencies in Kerinci

One of the most critical accesses in value-chain development (VCD) is the intervention by the agroforestry agency, the Kerinci Forestry Management Unit (KPHP), and Rikolto (Belgium non-profit organization with a coordination office in Indonesia). These two organizations focus on the capacity building so harvester groups can organize contracts with international buyers. The results from the AR identified that TAKTIK receives routine orders from ATN, and the members have changed how they harvest and sell cinnamon and, consequently, their means to meet the day-to-day expenses. Rikolto has also been teaching Payment for Ecosystem Service to TAKTIK's harvester group members. The primary objective of teaching is to support members' business growth by adopting good manufacturing practices and environmental awareness. This Rikolto's approach to a public-private partnership was quite effective in promoting the sustainability of the business relationship between the buyer and the producers. In return, the buyer witnesses that producers' capability to produce good quality products is improving. The buyer also gives regular feedback to encourage further improvement. The commitment to a long-term partnership/cooperation was realized as the mutual trust between the two parties strengthened.

II. **Kerinci local government**

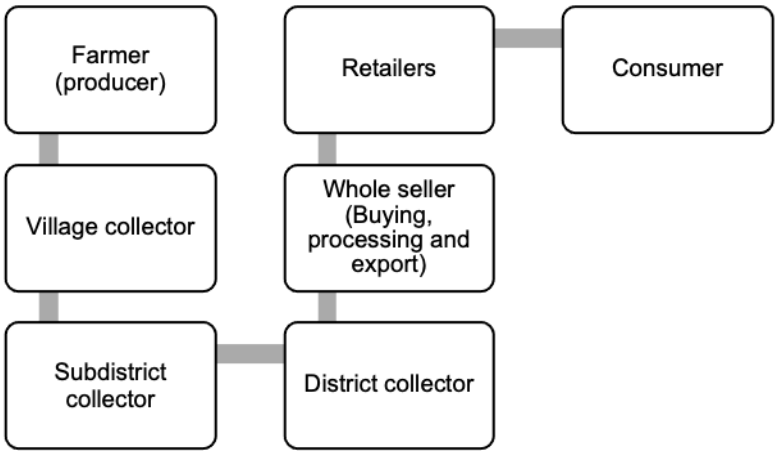
The Kerinci local government has always supported the development of the local commodity. Their active contribution can be seen in the local policies and community engagement endowed in the agriculture agenda. A collaboration was conducted with the government to register geographical indications for Kerinci cinnamon. Through the Jambi Province Plantations Agency, the government hopes that TAKTIK can become fully involved as a core member of the MPIG-K2J because all TAKTIK program areas will be registered for geographical indication. In 2016, Kerinci local government provided 50,000 cinnamon seeds to the harvesters willing to contribute to the development of Korintji cinnamon. The seeds provision continues until this day onward.

3.3.3 Trade channels

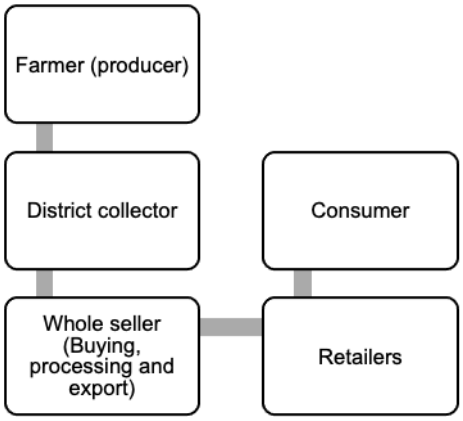
As mentioned, harvesters are engaged in two traditional ways of selling cinnamon products in Kerinci: selling the land or crop. By selling the land, the buyer is responsible for all costs related to the harvesting and processing the cinnamon goods after harvest, including hiring extra labor to peel, scrape, dry, and transport the cinnamon. A *toke* that buys cinnamon through this mode is entitled to cut down trees and use all parts of the cinnamon tree (bark, wood logs, leaf). While the deal is still subject to negotiation between the farmer and the customer, a *toke* always has the power to set the price, considering the costs associated with the harvest and their profit margins. Harvesters typically compromise on the price the toke provides because of their pressing fund needs. However, due to its simplicity, many harvesters prefer this sale mode. Harvester does not need to consider the expenses and procedures for harvesting and after harvesting.

The second method is selling the crop. This method requires the farmer to manage the crops on their plots at all stages, from cultivation until post-harvest. In this second method, harvesters must consider factors such as preparing the farm and hiring extra laborers for harvesting and post-harvest processing, product storage, and transporting them to the buyer (*toke*). Harvesters still need to sell their product to local buyers in this mode. They are free to determine the quantity of cinnamon sold to the buyer. However, the price of the product is still determined by the *toke*. Harvesters practicing this mode are forced to sell their products at low prices to avoid being required to store them for too long. Even though the production of cinnamon in Kerinci is important, the cinnamon industry is not profitable for the harvesters due to its oligopoly market. Wholesalers with market knowledge and connections to buyers play a key role in determining the purchase price, whereas harvesters do not have bargaining power due to a lack of access. Harvesters receive the lowest price of the transaction.

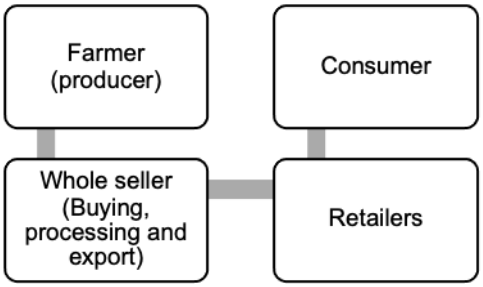
One of the identified findings is that there are three trading channels of cinnamon in Kerinci Regency based on figure 3.9 (A, B, & C).



A. Long supply chain process



B. Medium supply chain process



C. Short supply chain process (TAKTIK model)

Figure 3.9. Trading channels of cinnamon.

In general, the extended supply chain process occurs in Kerinci. The new initiatives have shortened the value-chain (Fig. 3.11 C) conducted by processing companies acting as buyers and exporters.

3.3.3 Results of the SWOT analysis

This section aimed to investigate the opportunities after a SWOT – analysis. The SWOT analysis is derived from the harvester interviews, key actors' interviews, and observations.

Strengths

- The name and reputation of Korintji cinnamon are well-known throughout the spice industry.
- Korintji cinnamon has higher quality than its main competitor, *C. zeylanicum*.
- An innovative and adaptable harvester organization willing to adapt to changes and buyer requirements.
- The buyers showed interest in developing the capacity of cinnamon harvester and GMP processors and quality standards.

Weaknesses

- The absence of proactive and promotional mechanisms directed to a market at the global level.
- Lack of research training programs and support services.
- Lack of information and database updates relevant to planting, producing, and exporting cinnamon information.
- Low bargaining position from harvesters.
- Traditional labor-intensive methods are used for processing.
- Most harvesters do not have access to credit and good financial resources. As a result, they do not want to invest in new products and technologies.

Opportunities

- The high demand for Korintji cinnamon on the world market.

- Health benefits of cinnamon.
- Trends towards natural flavors, fragrances, and health care among consumers.
- Supporting bodies and local partners to increase harvester capacities.

Threats

- Lack of awareness among international consumers about cinnamon differences.
- Vietnam cinnamon and Ceylon cinnamon are in higher demand (2019).
- Seasonal crops are more attractive for harvesters in the village.
- Standards are increasing in developed countries, which act as a trade barrier for Korintji cinnamon products to enter the market.
- Low quality of cinnamon due to mix-yield from various members

The interesting part of the Strength analysis is that reason behind the harvester decision to adapt to changes, and buyer requirements have added positivism to initiating transform their production. Furthermore, lack of knowledge was the main limitation to initiating such activity. Hence, the research shows that the harvesters need specific assistance and resources form respective local and government institutions to develop spice tourism successfully. Despite these limitations, there is a willingness to adopt new ideas of production, which must be exploited.

3.4 DISCUSSION

3.4.1 Shifting to modern practice of production

TAKTIK is an important stakeholder in the cinnamon business in Kerinci regency. This harvester group participates in discussions and policymaking at the stakeholder forum level. They focus on the organization management practices, such as the non-using of pesticides and clear-cutting is necessary to adapt to the changing needs and standards continuously.

TAKTIK also implements the so-called crop share lease. A crop share lease is an agreement where the landowner and tenant split the expenses of farming and production. Because of this, both parties experience the risk associated with high and

low prices and production. Under this scheme, TAKTIK receives service fees of 3% from production costs and has access to a loan to invest in a warehouse and technical assistance on quality and Good Manufacturing Practices (GMP). Working with local collectors, TAKTIK and its members continue to take on the roles of cultivation, harvesting, post-harvesting, stick processing, and quality control. In contrast, as their off-taker, TAKTIK's buyer, ATN, takes the responsibilities of processing (broker) export handling, providing capital, and marketing. As the active members together for a solution as stated earlier regarding 'fee-sharing.'

Figure 3.11. Harvester member of TAKTIK organization group discussion, source: Rikolto.

The latest capacity development provided by Rikolto to TAKTIK is introducing a business model of selling cinnamon sticks instead of cinnamon barks that enabled harvesters to increase the cinnamon added value per kg and hence, income. Instead of harvesting the whole cinnamon trees in the garden once every 20 years as they used to, harvesters started to harvest only parts of the cinnamon garden and processed them into cinnamon sticks (Figure 3.14). In this way, harvesters have a new alternative way of selling their cinnamon and can earn income for several years from one plot.

Figure 3.12. Cutting sticks to buyer preferences; 5, 8, 12, and 30 cm in TAKTIK warehouse.

3.4.2 The Importance of price fairness

Fairness in the cinnamon sector is becoming a larger concern. Sustainable, efficient, and resilient agro-food systems depend on ensuring fair and ethical behaviors throughout the agro-food chain. To build a sustainable system, it is essential to recognize and comprehend the business applications that support fairness in the cinnamon sector. Price fairness is known for fair living wages, in which a living wage is defined as the minimum income necessary for a harvester to meet their basic needs. This is not the same as a subsistence wage, which refers to a biological minimum, or a solidarity wage, which refers to a minimum wage tracking labor productivity. The lower the quality, the lower the gate price will be given to the harvester. Table 3.3 shows the average income.

Table 3.3. Harvester income description (**IDR 1,000,000 = $ 65**) in 2017

Tree Age for harvest	**Grade**	**Bark Collected for one tree**	**Total trees in 1 ha**	**Gate price: IDR (Indonesian rupiah) / KG for (14% water, VO 4%)**	**Total (IDR) income based on the waiting period**	**Divided Income / Year (IDR)**	**Divided Income/month (IDR)**
5 Y	KA	20 kg	200	40,000	160,000,000	32,000,000	2,667,000
10 Y	KF	40 kg	150	50,000	300,000,000	30,000,00	2,500,000
15 Y	KM	80 kg	100	55,000	440,000,000	29,333,000	2,444,000

The table above shows that a 5-year tree produces 20 kg of dried bark within 1 ha and can be harvested from 200 trees with the end-product of grade KA. In this situation, after sun-drying, the produce has a water content of ca. 14% and 4% of volatile oil, with a gate price of 40,000 IDR per kg. Total income comes from a total bark growth period, or “waiting period,” of five years. This means the total is divided into five years. This means that a harvester with a land size of 1 ha and 200 cinnamon trees will receive 2,667,000 IDR/month ($ 174 / month).

Another fact to follow concerns the price breakdown in the cinnamon supply chain, in which the income can differ substantially between harvesters and collectors. Harvesters earn a maximum of IDR. 40,000/kg ($ 2,5/kg), while wholesalers or exporters can earn up to 25% of the final retail market price after manufacturing and packaging. The research conducted by CBI in 2016 shows the price breakdown of cinnamon in the global market.

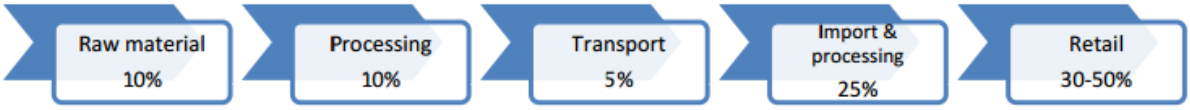


Figure 3.13. Indicative price breakdown of cinnamon, sold in spices and herbs section of supermarkets (CBI Market Information Database in ProFound, https://www.cbi.eu/market-information/spices-herbs/cinnamon)

One of the reasons for the low prices of cinnamon is the long trading channel between intermediates, as smallholders produce spices locally (Wangsa, 2007). Due to these long value-chains, harvester profits are small compared to the middleman. The figure above shows the price breakdown in the supply chain process, in which harvesters earn 10% of the selling price. Meanwhile, local process companies that sundried and cut the sticks into 5, 8, and 12 cm lengths receive an additional 10% income. Transporter from processing companies receives an additional extra 5%. This transporter delivers the product to the buyer outside the province—one pallet estimating 100 KG, costs IDR. 1,000,000, meanwhile, for transport, the truck can carry up to 50 pallets. The wholesaler

that does the final processing before exporting overseas adds 25% of the price. The responsibilities and buyer contact gives them the privilege of setting the price. Retailers sell the cinnamon at the final price, depending on the derivative and purchase order of the product, table 3.4.

Table 3.4. Income comparison in the cinnamon sector ($1 = IDR. 15,000,00)

Stakeholder	Bark	Tree amount (1 ha)	Sell Price (IDR)	Income		
				Five years	One year	One month
Harvesters	20	200	40,000	160,000,000	32,000,000	2,666,667
Collectors	20	200	160,000	640,000,000	128,000,000	10,666,667

However, the significant point that is often missed is that the collectors were the real beneficiaries of the low prices to harvesters. While harvesters invariably got 75% less than they should have ideally received, the collectors gained a price advantage four times higher.

3.4.3 Constraints and opportunities for value-chain development

Based on the study's findings, it can be stated that there is a substantial opportunity to raise the productivity of processed cinnamon products and expand the value-chain. Many stakeholders are involved in the production and marketing of cinnamon in the study area. The common factors influencing the value addition of cinnamon bark were the purchase price, the sale price, and shortened distribution channel. To understand the constraints and opportunities for improvement in the value-chain process in Kerinci, we categories it based on four important issues, see table 3.5.

Table 3.5 Constraints and opportunities in value-chain improvement

Categories	Constraints	Opportunities [January & October 2017]
Product and Market	• Not rewarded fair price • Farmer are price-takers • No access to market (local and international)	• Access to information for price • Access to wholesalers and end-market • Shorten the channel of distribution
Technology & Production	• No ownership of land • No investment in transportation and accommodative infrastructure • Traditional technology	Support by Local and State government for productivity improvement : farming technology, investment schemes, training etc
Human Resources	• Traditional harvesting and farming method • No regeneration of growers • Dependable only on Cinnamon	• Train farmers on improving capacities for farming and business • Organize community farmers to share experience • Need establish farmer forum
Finance & access to capital	• No support from investment bodies • No support from local and state government • Difficult to access to loans	• Establish cooperative • Partnership with local trade union and community banks
Environmental Issues	• Clear cutting • Product hygiene • No environmental certification	Training and facilitating by partners to conduct GAP

Constraints

The observations and findings showed that two significant constraints were identified: on-farm and off-farm problems.

Constraints harvesting

Based on the value-chain stream, the first constraint identified is that bark is sourced by small growers that lack competence and knowledge of agricultural practices. This research has shown that they are only clear-cutting without replanting new trees. Then, the second constraint deals with the ownership of the plot that is rented. The yearly maintenance is increasingly high because of the increase in seedling, fertilizer price, and labor costs. Due to this concern, the third constraints appear. There is no industry to support products and research development in Kerinci. Furthermore, there is a lack of investment in facilities and agriculture tools such as plastic mats, cleaning tools, moist meters, etc. Finally, the final constraint is production practices with environmental impacts, which will be explained in chapter 5.

Figure 3.16 The traditional process of production, source: Rana Menggala.

Constraints in post-harvest production in Kerinci

Constraints in post-harvest cinnamon processes arise because of the non-availability of regional funds for agriculture development. Therefore, Kerinci local government should prioritize providing finance to provide machinery to process the raw material into a more valuable commodity, e.g., a grinding machine that can make cinnamon powder, essential oils, and oleoresin, all products with a higher sale value in the market.

Opportunities

European consumers are increasingly interested in buying products with ‘clean & green’ labels. When products present sustainability and traceability labels, it is crucial to ensure that those claims can be traced and verified. Standard certifications are pivotal to accessing the global spice market. Therefore, traceability and a standard certification system would benefit Korintji cinnamon products.

3.4.4 Meeting global standards criteria

The importance of complying with the standard is related to legal requirements for food safety (traceability, hygiene, and control) in the form of certification. An example is the

European Union (EU) import regulation that imposes imported products to meet food safety management certifications before entering its markets, e.g., BRC, IFS, FSSC22000, and SQF. The EU regulations also require labeling on the packaging of the product so will provide information for the consumer, such as the following information according to CBI Product Factsheet, Cinnamon in Europe (2015):

- Product name.
- Detail of manufacture.
- Batch number.
- Manufactured date.
- Product grades.
- Harvested time.

As mentioned above, cinnamon harvest and post-harvest production in Kerinci lack supporting actors to guide and assist in meeting such criteria. Among others, the lack of knowledge to create derivative products, inadequate access to modern farming equipment and market access, and the information prevent local harvesters from benefiting from their livelihood. Local cinnamon growers are disorganized and cannot actively interact with capital and negotiate with market actors. Below are the international standards applicable in Kerinci for the harvesters.

Good Agricultural Practices (GAPs) are production and farm-level approaches to ensure the safety of fresh produce for human consumption. GAPs help growers understand the practices and risks associated with their farm and help identify practical ways to reduce the risk of contaminating produce grown, harvested, and packed. GAP production and post-harvest guidelines are designed to reduce the risk of food-borne disease contamination on fresh produce. These voluntary procedures can be tailored to any production system.

Good Manufacturing Practices (GMPs) specify a set of manufacturing guidelines to ensure the product's quality, including a range of preventative controls such as training, audits, documentation, and validation/evaluation.

HACCP (Hazard Analysis and Critical Control Points) is a systematic preventive approach to food safety. There are physical, chemical, and biological hazards in production processes. HACCP certification is built around several principles to prevent process hazards. HACCP standard is complete food safety and quality management system, and the food standards agencies recommend it as the most effective way to maintain product quality and consumer protection (SLSI, 2017).

ISO 22000:2005 specifies that an organization's food safety management system must meet. To obtain ISO 22000:2005, a company must demonstrate its ability to control food safety hazards.

Organic regulations are formulated based on guidelines or basic standards provided by the International Federation of Organic Agriculture Movements (IFOAM) and Codex Alimentarius. Overall, organic operations must demonstrate that they protect natural resources, conserve biodiversity, and use only approved substances (IFOAM, 2015).

Fair Trade is a trading partnership based on dialogue, transparency, and respect, which seeks more significant equity in international trade. It contributes to sustainable development by offering better trading conditions and securing the rights of marginalized producers and workers. Fair Trade organizations commit to Fair Trade as the core of their mission. They are engaged in supporting producers, raising awareness, and campaigning for changes in the rules and practices of conventional international trade (Fair Trade International, 2011).

A practical technical guide is required to maintain and enhance the quality of cinnamon bark, increase the selling value of cinnamon, and promote sustainability practices. It is essential to identify the stakeholder involved in the value-chain process in Talang Kemuning, to identify profitable value-creating activities and those that are not. By assessing value-creating activities, the value-chain analysis also establishes the cost drivers of each process.

Therefore, it is vital for cinnamon harvesters in Kerinci to enhance their compliance capacities through certification according to international standards, like the EU

standard. The inability to meet the necessary buyer product specifications and hygienic food standards (SPS) will be a bottleneck in the future. The adoption of the international standard of ISO 6538:1997 (*C. burmannii*) and ISO 22000 (Food Safety) for cinnamon can bring advantages and support the cinnamon harvesters to enhance their production compliance capacities to meet the conformity requirements of European markets. Building harvester capacity to deliver food hygiene and safety skills development will strengthen their role along the cinnamon value-chain.

The value-chain approach has advantages in addressing constraints and challenges to improving sustainable practices in farming. Promoting inclusive economic growth with an understanding of the environment can leverage some points along the chain toward small producers, traders, or processors. Using the value-chain as an approach and method to see the leverage point for livelihood improvement can start from the upstream or downstream process. Upstream actors are the producers, traders, or processors closely linked to the product's origin. Downstream value-chain actors are the more prominent traders and processors with access to the end market.

3.5 CONCLUSION

The Action Research conducted between 2017 - 2018 shows that the value-chain in Talang Kemuning, Kerinci is a buyer-driven chain where the buyer "*toke*" (trader and exporter) has a significant role and power in the cinnamon business. The cinnamon market in Talang Kemuning is a single channel that focuses on the international export market. Intermediaries had a significant role in the value-chain process. Village collectors in Talang Kemuning play a role in setting the farm-gate price, while cooperatives, with the support of local NGOs, made various attempts to improve the value channel of the farmer in the whole value-chain. Improving the cinnamon value-chain is one of the means for smallholder harvesters to regain their role in the value-chain.

The involvement of the Indonesian government as the primary stakeholder in the cinnamon value-chain is significant because it can bring value to national income (FAO, 2014). Indonesian ministries such as the ministry of agriculture and the ministry of

environment and forestry (MoEF) can support the development and coordination of the cinnamon value-chain through a law system at a fair price and access to a broader market and Investments. Government involvement can lead to higher productivity, and capturing a higher value includes cultivating, drying, packaging, research development, education, and future product marketing training.

The Indonesian government and relevant ministries can guide smallholder harvesters related to international market demands for product certification, and quality standards make it difficult for small growers to meet the request. The global consumer protection agency demands safe products, free from chemical elements harmful to human health, causing exporters to be careful in providing quality commodities and requiring that harvester conduct cultivation according to current standards or the tailor-made standards in which the AR of the dissertation is about.

Chapter IV

The Effect of Geographical Indications (GIs) on the Koerintji Cinnamon Sales Price and Information of Origin

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Chapter IV

The Effect of Geographical Indications (GIs) on the Korintji Cinnamon Sales Price and Information of Origin

Abstract

This chapter focuses on the impact of the geographical indications (GIs) of Korintji cinnamon on its value-chain. The study was performed from September 2017 to November 2017 in Talang Kemuning, Kerinci Regency, Indonesia. A village farmers' group was surveyed using a semi-structured questionnaire, roundtable discussions, interviews, and direct observations to understand whether the GIs improve income, source of production, and promote product quality. The literature on the topic was analyzed using a descriptive method, and a value-chain study was structured from the review's findings. This helped us better understand how GIs' effects are dispersed among the chain actors and eventually enter the areas where GI commodities originate. GIs generate added value, especially for farmers and buyers. Specifically, by using the GI Koerintji cinnamon's handbook of requirements, the efficiency of farmers and buyers has improved. The studied population included farmers from Koerintji Cinnamon Jambi Geographical Indication Protection Society (MPIG-K2J) and Tani Saktik Alam Kerinci (TAKTIK), a farmer group. To obtain a GI, TAKTIK had to implement good agriculture and manufacturing practices based on the handbook. Results show harvesters developed a system to monitor post-harvest handling to ensure a safe and high-quality supply to the global spices market. Following the book requirements, TAKTIK members follow specific procedures, including selecting raw materials, grading, origin verification, and quality control. Furthermore, GIs enable farmers to claim a price premium. As a result, GI Koerintji cinnamon's presence has added value and credibility to TAKTIK farmers, leading to price improvement.

Keywords: geographical indications; value-chain

4.1 BACKGROUND

The geographical indications (hereinafter “GIs”) could protect a product origin (sui generis) and improve their processing activities to meet good agriculture practices (Zoet, 2017). More than 10,000 Geographical Indications (GI) exist around the world. They aim at “identifying a good as originating in the territory of a State, or an area or locality within that territory, where a specific quality, reputation, or other characteristics of the commodity is, fundamentally, attributable to its geographical origin” (WTO definition). When producers obtain a GI for a specific commodity, they get the exclusive right to name their products after the territory where the commodity is produced. Therefore, GIs can be considered a tool for adding value to certain products. GIs act as a quality assurance that unlocks value by capitalizing on consumers’ desire for diverse, typical, quality products (Direktorat Merek, 2016). GIs can ensure origin, quality, safety, and premium price compliance. As a recognizable label, it promotes a product among different actors in the value-chain, buyers, and consumers (Jaya A, 2009).

GIs can be beneficial in indicating the quality of a product (J.E. Hobbs *et al*., 2000). A registration and certification system would support a brand origin therefore can be crucial in signaling credibility attributes. A producer's organization will oversee its administration and ensure adherence to production standards. Thus, producers can advertise quality and the related reputation that has grown over time (J.A. Winfree, 2005), which is encouraged to maintain product quality by the premium pricing drawn by a GI (G. Moschini & L. Menapace, 2018). In addition, consumer knowledge that origin labeling indicates attributes linked to natural and human elements is necessary for the claimed benefits of GI labeling, such as the promotion of environmental sustainability, to be fulfilled. This ties in with the consumer demand for traceability in agrifood products.
There are some empirically supported claims that consumers and European producers, where GIs have been developed for the longest time, have expectations about the quality of origin items on the European market. Studies show, however, that although European producers may not always specifically address positive environmental effects in shaping the quality of the product in the way they have formulated product

specifications, there has been a "greening" of product specifications recently reflecting environmental considerations.

The GI Korintji Kayumanis certificate was published on 26 May 2016 by the Ministry of Law and Human Rights (ID G000000043), see Appendix A. The Korintji cinnamon was Indonesia's 43rd product-protected geographical indication (Tregear *et al*., 2016). Korintji is the old spelling of Kerinci Regency, while Kayu Manis is the word in the Indonesian language for cinnamon (Bagal Ngo & Vittori, 2011). After the GIs were registered, MPIG- K2J managed them.

MPIG-K2J emphasizes GI's protection of Korintji cinnamon for productivity improvement, that harvesters should follow to meet the GI requirements. The initiative to register Koerintji cinnamon as a GI label by MPIG-K2J was an effort to add value to the commodity. TAKTIK was a pilot project for MPIG-K2J to improve their production activities to receive higher sell prices in the market by following the *Buku Persyaratan Indikasi Geografis Kayumanis Koerintji Jambi* (Handbook of Requirements for the Geographical Indications for Korintji Cinnamon).

The present chapter aims to identify the effects of GIs on the Korintji cinnamon sales price increase in a harvester organization, TAKTIK (Tani Sakti Alam Kerinci), as the first executor of this label in Kerinci Regency. It is promoted and executed by the Kerinci community for the importance of product recognition. TAKTIK also represents harvesters and acts as a link between them and market players, with the assistance and guidance of the GI Korintji label holder, the *Masyarakat Perlindungan Indikasi Geografis Kerinci* (MPIG-K2).

4.2 THEORETICAL BACKGROUND

Geographical indications (GIs) are a mechanism that can increase small producers' incomes (Tregear *et al*., 2016). They constitute a form of protection of intellectual property rights. They are specified in the Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPS) as 'indications which identify a good as originating in the territory of a member or a region or locality in that territory, provided that the

quality, reputation or other characteristics of that good are essentially due to its geographical characteristics.' It also can increase revenues for local producers and satisfy the needs of more conscious and demanding customers. There is better market access for GI products (Bramley *et al*., 2003). GI can help strengthen the value of local products, according to Bagal Ngo & Vittori (2011). GI is an opportunity to distinguish and value agricultural and agri-food products, seen in developing countries as agricultural and cultural development instruments. GI is a tool for agricultural and cultural development in developing countries, strengthening the value proposition of local products (Tregear *et al*., 2016; Bagal Ngo & Vittori, 2011; Del Prete *et al*., 2017). It makes GI a rural development tool that can serve commercial and economic interests while preserving local values (M.C. Wang, 2006). Recognition of the GI can affect the structuring and strengthening of the local value-chain (Barjolle, D *et a*l., 2011; Bramley, C., 2011; Delphine & E. Bianabe, 2017). Most of the registered GI Indonesian agriculture products have not emphasized the saliency of their respective GIs; thus, they are currently marketed merely as a commodity without strategically maximizing the emphasis on their GIs in the global market (Claire Durand & Stéphane Fournier, 2017). Ramli *et al*. (2010) stated that the application dan implementation of GI, particularly in Indonesia, provides various benefits, such as (1) providing legal protection for GI products; (2) product marketing strategies for domestic and foreign trade, especially for explaining the products' origin (3) improving the value-added of the product giving impact on the improved regional economy, (4) improving product reputation on global trade, (5) as the existence of equality of treatment for the protection of GIs and promotion beyond the country, (6) as one of the means to avoid cheating competition. Some literature also refers to GIs as an identity that indicates the origin of an item and a product which, due to geographical and environmental factors, including natural factors and human factors, gives reputation, quality, and specific characteristics to the products and goods (G. Giraud & R. Halawany, 2007).

4.2.1 Geographical Indications in the value-chain

A value-chain is a range of activities required to bring a product from production to the final consumer (Del Prete *et al*., 2017). To address the value-chains, GI was identified as a possible adequate sign of sustainability and origin to be developed to strengthen the capabilities of producers and private enterprises and effectively link cinnamon harvesters to domestic and international markets through the development of GI value-chains. This is expected to increase the increased income of smallholder producers and agribusinesses in the prioritized GI value-chain.

According to Fernandez-Stark *et al*. (2012), traceability, administrative measures, and product origin can become an upgrading trajectory. The main activities and supporters analyzed a cinnamon value-chain. The main activities and supporters analyzed a cinnamon value-chain system. Based on the concept of Porter (Barjolle *et al*., 2011), a chain system has two activities, namely the main activity and the supporting ones. Another piece of the literature shows that the harvesters have a limited understanding of upgrading opportunities regarding production methods. In this case, the stakeholder who knows this certification of origin sees it as a marketing purpose, not as guidance for process upgrading, including biodiversity concerns, sustainable agriculture practices, and food safety (Bramley, 2011). Until recently, GI registration's social-economic and environmental impacts are still debatable for researchers' implementation and require substantial investment and time (Dephine & Bianabe, 2017).

A GI-based product can generate a premium brand price and contribute to local employment, ultimately helping local community development (Andrea Borghini, 2014). Therefore, upgrading cinnamon harvester production by adopting geographical indications can be a part of a broader agenda in the international development practice called 'value-chain development (Ramli, 2010; G. Giraud, 2007). Recognition of a GI affects the local value-chain's structure and strength (S. Mawardi, 2009; R. Teuber, 2010). Unfortunately, most registered GIs in Indonesian agriculture is marketed merely as a commodity without strategically maximizing the emphasis on their GIs in the global market (Addor, 2002). According to Giovannucci *et al*., (2015), GI certification im-

proves the ability of companies to leverage their reputation to assure consumers of product quality.

4.2.2 Geographical Indications as value-added

Since the 21st century, there has been an increasing demand for local, traditional, and more extensively produced food (AFRICAN JOURNAL, 2018). Products with GI labels can contribute to these consumption trends. One of the essential aspects of GI is that it can increase the economic viability of smallholder enterprises from whom such food is often sourced. However, studies show that different GIs impact price premiums (Egelyng *et al*., 2016; Vandecandelaere *et al*., 2010). In the literature review, some scholars also mentioned that GI is a tool for agricultural and cultural development in developing countries, strengthening local products' value proposition (Barjolle *et al*., 2011). The research here wants to focus on the value proposition that can become a rural development tool, serving commercial and economic interests while preserving local values (Biénabe *et al*., 2017, Creswell, 2012) and also having multiple aims such as (1) increasing the selling price of a product in a market of growing competition; (2) to give a piece of controlled information about the origin to the consumer, at a time where value-chains are less and less traceable; and (3) to promote local and rural development by boosting collective dynamics directed to produce high economic value.

Add to this, according to Ramli (2010), the application and implementation of GIs, particularly in Indonesia, have various benefits, including (1) legal protection from the Indonesian Ministry of Human Rights and Law as intellectual property rights; (2) marketing assets for domestic and foreign trade; (3) improving the value-added of the product improving the regional economy; (4) improving product reputation in global trade; (5) providing means to avoid false competition in the way of belonging to certain producers in the geographical area defined who comply with the specific conditions of production for the product.

4.2.3 Geographical Indications as a label of origin

GIs link the product's origin with more specific functionality, safer, and hygienic. For example, European consumers are concerned about the quality of their food, which can be more guaranteed when they trace the products back to their origin. With this terminology, GIs may change the status of an agricultural product from "commodity" to "origin product" (Central Data Statistic, 2017). This shows that consumers respond positively to a specific label, even when unaware of the specificity associated with the indicated geographical origin (DIREKTORAT MEREK, 2016). When appropriately used and well-controlled, the label can become a powerful marketing tool that contributes to a region's economic development (COMTRADE, 2018). Giovannucci *et al*. (2012) state that GIs are a tool for "institutionalizing the resources of a place." The label may also differentiate products based on unique local features, historical-cultural factors, and characteristics linked to natural, geographical, and human factors such as soil, climate, local know-how, and traditions that integrate origin-labeling (R. Kaplinsky, 2000). This label may protect certain goods from specific geographical locations from misuse and imitation, promoting rural development and helping consumers by giving them information concerning their specific characteristics (Humphrey & H. Schmitz, 2001).

4.3 RESEARCH HYPOTHESIS

We hypothesize that a GI is an essential development tool for cinnamon harvesters that impacts sales prices, quality, consumer information on the source of origin, and environmental protection.

Moreover, The Indonesian Ministry of Law and Human Rights stated that GIs are potent devices that enhance value and rural economic development, in line with the nation's economy (Biénabe, 2017). Therefore, the research shall identify whether the GI label can impact the cinnamon sales price and increase harvester revenue. Furthermore, going deeper into the research will also reveal the impact of the value-chain among the stakeholders. Thus, the GI of Korintji cinnamon can also address the issues of the sale price, source of origin, and how value can be created, transferred, and distributed along

the supply chain (Egelyng *et al*., 2016; R Collins, 2000). In the following Figure 4.1, we see this situation illustrated graphically.

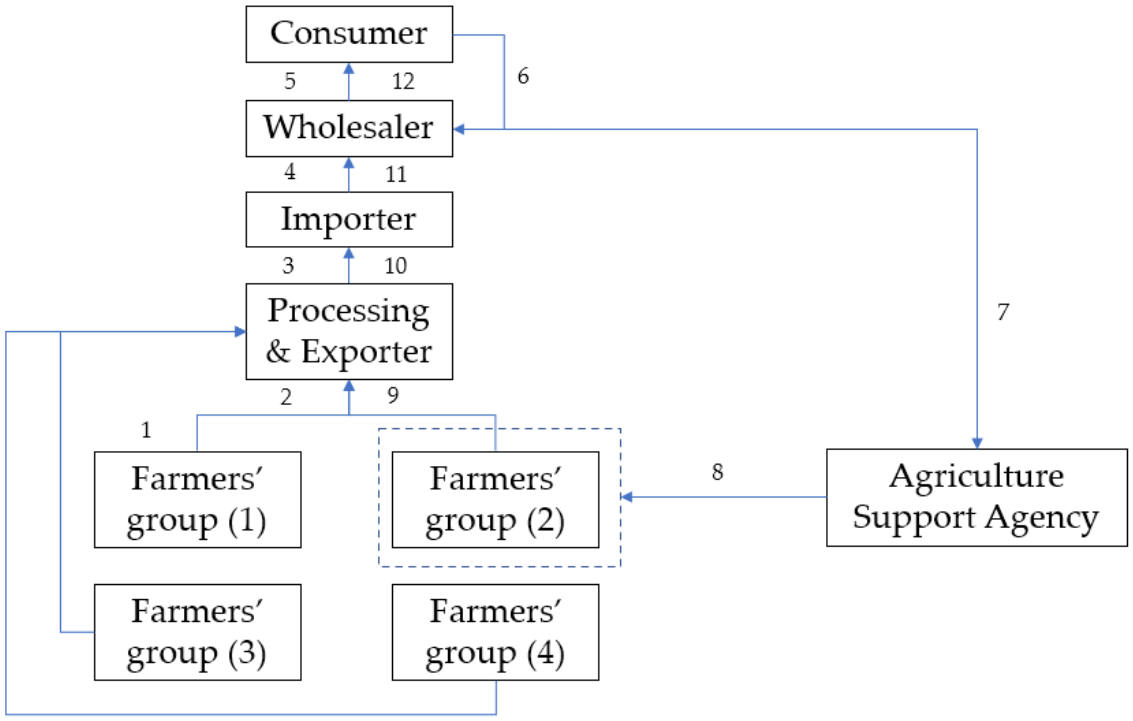


Figure 4.1. The GI research hypothesis, source: Rana Menggala.

The traditional supply chain is shown from points one to five, from farm to fork. Starting at point six, the hypothesis begins where global consumers need to be clarified of product origin. Consumers demand transparency from the wholesaler and supermarket at point seven. Wholesalers work together with an agricultural support agency for geographical indications to improve their production and manufacturing. The agency provides training and guidance for GIs so the label can be put on their packaging later. The harvester group two is the partner and will register the GI as a legal provision for the brand of origin. The harvester group also improved its traceability system to trace all transactions to its members. The harvester group, empowered with a label of origin, improvised production, and accounted traceability, has a better farm gate price to offer to the buyer that is mostly processing and has a license to export. The reason is that,

commonly, this processing company mix and blends all the bark. Hence, the GI label is present in the newest value-chain model; processing companies will consider twice whether to blend products due to the traceability system created before. From points nine to twelve, the importer can recognize the cinnamon bark from the village and producer through the supply chain development and the GI mechanism.

4.4 METHODOLOGY

4.4.1 Research Framework

The research combined questionnaire surveys, interviews, and round table discussions to collect cinnamon harvester information and data. The collected data would help develop the best practice framework and the conclusions and recommendations for findings (Staritz, C. 2012). In addition, the research findings aim as a vehicle for communication and negotiation among the stakeholders and a cornerstone of collective action. Its implementation is critical to its success and long-term viability.

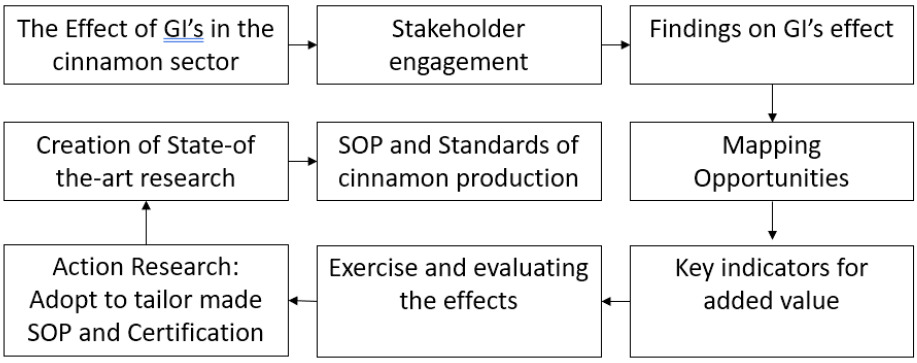


Figure 4.2. GI Research Framework.

The figure above shows the conceptual research framework to evaluate and see its effect on the sector, which is in the plan to be adopted for the tailor-made certification, especially on the system operating procedures (SOP) of sustainable harvesting. GIs' current practice literature will be reviewed, including books, journals, conference proceedings, workshops, seminars, and other sources. Past and present methods of GIs will also be investigated during the research. The review exercise includes

developing an instrument to conduct the interviews and questionnaires. Finally, the information collected from these interviews and questionnaire surveys is consolidated to answer the research objectives.

4.4.2 Research approach

This study uses an AR approach, as mentioned in chapter 3, beginning with GIs' research framework and value-chain, a common sense for linkage as added value-based. It starts with a research question, "What is The Effect of Geographical Indications (GIs) on the Korintji Cinnamon Value-chain for Greater Harvester Income?" The hypotheses are answered by collecting empirical data from field visits and conducting questionnaires and round table discussions. The research focus was on answering whether GIs can play a unique role in improving harvesting production activities and income.

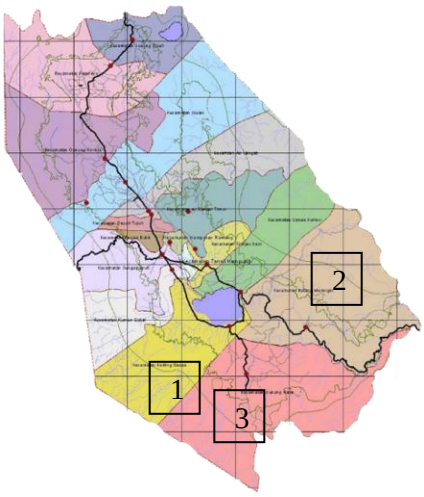
4.5 RESULTS AND DISCUSSION

The high quality of Korintji cinnamon comes from the combination of an agroclimatic area. It is noteworthy that the location of the cinnamon tree growing area is the precise altitude between 800 to 1,500 meters with volcanic soil with a pH of up to 6,76 (DIREKTORAT MEREK, 2016). We interviewed the chairman of MPIG-K2J to consent to this information. It was mentioned that they cooperated with Research Institute for Spices and Medicines (BALITRO) to conduct research to identify which area in Kerinci has the highest volatile oil and cinnamaldehyde preferable for the global market (Tab. 4.1).

Table 4.1. The results analysis of the levels of volatile oils and *cinnamaldehyde*

No	Sub-District	Test Result	
		Volatile Oil	Cinnamaldehyde
1	Gunung Raya	5,80%	93,23
2	Btg. Merangin	3,78%	90,08
3	Bukit Kerman	3,50%	90,50
4	Gunung Kerinci	2,57%	86,04
5	Siulak Deras	2,20%	74,35
6	Siulak Mukai	2,83%	73,48

Source: MPIG-K2J book of requirements



Based on Table 5.1 description, shows that the cinnamon that grows in the Gunung Raya district was considered a price determinant of the Kerinci Regency due to its highest concentration of VO and cinnamaldehyde. According to the local agriculture agencies, one of the factors is the historical volcanic eruption that makes the soil fertile. We had observed the area and considered it very humid and cold due to its latitude, 853 meters above sea level, with dense trees surrounding it.

Cinnamon quality is classified according to the part of the tree in which the bark comes and the bark's thickness. Generally, there are three different qualities, KC comes from branches and is about 1 mm thick; KB also comes from branches but is between 1,5 and 2,5mm thick; and KA comes from the trunk of a tree aged 5 to 15 years and is also between 1,5 and 2,5 mm thick. The price is determined by single or double coil; KF, which comes from the trunk of a tree aged 15-25 years and is between 2,5 - 3mm thick; and KM, which comes from the trunk of trees over 25 years of age and is between 5 and 10 thick. In the book of requirements, MPIG-K2J had differentiated the grades of cinnamon, which are (a) dried cinnamon (KM; KF; KS; KA), (b) Cinnamon sticks (VAA; VA; KAABC & KBBC), and (c) Cinnamon powder. The letter “K” from KM – KA grades stands for ‘Korintji,’ and the letter “M/F/S/A” determines the age of the tree (Table.4.2).

Grade	Age of tree	Bark Thickness
KM	30 >	0,5 cm
KF	20 – 30	0,3 - 0,5 cm
KS	10 - 20	0,2 cm
KA	5 - 10	0,1 cm

Table 4.2. Grades of Korintji cinnamon.

The table below shows the indicative price breakdown of cinnamon without added value, commonly sold as raw material. Exporters received better earnings due to the double effort they must take, such as regrading, second sun-drying, repacking, and many more. Retail receives the highest income in the supply due to its direct access to the consumer.

Table 4.3. The indicative price breakdown of cinnamon 2017 from European buyers

No.	Grade	Price EUR (€) / kg			
		Harvester	Middleman	Importer/processing companies (Increase by 25%)	Retail (Increase by 50%)
1.	KM	2.92	3.19	3.99	5.98
2.	KF	2.79	2.99	3.74	5.61
3.	KS	2.66	2,79	3.49	5.24
4	KA	2.53	2.66	3.32	4.98

Source: collective sources from different exporters and retailers.

Commonly producers receive 50% of the total retail price while processing companies that do the packaging and sorting receive an additional 10%. The transporter companies benefit €500 for five tons, mainly delivering from twenty-five to thirty tons for

one trip. Importer and processing companies receive a 25% additional price. Finally, retail receives the most significant profit, reaching 50%.

4.5.1 The Role of GIs as an added value

A value-chain is a range of activities required to bring a product from production to the final consumer (R. Kaplinsky, M Morris, 2001). The value-chain becomes a useful analytical tool for understanding the relationships among actors in the chain or streams to consider potential development (J. Humphrey & H. Schmitz, 2002). Producers can adopt a market-orientated attitude of “producing what they can sell” (R Collins *et al*., 2015). A GIs-based product can generate a premium brand price and contribute to local employment, which may help the local community's welfare (Staritz, C. 2012). Thus, upgrading cinnamon harvester production through value-chain interventions by adopting geographical indications can be a part of a broader agenda in the international development practice known as ‘value-chain development (VCD), based on the global value-chain theory (Humphrey and Navas-Alemán, 2010; C. Martin Webber, 2010). Since the 21st century, there has been an increasing demand for local, traditional, and more extensively produced food (Verbeke, W, 2006). Products with GI labels can be a solution to modern consumption trends. Therefore, GIs can increase the economic viability of smallholder enterprises. However, there are several debates that GIs are commonly linked to product differentiation strategies, which allow for price premiums (Matthew, 2014). The second aspect of this debate concerns the factors driving consumer demand for labeling. The logo of the Korintji cinnamon mark is shown in Fig. 4.3.

Figure 4.3. The Korintji Cinnamon GI label**,** Source: GI Korintji cinnamon – books of requirement.

The consumers' 'right to know' might be cited as the direct reason for the product's originality. The increasing demand for Korintje cinnamon does not correlate to the improvement of the process during post-harvest activities. On this concern, we hypothesize that adding value through certification or following the guideline of GI Korintji cinnamon is one of the ways to product upgrading, which can directly impact the cinnamon sector in the future. To test the hypotheses, we distributed a questionnaire among the cinnamon harvesters (*n=18*) invited during the RDs to verify their understanding of geographical indications.

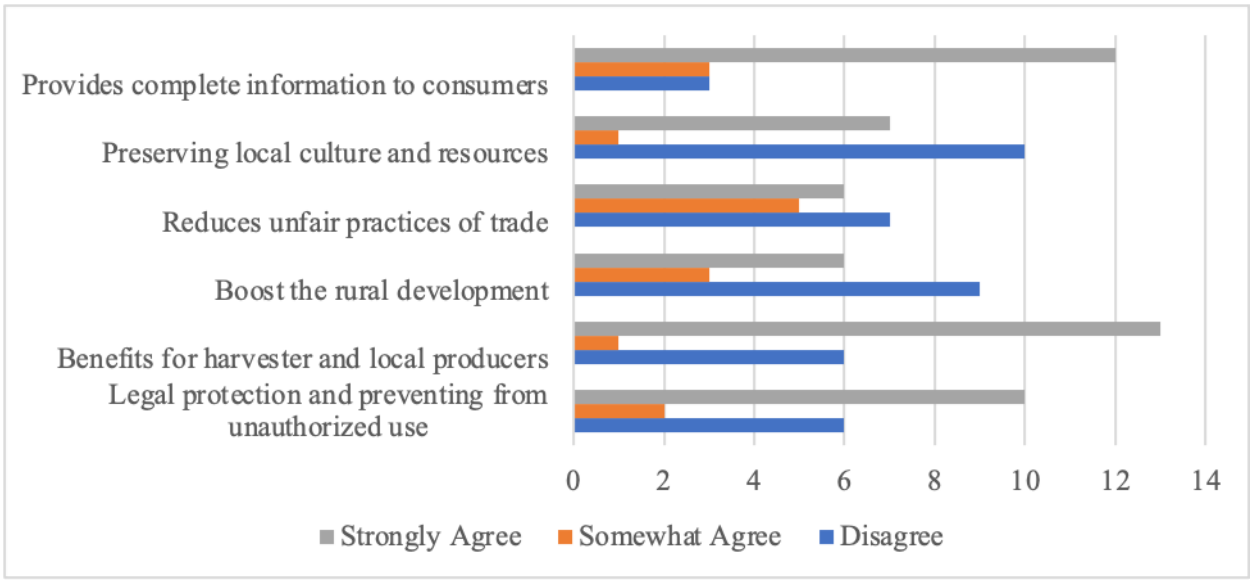


Figure 4.4. Stakeholder perception for geographical indications in RDs.

Based on the stakeholder perception that they strongly agree that GI can benefit harvesters and local producers by legal protection and prevent unauthorized use. We were also intrigued to understand if GIs can benefit the harvester and local producers. The benefits can be related to the harvesters' skills and capacities, such as their process upgrading. Fernandez-Stark *et al*., 2011 stated that process upgrading, the introduction of traceability, and administrative measures, in which this situation, the product origin of Korintji cinnamon, can become an upgrading trajectory. We investigated the main activities and supporters by analyzing a cinnamon value-chain

system. Referring to the concept of Porter (1998), a chain system has two activities, namely the main and supporting activities.

In the Bukit Kerman, harvesters generally sell the bark after local processing (sun-drying and packing by grades), after the debarking and scrubbing process. This is because the condition of the harvesters needs access to finance and incentives (Lie H *et al*., 2012). The process of selling cinnamon from harvesters is submitted to the next level of actors: intermediary traders, either a *toke* or a collector. As for intermediary traders and exporters, inbound logistics is seen from efforts to buy cinnamon. Every stakeholder has a different role in the value-chain process of cinnamon. The harvesters are in debarking, scrubbing, sun-drying, and grading. The intermediaries oversee sorting, and the exporter oversees turning the cinnamon bark into powders, broken, and essential oil. Outbound logistics activities are the activity of warehousing and distributing goods to different actors. For harvesters, outbound logistics distributes sun-dried and graded cinnamon to intermediary traders, either *toke* or collectors. According to intermediary traders, outbound logistics activities distribute cinnamon bought from harvesters to exporters and retailers. The exporters are doing warehousing until cinnamon delivery is readily exported or processed into cinnamon powder for sale to consumers. In this case, the members who use this certification of origin see it as a marketing purpose but not as guidance for process upgrading, including biodiversity concerns, sustainable agriculture practices, and food safety. Even though, until today, GI registration's social-economic and environmental impacts are still debatable for implementation among researchers and require substantial investment and time in the process (Musungu, *et al*., 2008). Therefore, answering the objectives and problem statement lies in supporting cinnamon actors in the value-chain to overcome constraints and opportunities to strengthen the practice, which leads to increased export opportunities due to the added value of the production methods.

4.5.2. The implication of GI Korintji cinnamon

In 2015, Rikolto, a Belgium Non-profit organization based in Indonesia, successfully facilitated TAKTIK “harvester organization group based in Talang Kemuning village” to

link up with new buyers Agripro Tridaya Nusantara (ATN). In October 2015, the first purchase order was signed with TAKTIK for 20 tons of stick cinnamon (KA - 8cm), and it was fulfilled and qualified for 8.8 tons. The grades and quality determine the gate price; at that time, the price was KM: $2.34, KF: $2.16, KS: $1.98: and KA: $1.86. This transaction did not require certification, which can bring a higher gate-farm price. The cooperation between TAKTIK and ATN continues under a purchase order (PO) system. Taktik and ATN are drafting a long-term contract for a target of 250 tons annually, but a cooperation model acceptable to both parties still must be negotiated. TAKTIK must improve its harvesting techniques that meet the Good Agricultural Practices and Good Manufacturing Practices criteria to meet this cooperation. They needed support from external parties to comprehend this condition, and at that time, MPIG-K2J, which functions as a social organization, could facilitate the development of value-added and access to markets and come into their network and circle of trust.

MPIG-K2J, as the initiator of GI Korintji cinnamon, had several roles in the community of cinnamon harvesters, namely, (i) maintaining/ensuring the quality of goods produced following GI criteria in the guidebook. (ii) Communicate the quality and characteristics of specific GI products to consumers. (iii) Recommend prices for GI goods due to their unique characteristics. MPIG-K2J works with the book of Requirements for GI Korintji cinnamon to guide the harvesters. The book contains information on a good's quality and specific characteristics, which can differentiate one good from other goods of the same category. The highlight of the requirements book concentrates on five significant aspects, described below.

1. Specific characteristics and qualities which differentiate the cinnamon from other cinnamon of the same category and explain the relationship with the place by origin where the cinnamon is produced.
2. The production process, processing, and process of making which is used to allow as to allow any harvester within the region to produce the relevant cinnamon.
3. The method used to examine the quality of cinnamon produced.

4. The geographical environment and the natural and human factors, as a unity, give, affect the quality or characteristics of the cinnamon produced.
5. The boundaries of the region and map of the area of Kerinci.

The MPIG-K2J aims to export high-quality products at a fair price through the GI Korintji cinnamon certification, which aligns with TAKTIK. The growing concern about food quality and safety was MPIG-K2J's main highlight. Regarding the provision of quality and safety, a relative improvement practice can be found in Kerinci to add quality and safety to place-based food production. From a demand side, consumers demanding more safe food ascribe growing importance to the origin of food products**.** Feeling confident and secure about the certification and GIs guidelines, TAKTIK and ATN have agreed to sign a joint-operation agreement based on the fee system. Under this scheme, TAKTIK receives service fees of 3% from production costs and has access to a loan to invest in a warehouse and technical assistance on Good Agriculture Practices (GAP) and Good Manufacturing Practices (GMP). Working with local collectors, TAKTIK and its members continue to take on the roles of cultivation, harvesting, post-harvesting, stick processing, and quality control.

In contrast, ATN takes on the responsibilities of processing (broken), export handling, providing capital, and marketing. The cooperation has also identified an end buyer, Lenersanpoortman (LP). The whole value-chain process can be seen in Fig. 4.5.

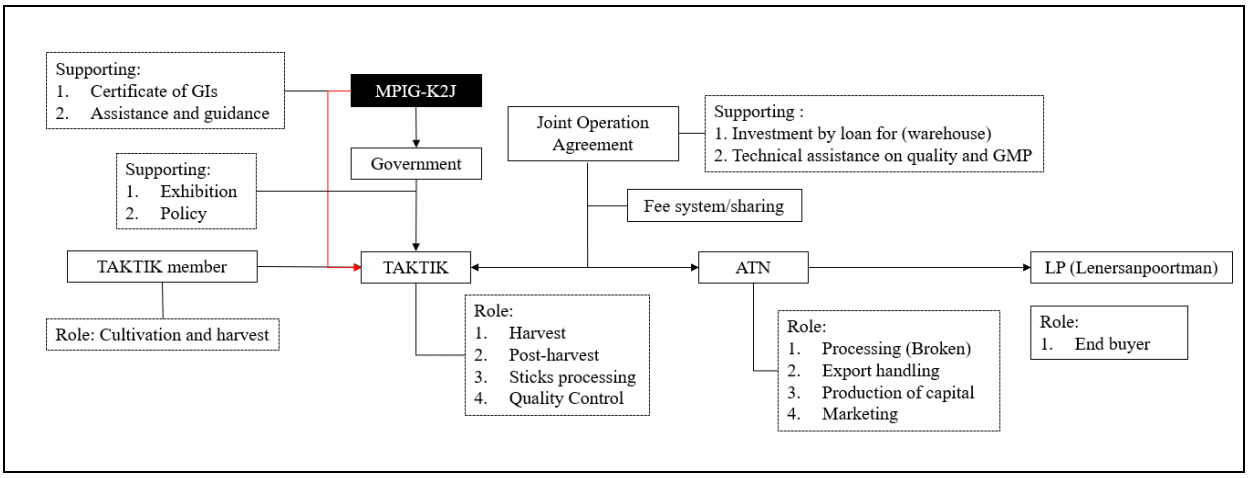


Figure 4.5. Value-chain analysis with Geographical Indications, source: Rikolto, 2017.

According to the information the researchers could learn from the MPIG Chairman during the field interview, the Geographical Indication of Korintji cinnamon production has changed the continuity of cinnamon production in Batang Merangin. Their results show that the cinnamon value-chain's shape has changed. To verify the whole value-chain improvement process, we surveyed the members of TAKTIK who had followed this GI guideline based on the book of requirements to improve product quality. The book contains guidelines for the sun-drying and processing process, which can be seen in Tab. 4.4 as follows.

Table 4.4. Drying and processing methods for cinnamon based on the handbook of requirements for the GI for Korintji Cinnamon

No	Drying Methods (DM)	Processing Methods (PM)
1	Sun drying is for cinnamon bark, which will be differentiated into KM, KF, KS, and KA grades, as well as for sticks and powder.	Cinnamon bark that has been scrubbed and dried to 10-14% of moisture content is separated according to gradation
2	The drying process is carried out using sunlight	Cinnamon bark which is graded as KM-KF-KS-KA, is separated for further processing into powder or sold directly without using the name Korintji cinnamon
3	The place for drying should be clean, using tarpaulin/plastic as a base for drying or a table.	Cinnamon bark, separated according to gradation, is cut into according to buyer preferences.
4	Cinnamon drying must not be located on the side of the public road and streets	Packing is done using a gunny sack.
5	Drying must be done for 2-3 days, then dried for seven days in an airtight room with a temperature of	The stitching of the gunny sack may not use ropes lubricated with kerosene, engine oil, or diesel oil. The use of water

	26 degrees Celsius	to lubricate the gunny sack is permitted.
6	The drying process is finished when it becomes brown and reddish with a 10-14% moisture content. A harvester can recognize it if the cinnamon bark is easily broken.	The size of the net or cardboard used is adjusted to market demand. The gunny sack and cardboard are labeled Korintji cinnamon Geographical Indications and are ready to be marketed.

We observed from one production center to another to compare and predict the outcome for DM and PM. We documented all the processes to discover whether the guideline was helpful for the harvesters as improvement practices (Fig. 4.6).

Figure 4.6. TAKTIK members used the mat to sun dry.

During the observation, we tried to validate the points of 1 – 6 processes. We had clustered the research areas with the distance from TAKTIK coordination offices with area A up to 1 – 3 km, area B up to 3 – 6 km, and area C up to 6 km – above. We used the sampling technique for the questionnaire for the analysis. In every area, we had snowballed for the samples we encountered during the road based on the targeted 20 individuals (*n=20*) of TAKTIK in a different area, in 60 members (*n=60*). We analyzed the socio-demographics and characteristics of the three areas.

Table 4.5. Socio-demographic characteristics of the sample and forestland characteristics

Description		*N=60*		
		Area A (N=20)	**Area B (N=20)**	**Area C (N=20)**
Gender	**Male**	**12**	**14**	**18**
	Female	8	6	2
Age	Up to 30	4	4	2
	30 - 40	**10**	**8**	**9**
	41 - 50	5	5	7
	More than 50	1	3	2
Education	**Basic school**	**10**	**13**	**16**
	Secondary school	6	5	3
	High school	4	3	1
Harvest experience (years)	Up to 10	4	2	2
	11 - 21	**8**	**9**	**10**
	22 - 31	6	4	5
	More than 31	2	5	3
Forestland size	Small scale (1 ha)	6	7	5
	Middle scale (2 - 3 ha)	**9**	**8**	**12**
	Large Scale (3 - 5 ha)	5	5	3

The characteristic described in table 4.5 shows that most of the harvester is dominated by males. The age harvesters within this area are mostly 30 – 40 years old and have harvesting experience in the range of 11 – 21 years. It means that they started the cinnamon sector when they were young age. They have a forestland size of up to 2 – 3 ha, which was inherent. Most respondents did not go to secondary and high school because they had to do domestic or farm work or find local jobs. The lack of education does not impact their capacities in external parties' harvesting methods and knowledge. In table 9 below, we interviewed the same respondents regarding their implementation of DM and PM according to the requirements book.

Table 4.6. Surveyed areas that implemented the GI Korintji book of requirements guidelines

AREA	Sundried 2-3 days		Using tarpaulin/ plastic		Checking the moisture content		Sun-drying on safe-place		Safely save the commodity indoor		Separate by grade		Check for foreign objects	
	Yes	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No
A (*n=20*)	**13**	7	**18**	2	**15**	5	**17**	3	**14**	6	**18**	2	**16**	4
B (*n=20*)	**12**	8	**19**	1	**11**	9	**14**	6	**12**	8	**17**	3	**13**	7
C (*n=20*)	**9**	11	**15**	5	**10**	10	**12**	8	**11**	9	**12**	8	**11**	9

Based on this table, we hypothesize that the further distance of areas could affect the ability to apply and implement the GI. Therefore, TAKTIK continuously reminds its members to provide a good quality product for the adaption of GI in their process. The purpose and benefits of the implication of Geographical Indications are not widely known and understood by cinnamon harvesters. In this survey, areas A, B & C (*n=60*), mostly from area C, did not make sundried cinnamon in a safe place (*n=8*). Furthermore, they did not check for foreign objects hazardous to the human body (*n=9*). Most harvesters implementing the DM and PM based on GAP and GMP adjustments live in area A (*n=20*).

Furthermore, we investigate how the operational procedure works and how MPIG-K2J educate the TAKTIK to improve their monitoring and controlling. It was understood that MPIG-K2J assisted TAKTIK in strengthening their organizational system with Internal Controlling System (ICS) as an added value in the processing situation based on the Korintji GI handbook for requirements for DM and PM.

In analyzing a cinnamon value-chain system, we refer to the concept of Porter (1998), namely the main and supporting activities. This GI Korintji cinnamon value-added value-chain research will only discuss the operations. It is related to managing the process that converts inputs from raw materials and labor into outputs in the form of goods that can be controlled using the ICS.

According to the MPKG chairman, ICS requires producers to implement self-control based on the operating manual and control plan. Furthermore, external controls by MPIG-K2J on producers' compliance with the control manual and control plan is implemented at least once a year. The quality of the product will be controlled and indicates standards for production and traceability. The system determines the responsible actors, identifies crucial control points, specifies the corresponding inspection methods, and stipulates sanctions. The operating manual and the control plan must comply with the product specification based on which the GI was registered in 2015.

The added value of the value-chain before and after the GI is contained in figure 4.7 below:

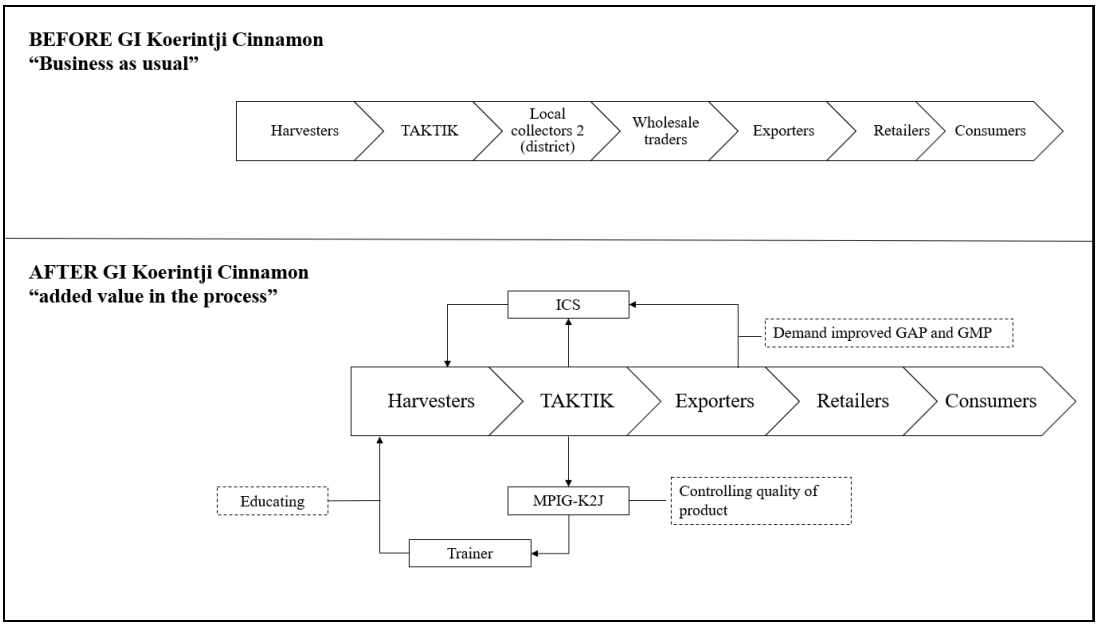


Figure 4.7. Value-chain before and after GI Korintji cinnamon.

The figure above shows that the presence of GIs had added value to harvesting and post-harvesting. The partnership between TAKTIK and MPIG-K2J was quite adequate, and they had created an ICS based on ATN's request to determine whether TAKTIK could ensure its quality control and product traceability. TAKTIK had established a team to document its quality system. Once in three months, MPIG-K2J inspects its active

members periodically. In 2017, the registered members of TAKTIK were counted to 254, and 136 members practiced the GAP and GMP based on the GI Korintji cinnamon guideline book, so it was a challenging job for MPIG-K2J. They then conducted a three-monthly visitation to the TAKTIK members to monitor and evaluate their post-harvesting practice, including sun-drying and packaging, since December 2016.

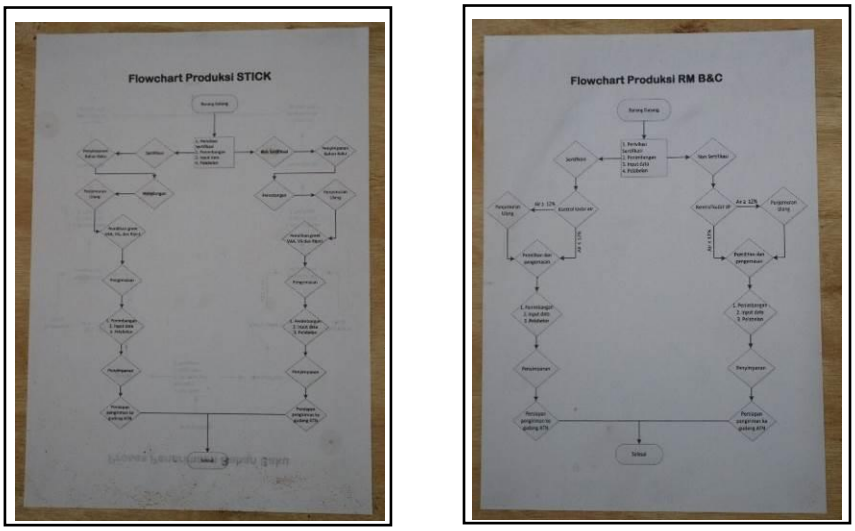


Figure 4.8. The internal control system (ICS) of TAKTIK, source: TAKTIK, 2017.

According to the MPIG-K2J chairman, since adopting GI Korintji cinnamon, TAKTIKs' members for the post-harvesting handling and process have become more thorough for foreign objects. Also, they mentioned that the quality control by TAKTIK through procedures has become stricter than before, so the quality of cinnamon is guaranteed. To continue our research findings, we surveyed TAKTIK activities in coordination with their members, whether the ICS is according to the GI Korintji cinnamon guideline. During the survey, we investigated how the practice had been done with their active members and saw improved DM and PM methods.

Figure 4.9. The production system of cinnamon in TAKTIK, source: Rana Menggala.

We investigated TAKTIKs' post-harvest product handling, which can be seen in Figure 4.9; (1) using a mat for the sun-drying process of the cinnamon bark after being brought from the forest. The sun-drying process can take up to 3 days during the daytime, from 9 AM – 4 PM, to decrease the moisture content by up to 15%. (2) After sun-drying, they separated the grades (KM/KF/KS/KA). (3) After the sorting, the cinnamon bark will be graded and cut into sizes 5, 8, and 12 cm long, depending on the buyers' requirements. (4) Before putting the cinnamon in the nets and cardboard, they look for foreign objects that can occur among the cinnamon, such as rocks, rubbers, and plastic. (5 & 6) TAKTIK wraps it up in a nest or puts it in cardboard based on the buyer's demand after the selection. The bag is put and a sign of product origin, which shall be explained later in the following section.

The improved post-harvest handling, such as drying and processing-packaging, became harvester behavioral change, and they became fully aware of the hazardous impact of a foreign object in cinnamon bark. Fig. 4.10 below shows the role of GI for cinnamon harvesters. The total respondent (*n=20*) was all the TAKTIK members living in area A. We questioned the four most crucial question-related GIs and their added value for daily production.

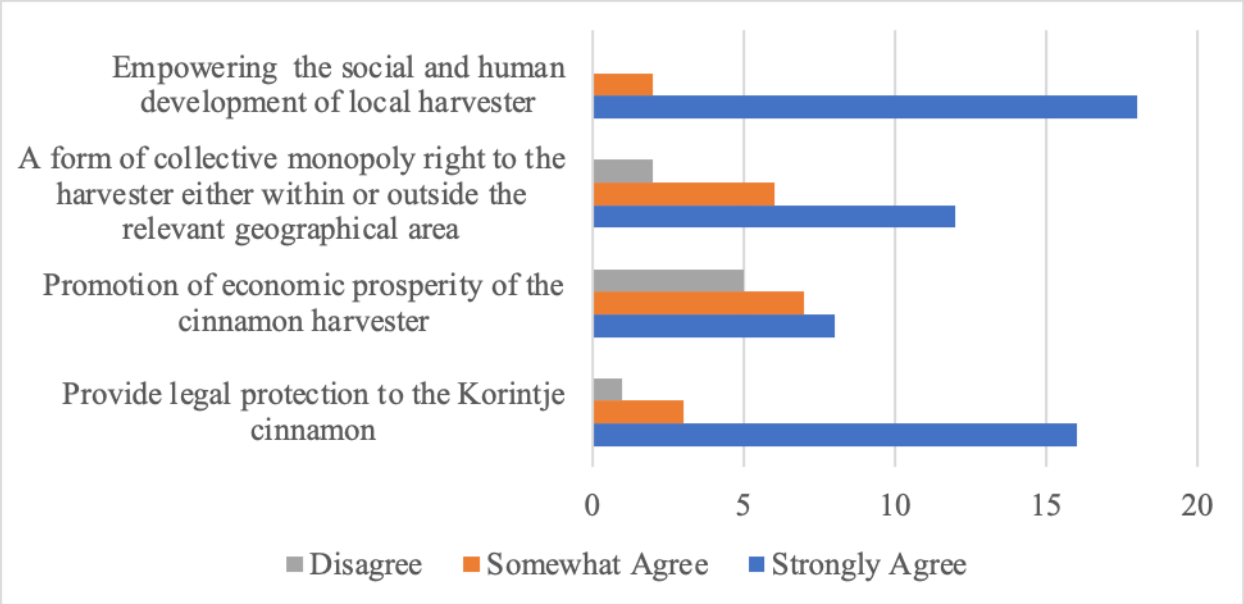


Figure 4.10. The effect of GI on cinnamon harvester.

The respondents responded very positively to the presence of GI Korintji cinnamon, even though not all of them clearly understood how it could boost their livelihood but had improved their post-harvesting practice. We can hypothesize that the guideline of Korintji cinnamon had changed their traditional cultivation and harvesting practice and that eighteen (*n=18*) respondents agree with it. The GI also became legal protection as Korintji cinnamon originality, due to other regions also producing cinnamon but not as high premium commodity from Kerinci Regency. In their functionality, GIs are “place-based names that conveyed the geographical origin, as well as the cultural and historical identity, of agricultural products” (Sarah Bowen, 2009); in this case, they can also bring opportunity for the Korintji cinnamon. Revinon (2009) identifies that using the GI label on the local market can also have a brand awareness impact on the region or

even a group of villages, which leads to economic improvement. International agreements have explained that GI is a certification that “identifies a good as originating in a delimited territory or region where a noted quality, reputation or another characteristic of the good is essentially attributable to its geographical origin and the human or natural factors there” (F. Galtier, 2013). This is particularly interesting in the case of the Korintji cinnamon, where the stakeholder with interest tries to sell the product in the global market. Indonesian cinnamon has an outstanding reputation in the European markets, and the name used in these markets is "Cassiavera." Nevertheless, it is produced and originated mainly from Kerinci Regency. Regarding the complete information to consumers, as mentioned in figure 5.8 earlier.

4.5.3 Traceability impact as an added value

Traceability is a system in which unique codes trace commodities from the smallholder to the buyer. The code could be a number, number-letter combination, or unique designation (Linus Opara, 2003). GI can trace a product's origin and quality, offering consumers detailed information about its authenticity (L. Gellman, 2012). MPIG-K2J started to initiate the traceability aspects of the GI Korintji cinnamon using a code as an example, “BK.Km.025.01.28.11.17”. The code stands for *Kayumanis in this package is produced from the Bukit Kerman district area in the form of grade dry cinnamon product (KM), sold by TAKTIK members with member number (025) from the village of Talang Kemuning (01) and is sold on 28 November 2017* (Fig. 4.11. Tracking code).

Figure 4.11. Tracking code of delivering goods to ATN “BK.Km.025.01.28.11.17**”,** source: RKCC**.**

Based on the usefulness of the tracking code, TAKTIK could see the evidence of the origin of GI products, offering detailed information about the authenticity of products pinned in the gunny sack. The diagram of implementing the traceability aspects can be seen in Fig. 4.12.

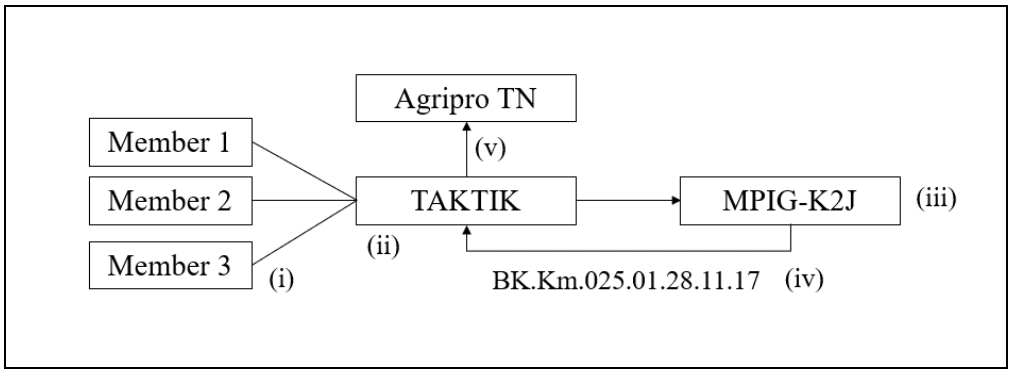


Figure 4.12. Traceability model of Korintji Cinnamon.

AS illustrated in the diagram in Fig. 4.12, there are four steps in their traceability model. (i) The members of TAKTIK provide the raw material unprocessed to TAKTIK; (ii) TAKTIK will process the raw material into goods as expected of ATN; (iii) MPIG-K2J assist in putting tags on the goods at any packaging; (iv) The tagged goods with the tracking code will be transported to ATN which they can see the source of origin.

The added value of this tracking code is seeing the “product of origin," which will later be registered in the ATN computing system. Thus, developing a tracking system can facilitate access to the market through differentiation and the creation of added value (Bowen, 2009)

4.5.4 Branding using the GI Korintji cinnamon trademark

The branding of origin is one of the possible strategies to escape the market of common goods, and therefore at low prices and intense competition (Agarwal and Barone, 2005)—branding of Korintji cinnamon with GI trademark act to promote a particular in the global market. The importance of differentiating branding and promoting Korintji cinnamon as a global brand in target markets is paramount to highlight the main

characteristics of Indonesian cinnamon sourced from other areas for its comparative advantage. The brand proposition of cinnamon is particular: unique taste, peppery, and robust taste. It could have several positive effects if it states product originality, which can become a good marketing strategy (Rich, 2011). Providing a specific trademark for cinnamon becomes punctual in the spice trading to be identified as its locality and traceability.

TAKTIK also uses the trademark for its branding of origin in its packaging. As a result, the trademark can reduce misappropriations and encourage other regents' cinnamon harvesters to adopt GAP and GMP according to handbook principles (Fig. 4.13).

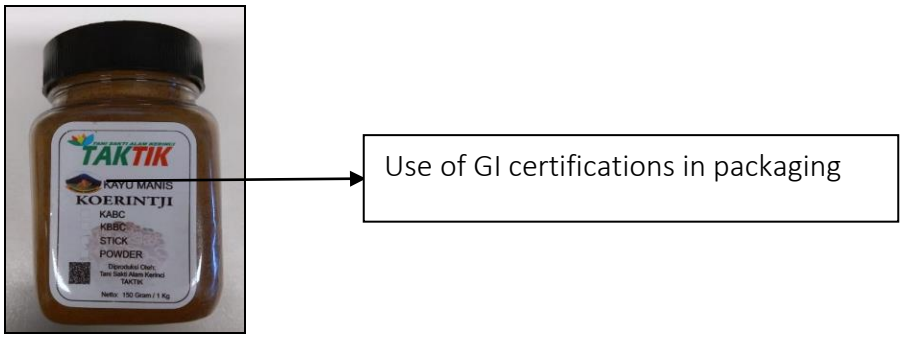


Figure 4.13. TAKTIK powder cinnamon packaging with GI Korintji certifications.

The trademark can impact the consumers to pay more for the certified product and know the product's origin (Jaffee, 2007). Establishing an adequately protected cinnamon origin (*seu generis)* brand can help harvesters gain a competitive advantage in 'buyer-driven' global markets. Adding value by differentiating the product can increase consumer perception of a premium commodity. Another advantage is that information of origin can be appreciated by consumers and somehow differentiates them from the output of harvesters in the rest of the world (Bowen, 2009).

4.5.5 GI Korintji cinnamon ability to increase the gate-farm price

Within a year, TAKTIK had improved its GAP and GMP, which reduced the moisture content by up to 25%; developed of Internal Control System (ICS), creation on traceability system; put a brand label of GI in their packaging based on the GI Korintji handbook of requirements that resulted in the increasing farm-gate price. Additionally,

according to the MPIG-K2J chairman, that had conducted a lab analysis in June 2017, the volatile oil had increased to 4% fit buyer criteria. Based on the discussion with the head of TAKTIK, PT Agripro Tridaya Nusantara (ATN) can tolerate the MC up to 20 - 25% if the Volatile Oil (VO) percentage is above 3.5%, offered a price of €2,92 - 3,11 for one kilogram of KM. This situated a winning stage for TAKTIK in which they had to meet all the ATN criteria. Table 4.7 shows the sale price difference over time of TAKTIK.

Table 4.7. Price differentiated over time**.**

Period	Grade	Moisture content (MC)	VO	Farm-gate Price
June 2016	KM	35 - 40%	2,7%	2.34
	KF			2.16
	KS			1.98
	KA			1.86

Period	Grade	Moisture content (MC)	VO	Farm-gate Price
June 2017	KM	23 - 25% ↓	4% ↑	2.92
	KF			2.79
	KS			2.66
	KA			2.53

TAKTIK then gained confidence as they demonstrated its influence in setting the price, and MPIG-K2J involvement in training and assisting the producers in applying GAP and GMP and meeting quality standards has heightened their confidence. In return, the buyer witnesses first-hand that producers' capability in producing premium quality products is improving. The buyer also gives regular feedback to encourage further improvement. As the mutual trust between the two parties strengthens, the commitment to a long-term partnership/cooperation can be realized. The partnership between TAKTIK and ATN became advanced and developed into a joint operation to pursue several goals, including accessing potential markets, gaining efficiencies, obtaining a loan for a significant investment—in this case, a warehouse—and access to skills and capabilities development.

Figure 4.14. Joint-operation partnership signing between TAKTIK and ATN, source: Rikolto, 2017.

Additionally, the joint operation between TAKTIK and ATN, including ATN's end buyer (LP), could assure financial institutions (banks), which in turn is hoped to provide access to individual loans for TAKTIK members as capital in harvesting seasons. This is evident in the trust given of mutual benefit, where they can improve their practice within one year. To summarize this research section, we hypothesize through the Theory of Change (Fig. 4.15) that the impact of geographic indications on harvester income could be increased over time if they could also improve their practice to meet the buyers' needs criteria for GAP and GMP.

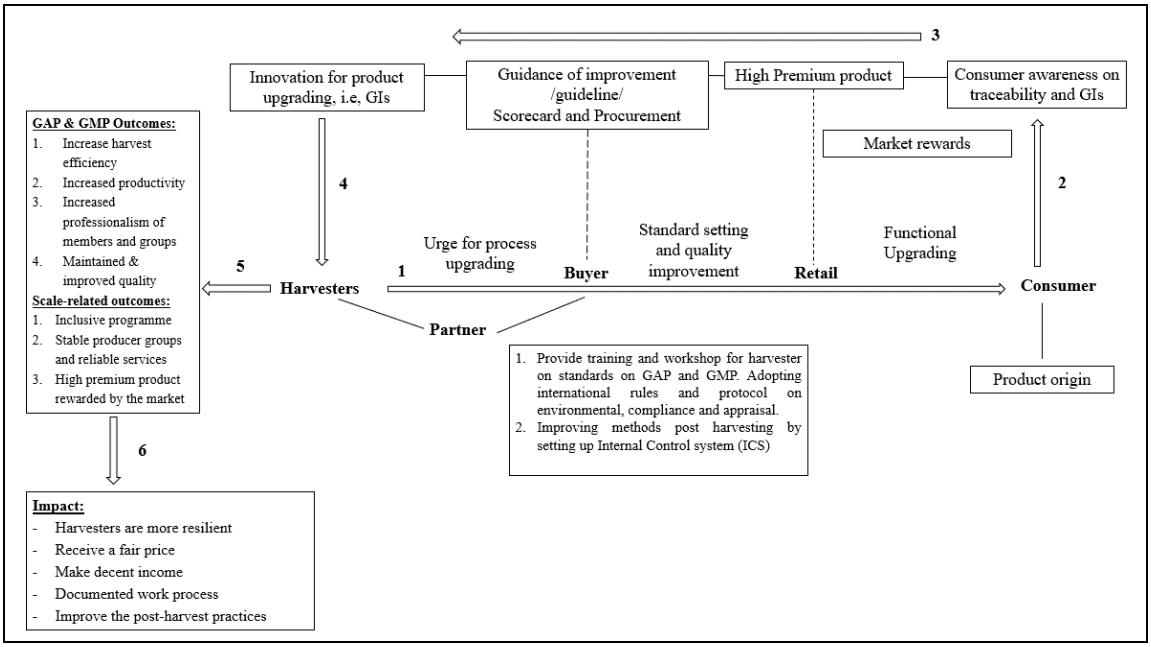


Figure 4.15. Theory of Change (developed) with GI Korintji cinnamon adding the GAP and GMP.

The challenge lies now in the hands of the TAKTIK members to uphold their product quality. MPIG-K2J expects that the GI impacts the bargaining position of TAKTIK and adds value to cinnamon harvesting practices.

4.6 CONCLUSION

This chapter has shown indications of the increase in the income of harvesters. The premium product demanded by ATN meets the criteria of newly improved techniques that harvesters adopt due to the necessity of the GI guidance book provided by MPIG-K2J. Furthermore, a GIs certificate guarantees the correctness of the quality and origin of cinnamon Korintji in the market. The price increase was expected to positively affect cinnamon products' development and production and increase the Korintji cinnamon sell price.

As place-based name protection, GI Korintji cinnamon is an added value due to several factors, including (1) clear product identification; (2) avoiding fraudulent competitive practices and providing protection to consumers from misuse of the reputation of GIs; (3) quality guarantee which gives confidence to consumers; and (4) fostering local producers, supporting coordination, and strengthening peer rights-holder organizations to create, provide and strengthen product name and reputation image. This, in turn, increases the value derived from their products while also providing consumers with the information needed that impacts prices.

According to Zografos (2008), GIs may increase production output and value-added products, including superior agricultural products, as shown by the result that took place in Kerinci. The added value is shown by the increase in the price of geographical indication products in the market, which is more expensive than similar products without GIs. Additional benefits include: (i) GI can be used as a product marketing strategy at local and global market levels; (ii) GIs adds value to the product and improves the harvesting activities; (iii) products with GIs label can be traceable using a tracking code from its origin to avoid competitions fraudulently; and (iv) GIs are leveraged to gain

extra gate price from a buyer. Although the GI of Korintji cinnamon impacts the increasing sale price and label of origin, it has been demonstrated that GI development could also directly enhance biodiversity conservation by utilizing a specific genetic resource or indirectly through production and management strategies that incorporate landscape and ecosystem factors. The value-chain governance approach contributes to the viability of rural livelihoods that rely on the sustainable use of specific biological and genetic resources and directly benefits sustainability in rural landscapes. They usually only bring environmental benefits if ecological standards are stipulated in the code of practices.

Chapter V

Sustainable Harvesting of *Cinnamomum burmannii* (Nees & T. Nees) Blume

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CHAPTER V
Sustainable harvesting of *Cinnamomum burmannii* (nees & t. Nees) blume

ABSTRACT

Cinnamomum burmannii (Nees & T. Nees) Blume is an endemic tree of up to 20 meters tall that grows in the surrounding forest in the Kerinci Regency. Cinnamon is one of the most valuable non-timber forest products (NTFP) harvested from Kerinci. The tree is classified as an NTFP based on criteria established by the Indonesian Ministry of Forestry regulation in 2007. As a result, it must be harvested sustainably. Its massive cultivation has caused deforestation in several areas in Kerinci. This chapter aims to assess the environmental impacts of continuous *C. burmannii* harvesting of the bark by clear-cutting the whole tree. Intensive clear-cutting, slash and burn posed a significant threat to (wildlife) biodiversity in the habitat of *C. burmannii*. The study was performed in collaboration with the Institute for Agricultural Technology of Jambi (BPTP) from October 2018–January 2019. A harvester group in Lempur Mudik village was surveyed through a semi-structured questionnaire, focus group discussions, interviews, and direct observations on *C. burmannii* production methods and their impact on forest conservation. We discuss how young farmers can contribute to forest conservation through the sustainable harvesting of cinnamon. We conclude by suggesting leverages for forest conservation and by proposing actions from the local and national governments that should be urgently taken to safeguard wildlife biodiversity in the surrounding forest.

Keywords: cinnamon; conservation; sustainable harvesting

5.1. BACKGROUND

The Kerinci Regency is located at the edge of the Kerinci Seblat National Park (TNKS). The TNKS is the largest conservation national park in Sumatra (13,791 km²) and one of the largest protected areas in southeast Asia (Anwar, 1996). In the TNKS, cinnamon trees grow in and out of conservation areas and border the land-owned plantations of the harvesters.

Evidence and scientific observation have proven that wildlife co-exists in the cinnamon forest in Gunung Raya. The cinnamon tree has both, economic (as cash crop) and ecological functionalities, supporting endemic wildlife like birds, monkeys, bears, and tigers (*Panthera tigris sondaica*, the Sumatran tiger).

The cinnamon forest becomes a buffer zone between natural forests and villages surrounding the TNKS. According to TNKS forest rangers, harvesters are sourcing cinnamon bark in conservation, where they harvest it illegally and only at night (Ardi H, *et al*., 2015). The harvesters leave the stem in the forest to rot after the debarking process, which endangers wildlife from lost natural habitat (Burgers, 2004). As is the case in all tropical countries, the biodiversity-rich ecology in Indonesia suffers from exploitation. Thus, the challenge is to achieve sustainable cinnamon harvesting against the backdrop of growing global cinnamon demand from Indonesia, which directly impacts the environment and biodiversity loss in its surrounding landscape (Arifin B, 2013).

Nowadays, extensive harvesting occurs in Kerinci due to the increasing demand for cinnamon in the global market, and in 2017 91,600 tons were exported to foreign countries, which accounted for (40%) of the total global production (CBI, 2018; TRIDGE, 2017). Cinnamon used as an ingredient and flavoring agent became worth US$ 107 million in 2017 as a trade commodity and is used by 76 countries worldwide (Thibbotuwawa, 2017). Due to international companies ' interest, the demand for cinnamon bark has increased in the last few years. As mentioned earlier, the situation has become one of the main reasons to harvest is unsustainable, leading to ecological and environmental neglect (Wagner, 1999).

Based on the Indonesian Ministry of Environment and Forestry (MoEF), cinnamon is listed as a medicinal plant in social forestry. Harvester groups/communities should manage forest landscapes sustainably (Ministry of Forestry, 2007). Therefore, sourcing should be environmentally and economically sustainable (Ros-Tonen, 2005; Adrijana Biba, 2013). Managing forests for producing forest goods also implies maintaining all plant and animal species' biological diversity within the forest (Collis, J. 2003). That is why the advocacy of social forestry came in to advocate sustainable sourcing and the creation of tailor-made certification.

5.1.1 Sustainable production of spices that leads to improvement in harvesting

Spices are a significant cash crop produced by millions of smallholder harvesters. This harvester frequently experiences food insecurity and poverty. The manufacture of spices encounters labor (women, migrants, and child labor) and environmental difficulties, including excessive pesticide use, depending on the spice and country.

Along with these difficulties, the spices and herbs sector also has a big chance to demonstrate its added value in producing, processing, and selling goods that provide employment and income to millions of people in the global South, many of whom are small harvester.

These spices are frequently cultivated or harvested in diversified, occasionally biodiversity-rich land use systems, which helps to maintain the ecosystem. These issues are also critical for the countries that produce the spices because the industry can significantly improve local economic, social, and environmental sustainability. Such advantages ought to be emphasized because they are frequently disregarded.

Spice production will become more attractive for smallholder harvesters by ensuring long-term demand for high-quality, sustainable spices at a reasonable price. The environmental harm caused by the farmer will be significantly reduced by his or her use of sustainable practices. To increase the economic resilience of smallholder households, a diversified farmer livelihood strategy must include the sustainable production of spices.

One of the examples of approaches to ensuring the sustainable production of spices is Nestlé, their responsible “Sourcing Standard,” which provides a clear framework for implementing sustainability programs or building upon those already taking place in Vietnam.

5.1.2 Sustainable Harvesting as its impact on value-chain development

As the demand for cinnamon increases globally, sustainable harvesting is the only viable solution for meeting demand. Adopting sustainable use, production, and development as a conservation strategy is controversial, and stances vary within the conservation community (Hutton & Dickson, 2000). Yearly, Indonesia exports up to 46 Metric tons of cinnamon bark, questioning the harvesting methods. Although harvesting is done continuously, there is a lack of knowledge regarding its environmental impact and sustainable harvesting techniques. However, the new challenges of agriculture also include environmental issues. Commonly, cinnamon harvesters use environmentally destructive harvesting methods to peel the bark from the top to the roots, generally causing the tree to die. Harvesting leaves, flowers, fruits, and seeds are considered less destructive. However, severe peeling affects a tree’s vigor and reproductive potential (Van-Andel and Havinga, 2008).

Sustainable harvesting is about satisfying today's demands without threatening the supply for future generations. Too frequent harvesting will cause scarcity and extinction of cinnamon trees, and sustainable harvesting ensures that seed banks are maintained, and new seedlings are produced to ensure a further round of harvesting. Cinnamon harvesting is limited; the recommended harvesting cycle is four years in natural areas. The best time for harvesting is during the dry season (February to May), as the sap decreases and volatile oil increases between September and December.

In general, the causes of unsustainable harvesting are identified by Maundu *et al*. (2006), Regassa (2013), and Cunningham (1997) as 1) a high rate of global population growth; 2) competing land uses; 3) degradation of the environment; 4) loss of indigenous knowledge; 5) increasing marketing of traditional medicine; 6) increasing demand on local and global markets, (7) lack of appropriate policies and laws and

failure to implement them; (8) poverty and high unemployment; (9) low prices paid for medicinal plants; (10) invasive alien plants threatening indigenous plant diversity; (11) the use of unsustainable harvesting methods; (12) undue pressure on unique preferred species; and (13) slow growth of the tree, especially cinnamon.

Harvesting requires tree identification and respectful harvesting practices (Nutto *et al.*, 2013). However, this market's economic development impacts cinnamon, which is more and more sought-after and sometimes over-harvested: unsuitable clear-cutting can reduce, even the disappearance, of cinnamon.

Concerns regarding the conservation of forest-plant species are receiving much attention due to overharvesting and exploitation. Biodiversity loss is, therefore, a significant challenge. Environmentally destructive are the harvest methods used by traditional harvesters (Grace *et al*., 2002; Delveaux *et al*., 2009). For example, forest-tree bark harvesting removes the maximum bark quantity and the periderm cork (outer bark).

Peeling a tree's bark is like human skin. If it comes off, it exposes the inner layer of live tissue to disease and insect infestation. It does not grow back. The cinnamon tree will heal around the wound's edges to prevent further injury or disease, but it will not grow back over a large area, and when the tree becomes scarce, peelers create ladders to maximize the amount of bark obtained from a tree (Cunningham, 1988). Some large trees are timbered to get the bark from the whole length of the tree, and when the bark of large trees is exhausted, young trees are stripped of their bark (Chungu *et al*., 2007). Cunningham (1988) also mentioned that the increasing scarcity of non-timber forest product (NTFP) species, such as cinnamon, means higher prices for traders, which increases their profit margin.

The demand for cinnamon harvested from smallholder plots increases daily, exceeding the available amount for sustainable production. The bark's high economic value increases uncontrolled harvesting and bark theft from Kerinci Seblat National Park (TNKS). The massive harvesting causes the seeds and trees are becoming increasingly scarce as the plant decreases in its natural environment. Hence, it is necessary to set

up methods and practices to ensure a stable future income and allow the tree to stand to recover naturally.

5.2 EMPIRICAL EVIDENCE

The cinnamon is harvested traditionally, and a mixture of the bulk from other producing areas can decrease the quality. The quality of a commodity depends significantly on the intended use, and it seems reasonable to start by identifying what problems occur at the production level. The research will identify value-chain development initiatives in the production method of sustainable harvesting production.

5.2.1 Sustainable production of spices that leads to improvement in harvesting

Spices are a significant cash crop produced by millions of smallholder harvesters around the world. These harvesters frequently experience food insecurity and poverty. The manufacture of spices encounters labor (women, migrants, and child labor) and environmental difficulties, including excessive pesticide use, depending on the spice and country.

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households, a diversified farmer livelihood strategy must include the sustainable production of spices.

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5.2.2 Drivers for sustainable supply of raw materials

The opportunity to make production more transparent through the certification and labeling of products and services that comply with social and environmental standards makes conscious consumption decisions possible. Adopting standards may empower spices harvesters, growers, and harvesters to access GVCs and export markets to benefit from price premiums, increase sales, and create more secure markets.

5.2.2.1 Sustainable Harvesting as its impact on value-chain development (VCD)

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of cinnamon trees, and sustainable harvesting ensures that seed banks are maintained, and new seedlings are produced to ensure a further round of harvesting. Cinnamon harvesting is limited; the recommended harvesting cycle is four years in natural areas. The best time for harvesting is during the dry season (February to May), as the sap decreases and volatile oil increases between September and December.

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Figure 5.1. Gunung Raya subdistrict, Kerinci Regency - https://earthexplorer.usgs.gov/.

The demand is overshooting the supply of resources, causing the overharvesting of cinnamon. This poses a threat to the cinnamon trees in Kerinci. The unmindful collection has led to a decline in the tree population. Also, there is no national regulation

of the harvest and cinnamon trade, which has resulted in very little awareness concerning the importance of the sustainable collection of tree resources. The local communities also bark for their livelihood, so it is vital that any exploitation of these resources, particularly in the volumes commonly demanded by international trade, be sustainable. However, most studies overview that the ecological effect of harvesting on the target species is uncertain, considering NTFP's involvement in sustainable development and conservation of biodiversity and increasing concerns about the over-exploitation of these forest goods. The opportunity has contributed to a robust debate on the importance of NTFP harvest for conservation and the socio-economic well-being of rural and oppressed communities (Arnold and Ruiz Pérez, 2001; Maundu *et al*., 2009). Nevertheless, in Kerinci, the gate price serves as an incentive for higher harvest rates for harvesters (Cunningham, 1993), and the generally low prices paid to harvesters also force them to increase harvesting to generate a reasonable income (Monakisi CM, 2007).

However, harvesters lack adequate guidelines for sustainable harvesting, i.e., practices that increase biodiversity conservation, forest management (plant nurturing and replanting), sustainable production, and farmer family livelihoods by conducting intercrop (Chen, P. 2003). The chapter aims to characterize the condition of sustainable harvesting of cinnamon in the Kerinci Regency, Indonesia, as one of the largest producers of *C. burmannii*. We hypothesize that preparedness of harvesters to apply sustainable harvesting can be one solution for cinnamon forest conservation.

5.3. METHODOLOGY

5.3.1 Theory of change

As a result of the research conducted in 2017, the Indonesian government's involvement as the primary stakeholder in the cinnamon value-chain is necessary to enable the whole enabling environmental process (Figure 5.2).

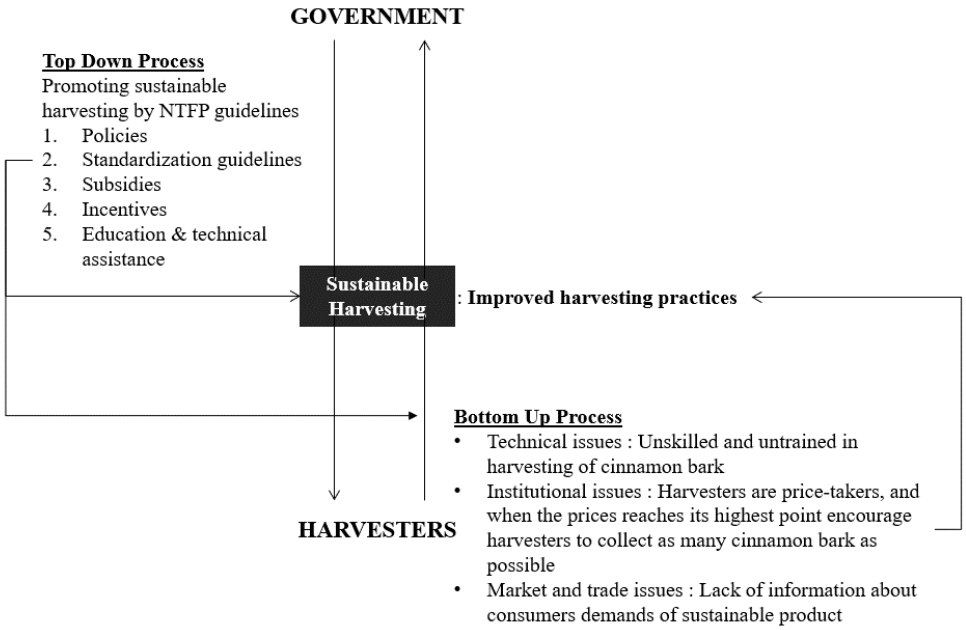


Figure 5.2. Theory of Change.

Indonesian ministries such as the Ministry of Environment and Forestry (MoEF) can support developing and coordinating cinnamon harvester practices to meet sustainable harvesting practices. Based on the MoEF-social forestry platform, forest farmer groups/communities should manage the forest landscape sustainably, 1–2 ha in densely populated areas (generally for harvesters) or 4–5 ha (general estates in less densely populated areas). The involvement of the MoEF through social forestry can lead to greater productivity and the ability to capture a higher value, including harvesting, drying, packaging, research development, education, and future product marketing training. This research aims to analyze how much a harvester can develop toward the sustainable harvesting of *C. burmannii* in the Kerinci Regency, Indonesia.

The hypothesis is developed from the theoretical concepts, and the conceptual framework, as presented in Figure 5.2, is explained further below.

1. A non-timber forest (NTFP) product, such as cinnamon, can provide income for smallholder families in Kerinci.
2. As mentioned, a harvester chooses clear-cutting as the best practice to harvest the cinnamon bark. The harvesting is not conducted in the most “sustainable” way; for example, there is no replanting of the cinnamon seeds. To attract harvesters to continue with cinnamon bark harvesting, the MoEF can educate them on sustainable harvesting.
3. This support could result in better practice from the harvesters because environmental damage and wildlife loss can be prevented. The harvesters can be thought of as upgrading their practice, such as certification and sustainable agroforestry through silviculture. This could result in increased sustainable harvesting practices.
4. However, clear-cutting practices are the easiest way to harvest tree bark. However, it can be educated to change the harvesting method.
5. This education and technical assistance can influence harvesters in the future. The local policies and economic instruments, such as incentives and subsidies, can allow a harvester to change their practice.

Based on the conceptual framework, a multistakeholder approach should address a better sustainable harvesting practice. The bottom-up process can educate harvesters to adopt sustainable harvesting practices with assistance from the Assessment Institute for Agricultural Technology (BPTP) and the Forest Management Unit (KPHP).

5.3.2. Data collection and methods

We searched for peer-reviewed articles from the beginning of 2018 in 3 free-access bioscience sources databases, i.e., ISI Web of Knowledge, Science Direct, and Google Scholar. The initial search syntax used was “sustainable harvesting,” in combination with “NTFP,” “commercial harvesters,” “harvesting impacts,” “biodiversity,” and “cinnamon.” The keywords were to search for publications on biodiversity and conservation relating to the different harvesting methods used by traditional harvesters

and industrial agroforestry and the effects of harvesting on biodiversity in tropical countries. We tried to identify the harvesting of cinnamon bark cultivation in several agroforest areas to understand current practices.

Then, we performed a field trip to Indonesia in October 2018 to collect information from multiple sources, using face-to-face interviews, informal meetings, and direct observations. The local research partner guided us through the field research, which gave us vital information to complete the research. Respondents included traditional cinnamon harvesters, cooperatives, and traders in Lempur. Similarly, secondary data were gathered from reports and records of local district officials and other organizations relevant to the research findings, such as the *Kepala Desa* (village leader). These methods allowed for a more in-depth exploration of sustainable harvesting and the collection of information that facilitated a greater understanding of the constraints and opportunities in conservation's respective contribution. An informal discussion was conducted to understand standard harvesting practices on 16 October 2018. Some participants were invited to the informal discussion, in which they had already participated in individual interviews. The participants were divided into two small groups to discuss the research question about adopting sustainable harvesting and forest conservation.

5.3.3 Research site description

The field experiment was conducted in one locality (S 02° 16' 42.8"; E 101° 33' 40.1") in the community cinnamon agroforest of Lempur Mudik village, Gunung Raya district, Kerinci Regency, Jambi Province, Indonesia (Figure 6. 2). The research site's location was selected due to the analysis of highly volatile oil (VO) and production capacity based on the information from the research partners (the Indonesian Agency for Agricultural and Research Development). The research location differs from chapter 5, which occurred in Talang Kemuning.

The cinnamon agroforest in Lempur can produce high-quality cinnamon due to its fertile soil and based on the Decree of the Indonesia Ministry of Agriculture NO: 51/KPTS/KB.020/9/2017, concerning the determination of High-Producing Blocks (BPT)

and Cinnamon Selected Trees (PIT) in Lempur Mudik, Gunung Raya district as the primary source of superior seeds.

Figure 5.3. Collecting soil samples to be analyzed.

The cinnamon agroforest where the experiment took place is surrounded by small villages such as Lempur Tengah, Lempur Mudik, Lempur Hilir, Baru Lempur, Manjuto Lempur, Parikan Tengah, Sungai Angat, Kebun Baru, Kebun Lima, Air Mumu, and Masgo. According to local knowledge, Lempur comes from the Kerinci language; the word "*Talempow* or *Terlumpur*" later becomes Lempur. Seeing its natural conditions, this area is a highland mud marsh surrounded by hills and mountains.

5.3.4. Respondent

A field survey was conducted in the Lempur district to gather information about the harvester practices. For the survey, harvesters were approached by visiting the cinnamon agroforest in Lempur with the guidance of BPTP. This way, specific characteristics of sustainable harvesting can be measured between the areas. The survey consisted of quantitative and qualitative questions. In addition to the survey, interviews were held at local governmental departments in Sungai Penuh. The purposively selected respondents were affiliated with the Embun Pagi harvester group, comprising 170 members. A total of 30 harvesters in the group were selected based on the recommendation given by Embun Pagi's head (Table 5.1). The 30 harvesters actively practiced organic farming based on the EU organic label.

Table 5.1. Harvester characteristics in the Lempur subdistrict.

Characteristics	**Description in Survey: *n* = 30 Cinnamon Harvesters**
Occupation	28 Full-time 2 Part-time
Gender	26 males 4 females
Land area	Min. 1 ha Max. 2 ha
Age	26–50 years
Family size	4–7 members
Average farming experience	15–20 years

The respondents were male and female cinnamon harvesters actively involved in the group, who held weekly meetings to share price updates, methods, and extra information on cinnamon-related activities. The in-depth interviews were conducted with these 30 respondents (*n* = 30). To answer this research question, the following sub-questions were asked:

- Harvesters' perception of environmental responsibility and the conservation of natural resources.
- Harvester commitment to continuous improvement for sustainable harvesting activities.
- Use of appropriate best practices by harvesters.

Furthermore, the research needs a broader understanding of harvesters' perceptions of sustainable harvesting. A group of harvesters was invited on 16 October 2018 to discuss sustainable harvesting to gain more information. During the discussion, the research team involved broader stakeholders in the process. Stakeholders from sub-districts such as Kayu Aro, Siulak, and Batang Merangin. The discussion, therefore, brought together stakeholders that were purposively selected to represent "the possibility of upgrading towards sustainable harvesting." The discussion participants were divided into small groups to discuss the question of sustainability in-depth, specifically (1) to identify best practices of bark harvesting and (2) to identify biodiversity loss caused by clear-cutting without replanting. Participants were asked to provide

information on increasing their productivity and meeting the Indonesian sustainability regulations (NTFP Gazette number: p.35 / menhut-ii /2007. The protocol states that “forests are an ecosystem that consists of natural resources dominated by trees and natural habitat, which cannot be solved from one another.”

5.3.5. Data analysis

The data was collected with the surveys at the harvester level about their understanding and perception of sustainable harvesting related to forest conservation. Sustainable harvesting influences global trade as a sustainable product. The data collected with the harvester surveys about sustainable harvesting were compared between the two groups of harvesters from the two areas in Lempur to see their understanding of clear-cutting and its environmental impact. The quantitative data from the 30 harvesters were analyzed with Microsoft Excel for these surveys. The analytical tools used were a chi-square test for nominal and ordinal variables. The chi-square test was chosen to show the differences in answers between the two groups' nominal variables during the discussion.

5.4. RESULT

According to the interview with BPTP and KPH in January 2019, cinnamon harvesting became more widespread in Kerinci five years ago. Currently, three aspects are unfavorable for preserving forests in Lempur mudik, namely (i). Better farming practices (ii). Afforestation, and (iii) controlled deforestation. Cinnamon harvesting can impact the degradation of the environment (Figure 3), where soil erosion, reduced soil fertility, critical land loss, and forest loss affect biodiversity protection.

The current situation was that harvesters in Lempur, Gunung Raya subdistrict, collect as much bark as possible in Lempur and are generally “price takers” with limited bargaining power due to the increasing demand. The harvesters depend on this commodity as their primary income; they must wait 5–7 years before harvest. Meanwhile, during this waiting period, most harvesters live in a low-income situation that jeopardizes their livelihood. During harvest time, harvesters use an ax and saw to

cut the tree down to collect as much as possible for the bark. They commonly collect up to 600 kg of wet bark, and one tree can provide up to 20 kg daily.

In having 600 kg of bark, harvesters cut at least 30 trees, impacting the natural habitat. Another behavior or stigma of the harvester is that when they receive a lower price than their associate, generally, they start to cultivate again to get the same price. The mistake occurs again in the process of sun-drying, and they can make a mistake in the water containment of the bark without knowing the water percentage. The situation becomes a cycle that continues, impacting overharvesting due to their not-knowing capacity. Harvesters then sell the raw material individually and primarily to collectors without practicing sustainable harvesting. Although cinnamon is an essential commodity for the surrounding areas, it is difficult to determine the cultivated area since no records were kept in the local statistical office and government.

The price is an incentive to harvest more substantial cinnamon quantities, so it needs to be addressed through sustainable harvesting interventions. Harvesting of cinnamon bark is usually done in the rainy season from September to February, intended to skin the tree [Muhammad, D.R.A, 2017] efficiently. Most of the trees observed in the research location are between 8–and 25 years and ready to harvest. Based on the interviews and questionnaires n = 30), it was elaborated that most of the harvesters in Lempur have at least 1 ha of “ladang kulit” (cinnamon agroforest). Since 2015, the Embun Pagi (harvester group in Lempur) has assisted the Assessment Institute for Agricultural Technology of Jambi (BPTP) in improving their farming techniques and seedling processes. The cinnamon harvesters were previously not organized, so they did not make much profit from cinnamon cultivation or sales, let alone planting new cinnamon trees. Most of the harvesters in Kerinci were previously not trained, so they did not know how to organize and manage groups, and they have no orientation on developing and practicing sustainable harvesting more efficiently.

In other areas of the surrounding TNKS, Batang Merangin, a similar integrated approach has been promoted by Rikolto (A Belgium-based non-profit organization), where the harvesters were previously clear-cutting the park's slopes resulting in severe

soil erosion. Harvesters are now provided with training, support, and market outreach for agreeing to use organic and sustainable harvesting practices. Sustainable harvesting is the primary concern for BPTP, which can be translated to providing a constant cinnamon bark supply in Lempur through improved harvesting methods. According to BPTP, clear-cutting is not the appropriate platform for sustainable harvesting. One of the indicators for harvesters is that they are adequate in using their knowledge and capacities by interacting with the environment for better compliance toward sustainable harvesting. Harvesters see the value price is higher when the tree reaches more than 15 years due to the bark's quality increasing with age (n = 30). Interviewed harvesters consider prioritizing the amount of bark they can peel rather than its environmental impact. Peeling requires skilled labor, and the know-how of cinnamon peeling is handed down from generation to generation (n = 30). Clear-cutting ("tebang habis," in the local language) is the easiest way to cultivate the bark when the tree reaches ten years old, and it involves cutting down the whole tree, followed by peeling the bark (Figure 5.4).

Figure 5.4. Clear-cutting process of cinnamon tree in Lempur.

After the clear-cutting and peeling, the bark is scraped with a "pangikih" (blunt knife) to clean off the moss, crust, and cork. It takes a group of men and women to do this activity, which can take hours until finally finished. The harvesters leave the tree stem in the forest due to its lack of value (Figure 5.5).

Figure 5.5. Cinnamon tree clear-cutting impact on ecosystem in Lempur.

As for the reasons for choosing clear-cutting, it depends on different kinds of factors. Based on Figure 5.6, 22 harvesters had chosen clear-cutting due to cinnamon's economic reasons as the primary cash crop for their livelihood. Clear-cutting for the respondent was the most common and economically profitable method of getting the bark. Based on the 25 respondents (n = 30) mentioned that cinnamon is easy to cultivate or known as forest grass “rumput hutan”, which does not present any concern for replanting. The increasing gate price of cinnamon bark is the reason for 20 respondents to choose to clear-cut rather than cultivate by height, as can be noticed

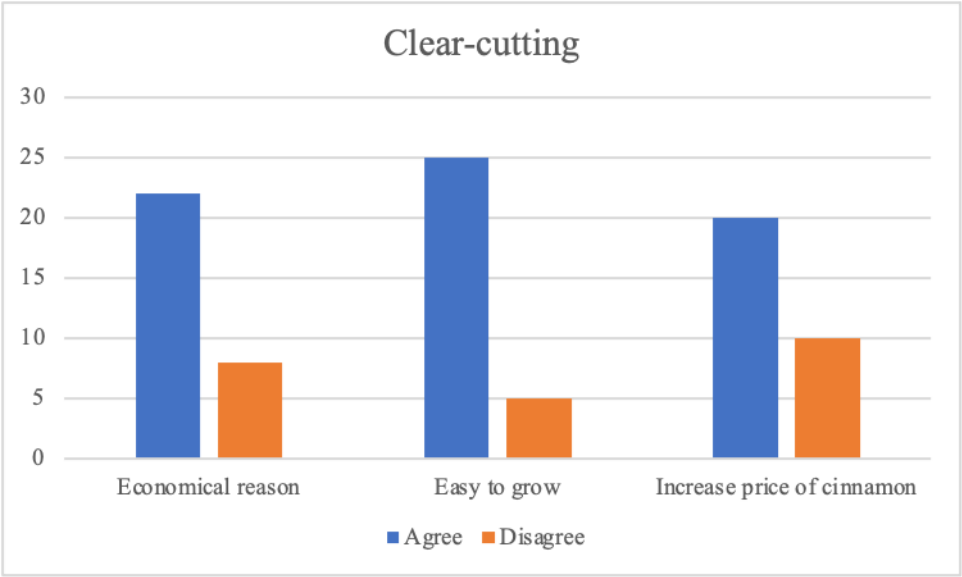


Figure 5.6. Reasons for clear-cutting.

According to the BPTP, clear-cutting in Lempur has caused several wildlife species due to soil erosion and tree loss. The most notable species that have been hit like this are the northern Sumatran surili monkey (*Presbytis melalophos*) and other animal species that have decreased from the removal of the cinnamon tree.

To conduct sustainable harvesting, methods like clear-cutting must be considered and reconsidered in the traditional practice to understand the impact of tree loss on wildlife species. International environmental and sustainable food sourcing programs become the key indicator of a sustainable product that meets international standards (certification) of using natural resources and even biodiversity. A second measurement was conducted to understand harvester's views toward sustainable harvesting (Figure 5.7).

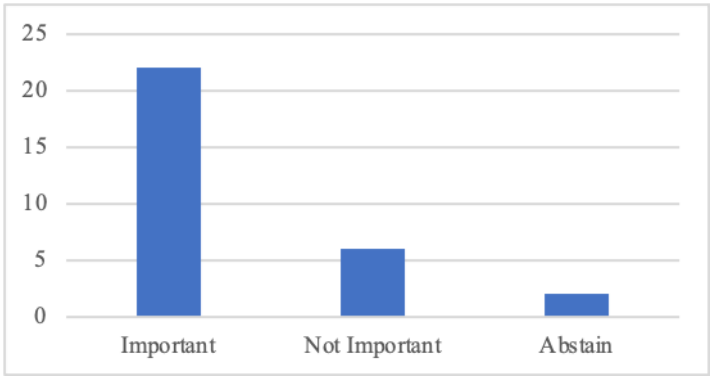
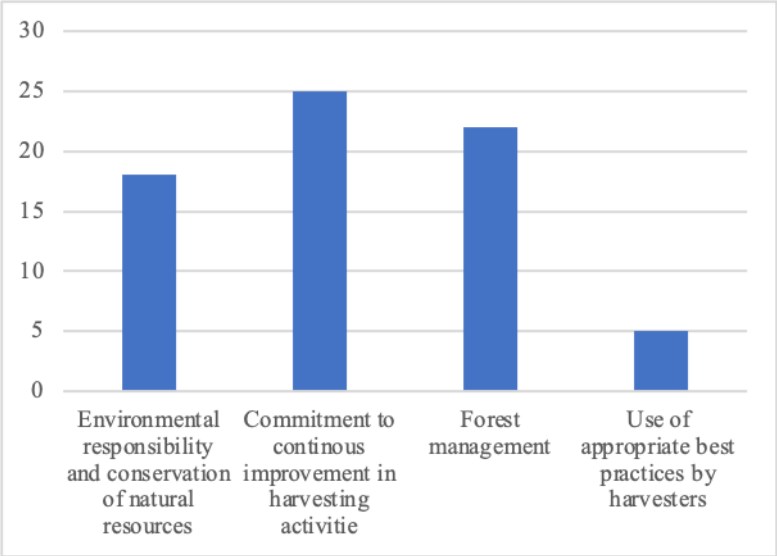


Figure 5.7. Harvester perception of sustainable cinnamon bark harvesting practices.

The graph shows that 6 of the total respondents interviewed (n = 30) have a minimum understanding of sustainable harvesting, which concludes that the adoption of sustainable harvesting practices can have a positive impact on resource conservation, socio-economic status of the community, quality of products, and economic returns (Hernández-Barrios, 2015).

The hypothesis of harvester preparedness to apply sustainable harvesting, which can be one of the solutions for forest conservation, was questioned during the group discussion conducted in Lempur, and the results are shown in Table 5.2.



Variable	Observed	Expected	Residual = (OBS-EXP)	(OBS-EXP)^2	Component = (OBS-EXP)^2/EXP
Environmental responsibility and conservation of natural resources	18	7.5	10.5	110.25	14.7
Commitment to improving harvesting activities	25	7.5	17.5	306.25	40.83
Forest management	22	7.5	14.5	210.25	28.03
Use of appropriate best practices by harvesters	5	7.5	−2.5	6.25	0.83

Table 5.2. Chi-square test (*n* = 30).

Based on the chi-square, twenty-five of the correspondents in the group discussion see the commitment to continuous improvement in harvesting activities as necessary. On the environmental responsibility and conservation of natural resources, eighteen of thirty

harvesters consider it essential, most of whom are younger. Forest management ranks as the second most important consideration for sustainable harvesting with twenty-two correspondents. However, five correspondents consider clear-cutting as the best practice to get the bark during the harvest. Clear-cutting is the easiest way for a farmer to meet the increasing demand, which causes the harvest of cinnamon bark on a massive scale that causes overexploit of the forest to the extent that natural regeneration is now being hampered significantly in Lempur.

5.5. DISCUSSION

The causes of unsustainable harvesting, in general, are listed by Louis and Nel [26] as (i) increasing commercialization of forest goods, (ii) increasing demand in the local and world markets, (iii) lack of appropriate policies and legislation and the failure to enforce them, and (iv) poverty and high unemployment. The shift from subsistence use to commercial trade in spice has increased cinnamon frequency harvested from wild habitats. The young harvesters who participated in the study consider that protecting their forest can bring back what has been lost, such as wild animals, due to the massive deforestation in Kerinci Regency caused by palm oil and rubber plantation. Elmqvist et al. (2003) mentioned that some animals have essential roles in ecosystem processes and organizations, such as pollination, seed dispersal, and herbivory, and the loss of these species has negative consequences for the ecosystem (Figure 5.8). Clear-cutting consequences are that cinnamon trees can no longer provide shelter for various forest species, and others' riches are also lost. Wildlife, such as the sun-bear (*Helarctos malayanus*), Sumatera tiger (*Panthera tigris sumatrae*), The Sumatran surili monkey (*Presbytis melalophos melalophos*), Malayan tapir (*Tapirus indicus*), bearcat (*Arctictis binturong*), and endemic birdlife, such as Schneider’s pitta (*Pitta schneideri*) are forced to find new habitats (Figure 5.8). Species, such as *Treron vernans*, live in the cinnamon agroforest's surroundings in Lempur where wildlife used to hunt and eventually live along-side villagers.

Figure 5.8 Insect trap using cinnamon berries made by *Treron vernans L* (Pink-necked green pigeon).

Figure 5.9 Wildlife living in the cinnamon trees (left: surili monkey, right: bear nest).

Therefore, harvesters should be aware of the environment (Comm. MoEF, November 2018). The impact of cinnamon overharvesting can have an environmental degradation impact in Lempur. Intensive harvesting without replanting can cause rapid forest loss. Therefore, forest conservation is threatened by increasingly unsustainable harvesting practices (FAO, 2000). The situation is more critical to achieving sustainable harvesting. The increasing global demand makes it difficult for traditional harvesting to become sustainable. Harvester sees the bark as a value-worth of cash; only a few are determined to replant the seeds. The basic knowledge of sustainable harvesting is to add value to the forest, which can impact forest management (Ros-Tonen, 2012, Belcher, B, 2007). One of the methods a harvester can adjust to traditional harvesting is to study international standards for sustainability to meet global market demands for cinnamon as a premium product.

5.5.1 Sustainable harvesting

Sustainable harvesting is related to product quality, which can be a significant problem for Western countries like Europe. European consumers selectively choose food, safety, and quality products. European consumers consider the quality aspects before purchasing (Friedell, G. 2007). Cinnamon is consumed throughout Europe, and the needs of protocols for market requirements need to be adjusted. The standards and certifications on the non-tariff for specific sectors, including HACCP, GAP, GMP, ISO norms, health standards, trade fairs, and environmental standards, are essential. Certification schemes and initiatives, such as consumer recommendation lists, influence consumers' choices (Janssen, M, 2012). Sustainability claims in certification schemes can be divided into four categories (UNCTAD, 2019):

1. Environmental issues (e.g., ecosystems and biodiversity, waste management).
2. Labor conditions (e.g., health and safety, human rights in the workplace, including child labor and forced labor).
3. Local economic and community benefits (e.g., business ethics, fair trade, education, social rights).
4. Food safety and quality (e.g., traceability, hygienic production, and handling).

However, researchers stress that those sustainable products are sometimes mere marketing claims. Whether consumers differentiate between supposed sustainable marketing claims and proper environmentally-friendly or Fairtrade products that depend upon their sustainability knowledge is their choice. Consumers with knowledge about sustainability should evaluate sustainability claims critically and trust those businesses that show convincing sustainability efforts (Park, H. 2016).

Due to high standards and technical requirements, cinnamon products have had non-tariff concerns entering the European market in the last decade. Another issue is the high cost of obtaining and maintaining standards certificates. Only listed international companies have certificates and standards for the wholesaler. See Table 5.3 below.

Table 5.3. List of certifications owned by processing companies

No.	List of Companies	Standards and Certificates
1	Royal Polak	FSSC 22000, Fairtrade, Skal, Rainforest Alliance, Kosher
2	Cassia Coop	Rainforest Seal (Sustainable Agriculture Network Standard) & EcoCert
3	Unispices	Ecocert SA & ISO 22000:2005 Food Safety Management System
4	Kerinci Agro	Ecocert SA
5	Tripper	USDA Organic seal, Oregon Tilth Certified Organic, EU Organic seal, Nature-Future-Culture (NFC), ISO 22000:2005 Food Safety Management System
6	AGRIM PTE LTD	ISO 9001:2008 Quality Management Certificate, HACCP Certificate, Good Manufacturing Practices (GMP) certified factory
7	Q-Spicing	ISO 22000:2005 (HACCP) by Sai Global, Australia, Halal by MUI, Indonesia, Kosher by KLBD, Organic Certified EU & Organic Certified NOP (USDA)

Since the beginning of 2019, Embun Pagi has been trading with international buyers through the support of BPTP, and they realized the importance of organic certificates for cinnamon production and the need for upgrading to a cooperative to have a legal entity. Working with international buyers made the Embun Pagi group understand the importance of an organic certificate. Organic certification is predominantly used for cultivation operations but can also be applied to a wild collection. Simultaneously, the different organic regulations have some requirements for ensuring the sustainability of wild crop harvesting. It is also crucial for the group to become cooperative regarding the legal aspects and trade externally as an independent body following this certification. Embun Pagi's leader explained that being a cooperative will help them meet the requirements of certified organic companies and take full advantage of the government’s support policies in promoting the collaborative economy. Global consumer demand for sustainable products has rapidly increased in the last decade.

5.5.2 Moving Towards Sustainable Harvesting

The acknowledgment of fair trade, organic agriculture, and sourcing information have all been studied in the context of global value-chains to improve productivity (Bidwel, S. 2015). Studies have reported varying examples of the impact of fair-trade certification in developing countries. Cinnamon harvesters’ participation in alternative systems, such

as fair trade, can reduce exposure and vulnerability to low commodity prices, meaning producers have benefited from more price stability (Fridell G, 2007; Bacon, 2005). However, because fair-trade-certified products have mostly been found in mainstream markets controlled by multinational companies, it has been suggested that most of the income from the sales of fair-trade products is acquired by the consumer countries (Johannessen, S, 2010). A basic economic principle is that exports are components that can affect economic growth (Mankiw, N.G, 2000; Armstrong, H, 2000). Therefore, Embun Pagi, since the beginning of 2019, is currently under guidance by BPTP to meet the sustainable harvesting goals-based, which is noted during the interview (n = 30). The harvester group follows the organic standards to receive the EU-certified organic label by BPTP. Therefore, BPTP assistance is crucial for the harvesters to overcome unsustainable harvesting and forest conservation. The assistance of education includes (i) encouraging sustainable and non-destructible harvesting (clear-cutting) of NTFPs by creating awareness and imparting training on education for sustainable development; (ii) educating harvesters to collect seeds from *Cinnamomum burmannii* and put them in a nursery; (iii) Teaching how leave the bark uncultivated up to 20 cm from the ground.
The AR had tremendous support from the Ministry of Environment and Forestry to move towards the improved practices of sustainable harvesting that become an added value in the value-chain process.

5.6 CREATION OF INDONESIAN NATIONAL STANDARD (SNI) FOR SUSTAINABLE PRODUCTION OF CINNAMON

The Indonesian National Standard, or SNI, is used across Indonesia and is a voluntary-based scheme from the Indonesian National Standardization Agency (BSN), a Non-Ministerial Government Institution assigned by the Indonesian government of Indonesia to foster and coordinate all standardization and conformity assessment activities in Indonesia. According to Government Regulation no. 102 of 2000 concerning National Standardization, standardization is the process of formulating, establishing, implementing, and revising standards, which are carried out in an orderly manner and in

cooperation with all parties. Standards are technical specifications or standardized procedures and methods compiled based on the consensus of all relevant parties by considering the requirements of safety, security, health, and environment, development of science and technology, as well as experience, current and future developments.

Standardization is needed to support increased productivity, production efficiency, and quality of goods, services, processes, systems, and personnel, which is intended to increase competitiveness and protect consumers, business actors, workers, and the community, especially in the fields of safety, security, health, and safety.

The functionality of SNI is to create a system that allows products to meet the quality and requirements of Safety, Security, Health, and Environmental Conservation (https://bsn.go.id/main/berita/detail/11517/tentang-bsn). Therefore, SNI is a technical, regulatory instrument needed to support Sustainable Development Goals (SDGs) with the new environmental conservation. With this saying, the creation of 'Sustainable Production of Cinnamon SNI' may impact environmentally friendly harvesting in the future. The research had support from the Ministry of Environment and Forestry, Directorate of Social Forestry of Partnership, and Center of forest certification to robust this research novelty.

In the Ministry of Environment and Forestry context, there are two significant changes, namely the procedures for environmental control and the provision of forest areas. The Ministry of Environment and Forestry manages 126 million ha of forest area, divided into conservation, protection, and production functions based on their characteristics. Five priority considerations in the context of environmental control and forest area provision are 1) priority to accelerate forest area settlements, 2) forest area to be maintained, 3) procedures for changing the allocation and function of forest area, 4) utilization of production forest, protected forest for permits, and 5) fostering and developing forest product processing.

Within the framework of ensuring forest sustainability, environmental health, and community welfare in the utilization of natural and forest resources, it requires standards in the form of standards and quality covering environmental quality, disaster resilience,

and climate change, as well as sustainable forest management, production coverage, quality control, and supervision. Registration, testing, certification, accreditation, licensing, and labeling, and ensuring the implementation of standards through supervision and surveillance can be carried out continuously. Therefore, implementing environmental and forestry standards is a continuous process including for *C. burmannii* (Nees & T. Nees) Blume is also categorized as a non-timber forest product, as mentioned earlier in the dissertation. Indonesian National Standard SNI 8891:2020 Cinnamon bark as raw material production. This standard was prepared by the Technical Committee 65-02 Non-Timber Forest Products. This standard was discussed and approved in a consensus meeting on 15 October 2019 in Bogor, attended by representatives of relevant stakeholders, namely representatives from the government, business actors, consumers, and experts.

This standard was through the polling stage on January 9, 2020, until March 9, 2020, with the results being approved as Indonesian National Standard. The Head of the National Standardization Agency, Number 282/KEP/BSN/7/2020, signed the decree recognizing National Standards 8891:2020 Cinnamon Bark.

5.6.1 Sustainable harvesting guidelines for SOP and SNI

The research group created the “guidelines” to achieve sustainable harvesting criteria, later implemented in the SOP Handbook of Sustainable Harvesting and SNI 8891:2020 as stated in the Theory of change (P.77) as innovative sustainable production and Good Handling Practices. The creation of the Cinnamon Good Handling Practices (GHP) system operational procedure is a guideline created to maintain the quality of cinnamon bark. This guideline helps guide the development process of sustainable harvesting in Kerinci Regency. Much guidance will also be relevant to development processes elsewhere in Indonesia.

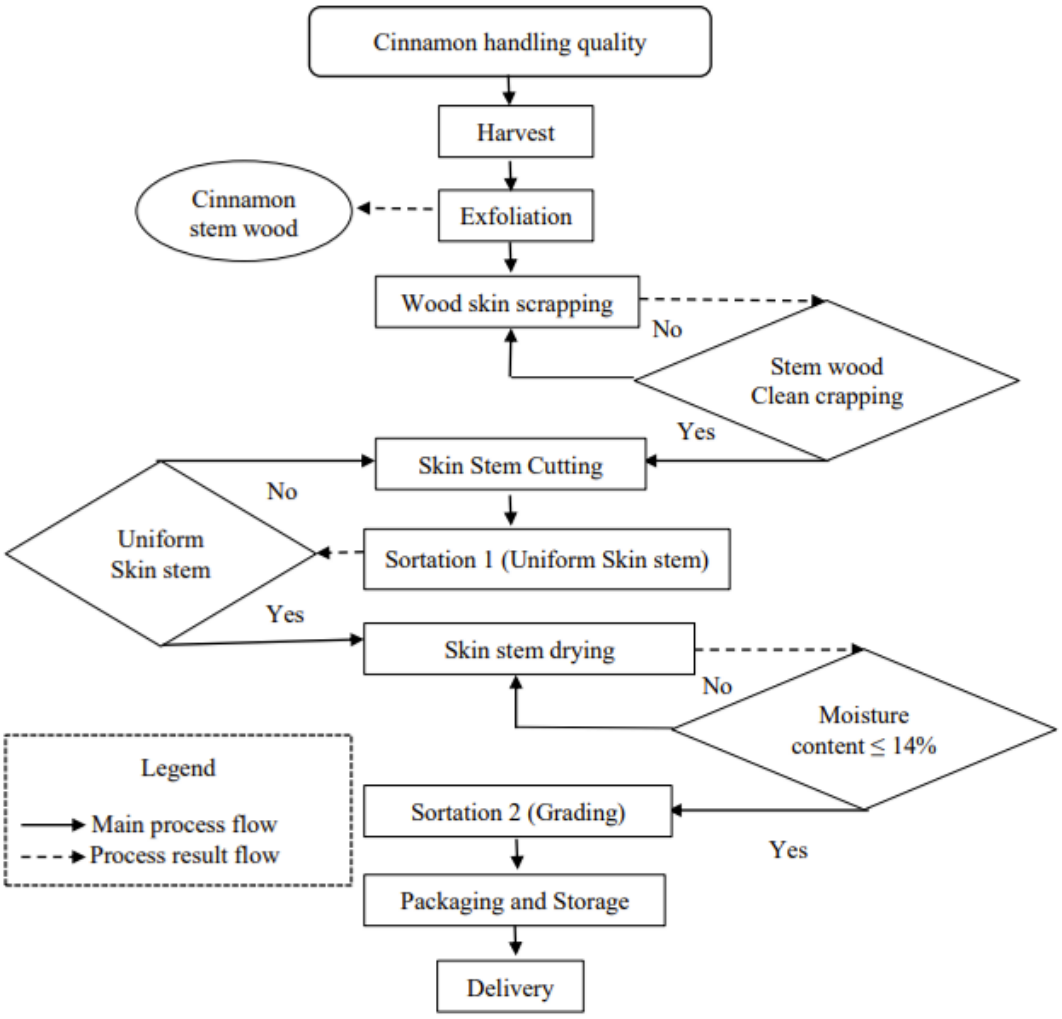


Figure 5.10. The cinnamon GHP scheme for farmer level (Source: J Hendri "co-researcher," 2022)

Here below are presented step by steps of sustainable harvesting practices:

1. **Harvesting the cinnamon bark**

The main cinnamon product is bark, which is different from other commodities. Therefore, the harvesting process requires specific handling. There are two ways of harvesting: cutting down the tree and then peeling the bark, which is the traditional

harvesting, or directly peeling the bark without cutting the tree first (suggested by the Action research).

2. **Harvesting the bark by the age of the tree**

Harvest age affects the quality of cinnamon production. The ideal harvest is done when the cinnamon plant is 8-12 years old because the bark is not so thick that it can roll well, but the essential oil content is low. In contrast to cinnamon plants harvested at 15-20 years, they will have thick bark and be challenging to roll, but high essential oil content (3.5 – 4.5%) meant cinnamon powder. Cinnamon harvested at the age of 4-5 years produces 1-1.5 kg of dry bark, aged 6-8 years produces four kg of dry bark, and those over eight years can produce 7-8 kg of dry bark. Cinnamon ready to be harvested has dark green leaves, and new shoots have grown. Trees with this condition usually already have enough sap between the wood and bark, so the skin is easy to peel.

3. **Harvest period**

The best time to harvest cinnamon is before the dry season because the bark can be dried in the sun immediately after harvesting. During the wet season, the bark can regenerate at this period. This method of seasonal cinnamon barking was identified at the Dayak Community of Borneo during the cinnamon expedition that was presented before.

4. **Harvesting methods**

Four cinnamon harvesting Methods are explained below.

A. Simultaneous cutting method

   Many cinnamon harvesters carry out this unsustainable method. The method is to clear-cut the cinnamon tree directly to the ground. After that, the cinnamon bark will be peeled off.

B. Situmbus System

   Cinnamon harvesters developed this method in the Situmbuk area, Tanah Datar Regency, West Sumatra Province. The method is conducted two months before

the tree is cut down. The bark is peeled in a circle starting from a height of 30 cm from the base of the stem to 80-100 cm. After that, the plant is cut down to 30 cm from the base of the stem. The base of the stem is left to grow shoots that can be used as seeds.

C. The trunk system is beaten (hit) before cutting

Cinnamon harvesters developed this system in the Sungayang area, Tanah Datar Regency, West Sumatra Province. The trick is to beat the bark in a circle to get thicker. The beating of the bark is carried out two months before the plant is cut down.

D. Vietnamese System

This system method is conducted by peeling the cinnamon bark into a rectangle of 10x30 cm or 10x60 cm. Exfoliation is done alternately so that it looks like a chessboard. A new callus will grow on the part of the stem that has been peeled off. The skins will be interlocked. Then the exfoliation of the bark that has not been harvested leaves the skin that has just grown. Harvesting is only done on the bark.

5. How to harvest in a sustainable way

The recommended harvest method is selective harvesting or gradual harvesting. Selective harvesting is done by first harvesting some plants (35%) at 5-6 years old. – 15 cm so that new shoots will grow later. Choose only 2 – 3 shoots so their growth is good and grows into a new cinnamon plant. The sunlight can come back in at the location of the plants that have been harvested. Therefore, this area can be planted with understored crops, such as secondary crops or horticultural crops that do not require chemicals in the cultivation process. Other cinnamon plants are left for harvesting at 10-12 years (30%) or 20 years and over (30%), just like the first harvest, at the location where the plants that have been harvested can be planted with intercrops such as secondary crops or horticulture (i.e., coffee) that do not require chemicals in the cultivation process. Selective or gradual harvesting is better than total harvesting because it does not deforest the forest, so it is better for the environment and living

things in it. It should be noted that 5% of plants are still not cut/harvested and can be used as mother trees.

In addition, cinnamon trees at the age of 5-6 years are usually harvested by thinning to reduce tree spacing that is too close. This thinning harvest can be done up to two times with an interval of 5 – 6 years. The objectives of this thinning harvest are:

A. The trees grow straight.
B. The potentiality of branches growth.
C. Reduce micro-moisture.
D. Remove sick trees.

5. Cinnamon bark exfoliation

Exfoliating the bark can be done in two ways: exfoliating before the plant is cut down and after the plant is cut down. Before exfoliating the entire skin, the *Santang* process is carried out first and left for one month. *Santang* is a process of exfoliating the bark at the base of the stem as high as 30 cm from the ground, which aims to make the cinnamon tree dry slowly, thus facilitating the exfoliation process and preventing skin damage when exfoliated. The steps for exfoliating the cinnamon bark are as follows:

A. The cinnamon bark from stems, branches, and twigs must be separated.
B. The skin that contains moss or dirt is cleaned by scraping until the skin looks yellowish green and the surface becomes slippery.
C. The bark is cut around the stem at 5-10 cm (bottom cut) from the base of the stem and cut again at the height of 100 cm (top cut) from the first cut.
D. The skin between the lower and upper cut margins is incised perpendicularly with 5-10 cm.
E. The skin is removed using a lever blade and pulled from top to bottom, so the bark is 5-10 cm wide and 100 cm long.
F. Exfoliation is carried out until all the bark has been exfoliated.
G. The branches on the branches are cut. In addition, the leaves and parts that cannot be peeled on the twigs and branches are also cut.

H. Cut branches and twigs skinned with a knife.
I. Large enough branches are cultivated for barking such barking to obtain high-quality bark sheets.
J. After peeling, the cinnamon bark is stacked in a place protected from direct sunlight for one night (curing).
K. Bark and bark from large enough stems should be scraped off to keep them clean. The process of scraping is recommended using a sharp knife.

6. Replanting

The importance of replanting is to secure the next generation of cinnamon bark and secure the commodity provision in the market. The steps are: (a) Seeds collections in the forest; (b) Take it to the seedling nursery area, and (c) Replanting in the nearest area in the strip method.

5.7 ACTION TAKEN TOWARD SUSTAINABLE HARVESTING

5.7.1 No clear-cutting demonstration and evaluation

The first learning medium was to develop a demonstration plot for stakeholders on cinnamon plantations to experience what to do and how to do it. Harvesters learned to carry out their new insights on their farms. Here, the research team and change agents collaborate with harvesters to establish sustainable production practices. Field visits and weekly meetings were conducted to discuss the progress and issues that emerged during the three months. The harvesters developed ownership of the meeting and confidence in decision-making. There was also greater sharing of information experiences from the field, including knowledge exchanges.

One clear-cut occurs due to the KBBC grades that harvesters could get from the unreachable tree branches to peel. This matter is understandable for the income loss that can happen, but there is also reason to clear-cut, which at the lower tree trunk of the tree is the thickest part of the bark, all the wall to the roots. This is the part the interdisciplinary comes in on based on some literature reviews of agroforestry that

mention that after being cut down, some trees can start growing back to new branches as early as 3 to 4 weeks because the roots are still intact (PL Pyttel, 2013).

For example, at first, harvesters developed confidence in their ability to understand and use technical and scientific knowledge as they harvested the cinnamon bark, which was probably left uncut and debarked 30 - 40 cm of the ground so that the stump could regenerate into a mature tree.

Figure 5.11 Harvesting techniques without clear-cutting.

Second is the debarking technique; this method was previously learned from the cinnamon harvesters in Vietnam (Vietnam way) that was then applied to Indonesia. In this case, the bark can regrow after a couple of years. Peeling of the bark reaches a maximum of up to 2 meters high,

Based on the research conducted by Pathiratna and Perera (2006), the bark can regrow. It takes three months to heal from harvest and one year to replace the removed bark layer. To be able to promote the creation of sustainable production, the researcher educates the target group on the peeling process without clear-cutting

5.12. Teaching the peeling process without clear-cutting.

With knowledge beforehand that within three years, the tree will again be able to be harvested for the cinnamon bark. Not long after, the harvesters started to follow peeling. This opportunity also gives the bark to regrow.

Figure 5.13 - A Gunung Raya Subdistrict, 2.2547° S, 101.5373° E, source: Rana Menggala.

Figure 5.13 - B Bukit Kerman subdistrict, Kerinci 2.2301° S, 101.5243° E, source Rana Menggala.

Harvesters were also taught to direct plant the seedling after cutting down the trees, as the approach of social forestry. Harvesters valued scientific information for providing general concepts and understanding why certain practices were recommended. Learning the theory and principle of cinnamon management enables participants to find out how and why certain practices were recommended and become the objective of their decision-making. This demonstrated that within this circumstance, change agents generated new knowledge and gained lessons from that. They learned how to harvest the bark without compromising the environmental damage. The significant outcomes from these two exercises were the understanding gained by the participants of their situation in terms of (1) practices they could undertake to improve their accomplishment and (2) the contextual issues that need to be addressed.

In Figure 5.14, a new approach toward sustainable harvesting has been conducted by the BPTP since 2015 by creating a cinnamon nursery. Harvesters can now plant seeds at the nursery near the cinnamon plot “*bidang*.”

Figure 5.14. Collection of wild seedlings in the forest.

After collecting wild seedlings in the forest, the next step will be the forest nursery. Forest nurseries are advantageous in propagating recalcitrant seeds, dormant seeds, and tree species with irregular flowering. Nurseries are also suitable venues for vegetative propagation operations. Cinnamon tree seedling production has become a fundamental tool for addressing reforestation, restoration, and conservation needs explained earlier in this chapter.

Figure 5.15. The forest nursery of *Cinnamomum burmannii* is in Mudik.

The advocacy of this forest nursery (Figure 6.14) is immediately given a canopy (fishnet) to prevent seedling death from direct sunlight. After 6–8 months in the forest nursery, the seeds will be transferred to the field. The spacing for cinnamon is 1.5 m × 1.5 m and 2 m × 2 m, while the “tumpeng sari” intercropping process is generally less frequent, i.e., with an area of 3 m × 3 m and 4 m × 4 m.

Based on the AR approach, in addition to achieving more excellent knowledge around sustainable harvesting, such research can simultaneously empower communities worldwide through collaboration and partnership. As the approach of AR toward community-based importance continues to grow, harvesters can develop the sustainable management of cinnamon harvesting in Lempur area as long they are informed well in the process.

5.7.2 Engagements of the AR for the creation of research novelty

Two solutions were to improve the production method: the first SOP Handbook of Sustainable Harvesting. This “System Operational Procedure” partnership between Kerinci Forest Management Unit (KPHP) and Penabulu Foundation. The researcher introduced both parties as it was the opportunity to support the organization's vision and mission on Value-chain Development.

Figure 5.16. Introduction of the Cinnamon SOP on Sustainable Production.

The second was the creation of national standards to meet sustainable harvesting. With the support of the Ministry of Environment and Forestry in mid-year 2019, this standard came into progress and development. The research became the essential foundation for the initiative, in which guidelines and findings were inserted in creating the standard.

Figure 5.17. Launching the Indonesian National Standard of Sustainable Harvesting of Cinnamon.

This standard was prepared due to the need for quality requirements to improve harvest management and meet high market standards of good quality. The research outcome resulted in the Decree of the Head of the National Standardization Agency Number 272/KEP/BSN/7/2020 concerning the Stipulation of Indonesian National Standard 8891:2020 Cinnamon Bark, published in August 2020.

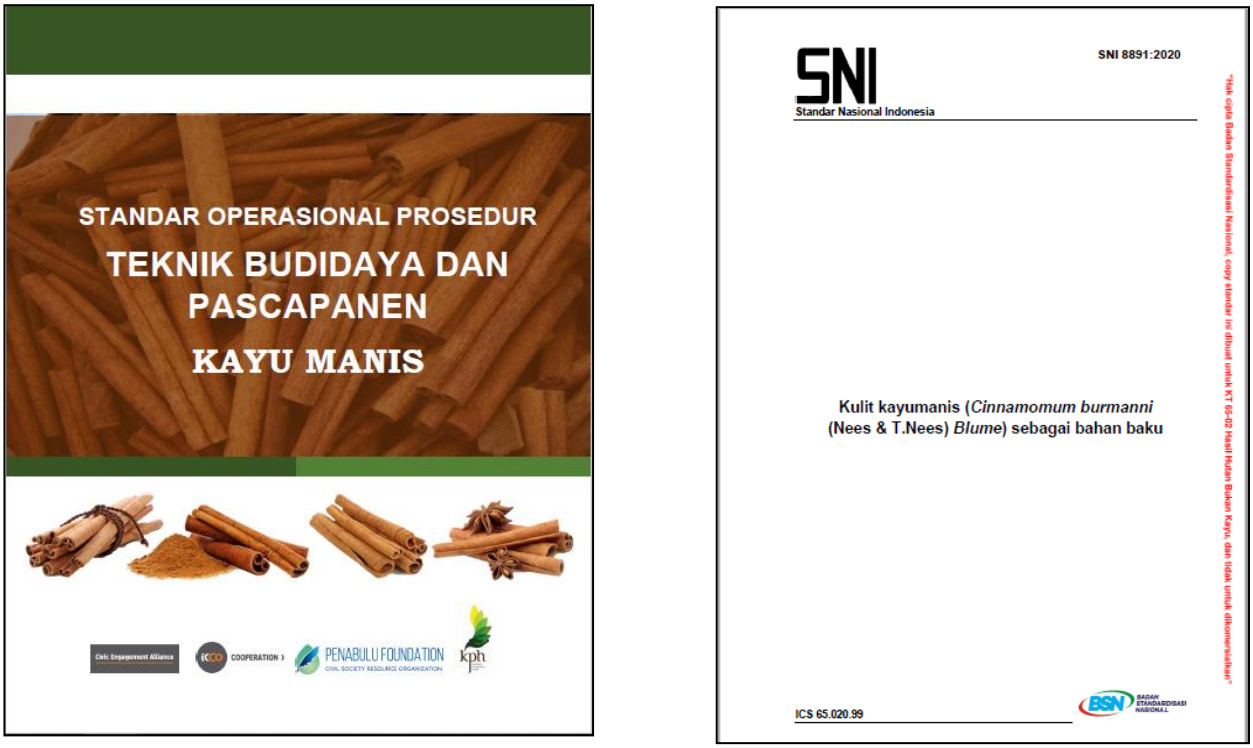


Figure 5.18. State-of-the-art (Left) SOP Handbook of Sustainable Harvesting, (Right) SNI 8891:2020.

The SOP and SNI include (1) Timing of harvesting: Specification about the season, date, or time of day the harvesting is carried out; (2) Material to be harvested/ part harvested: Collect mature and healthy material; (3) Harvesting techniques: Different techniques for different part harvested; and (4) Harvesting equipment and storage. The enhancement of skills of different stakeholders through the SOP Handbook of Sustainable Harvesting and Indonesian National Standard 8891:2020 to meet sustainable harvesting practices is by improving the post-harvesting techniques, marketing, and certification to improve the economy of the harvesters. This approach and standard of sustainably harvested cinnamon are essential for fetching higher prices at national and international markets. Primary, empowering the cinnamon harvesters on these issues will provide good economic benefits to them, thereby aiding in the conservation of the resources.

5.8. CONCLUSION

This chapter concludes that cinnamon contributes to the livelihood of harvesters by increasing the gate price, but this impacts the natural habitat of the wildlife. Therefore, clear-cutting practices should be changed towards sustainable practices to benefit the environment. Moreover, the effort towards sustainable harvesting, which BPTP had guided, can be neglected due to the emerging demand for cinnamon bark.

The primary findings of the research indicate that the cinnamon harvesters in Lempur did not have the applied skills to perform sustainable harvesting before BPTP came along in the process. Furthermore, the local government's involvement is necessary to connect with the harvester, including providing rewards and incentives for a harvester to meet the sustainable harvesting practice. It is questionable whether the supply will keep up with the demand if it is without a change in the practice. Several socioeconomic factors also contribute to the overharvesting of cinnamon trees, such as increasing demand, unequal commercialization chains (William, 2014), and economic incentives to extract all available resources without controlling for quality (Crook C, 2001). The most necessary thing to do related to the human and environmental relationship includes components such as (i) strengthening the capacity of local planning by incorporating conservation into the planning aspects of the activities of harvesters, (ii) the rights of

rationalization of resources and (iii) the development of the local area towards a sustainable living environment. Understanding harvesters and buyers can facilitate a collaboration that fosters biodiversity conservation by engaging with the younger generation of cinnamon harvesters.

Chapter VI

CONCLUSION, LESSONS, AND FUTURE PERSPECTIVES

This chapter summarizes the key research findings. It will also review the study's limitations and propose opportunities for future research.

Cinnamomum burmannii (Nees & T. Nees) Blume is one of the primary spices exported overseas and used in various food and pharmaceutical industries worldwide. Kerinci Regency is one of the main cinnamon production centers characterized by a cinnamon production of exceptional quality. Cinnamon bark is sold globally under the marketing name Korintji Cinnamon. Cinnamon plantations are in the hilly area surrounding the Kerinci Seblat National Park, with APL (Other Use Areas) and production forests status from the Social Program, the Ministry of Environment and forestry. Cinnamon plantations in these Social Forestry areas are evenly spread over 46,000 ha. The Kerinci community owns these cinnamon plantations as a form of land-use heritage. In general, people in the sub-districts of Bukit Kerman, Gunung Raya, Batang Merangin, Gunung Kerinci, and Siulak Kerinci Regency are cinnamon harvesters. The current demand for cinnamon and the profit from this activity have resulted in overharvesting and deforestation.

Consequently, current sourcing practices pose severe difficulties in the short term for this crucial sector. Traditional harvesting methods of cinnamon are often destructive and reduce the biological diversity and environment, as Finwatch (a Swedish Non-Profit Organization) and other organizations have shown. Sustainable harvesting is necessary for conserving plant diversity and, simultaneously, for the livelihoods of many rural peoples in forest areas who rely on forest products for their sustenance. Due to the significant demand for the bark, overharvesting the tree bark is unsustainable without replanting, harming the environment. Nonetheless, ongoing changes in the global spice market towards sustainability open opportunities for added-value products, including cinnamon. Cinnamon itself is acknowledged as an economically significant Non-Timber

Forest Product (NTFP) that, if harvested appropriately, can help the communities that live near forests by providing them with a source of income.

As we show in Chapters IV and V, cinnamon sourcing requires a practical, sustainable harvesting method and a change of behavior towards sustainability. Changing behavior in harvesting techniques can create a win-win strategy for harvesters and biodiversity; therefore, the tailor-made Indonesia's national standardization (SNI) of sustainable harvesting can be a game changer in the sourcing of cinnamon. Adopting these standards may help to compete in the international arena. Therefore, this thesis proposes several vital changes that should be adopted for a sustainable global food system and shows as an illustrative example that the Kerinci cinnamon value-chain can contribute to sustainable spice production if proper measures are adopted.

6.2 FROM SCIENCE TO ACTION

The Action Research (AR) conducted in this PhD thesis aimed to support the cinnamon sector in Indonesia by creating guidelines and tailor-made standards for harvesting that are good for the environment and smallholders' livelihoods. The results of this AR have also shown that harvesters became aware of the problems, accepted the suggestions, and engaged authorities and institutions (local government and ministries in Indonesia) to support value-chain development.

The increasing demand for Kerinci cinnamon causes the harvesters to adjust the harvesting practice according to international standards and regulations for a sustainable sourcing and production. According to the Food and Agriculture Organization of the United Nations (FAO), for agriculture to be truly sustainable, it must meet the needs of present and future generations while ensuring profitability, environmental health, and social and economic equity.

Harvesting cinnamon sustainably is an essential issue for many growers and producers. There are many ways to ensure that cinnamon is harvested sustainably, and each method has advantages and disadvantages.

One way to sustainably harvest cinnamon is to harvest the bark from certain trees. This ensures that the tree can continue to grow and produce new bark, allowing for a higher yield of cinnamon per tree. However, this method requires careful management and often results in lower-quality cinnamon. Another way to sustainably harvest cinnamon is to replant cinnamon trees after each harvest. This ensures a constant supply of new trees, which helps offset the impact of harvesting on the environment. However, replanting can be expensive and not feasible for all growers. Therefore, the best way to harvest cinnamon sustainably will vary depending on the growers or producer's resources and needs. Because cinnamon production is an important industry in many tropical countries, sustainable cinnamon harvesting is essential to preserving the environment and ensuring a constant supply of cinnamon. There are ways to harvest cinnamon sustainably, and the best method will vary depending on the grower's or producer's needs. Ultimately, sustainable cinnamon harvesting practices help to protect the environment, improve the economy, and ensure a continuous supply of this valuable spice.

Based on what is here briefly summarized and on the results of this PhD, a few actions may create a difference in the cinnamon sustainability sector, i.e. (1) the System Operational Procedure Handbook of Sustainable Harvesting and (2) the Indonesian National Standard (SNI) Certification for sustainable harvesting, published in August 2020 as added value in the cinnamon industry by the Ministry of Environment and Forestry, Indonesia. The SNI is free to purchase by harvesters and can be used to improve the farming practices in Cinnamon. The importance of the actions here proposed and hence of this PhD was acknowledged by the Kerinci local government and the Ministry of environment and forestry (MoEF) of Indonesia in 2021.

6.2.1 The enabling environment

Sustainable harvesting practices must continue to be developed to maintain the cinnamon’s security and quality. Many advances have been made in the field of sustainable harvesting however, many challenges must be still addressed to ensure that harvesting practices are practical and meet the needs of consumers.

There are several benefits to sustainable cinnamon harvesting. One benefit is that it helps to protect the environment. Cinnamon trees are typically grown in areas with a tropical climate, and the loss of these trees can have a significant impact on the local ecosystem. By sustainably harvesting cinnamon, we can help to preserve these ecosystems. Another benefit of sustainable cinnamon harvesting is that it ensures a constant supply. When farmers replant cinnamon trees after each harvest, they help to ensure that there will be a continuous supply of new trees. This helps to prevent shortages of cinnamon, and it also helps to keep prices stable. Finally, sustainable cinnamon harvesting practices help to create jobs and improve the economy in cinnamon growing regions. By investing in sustainable harvesting practices, farmers and producers can help to create jobs and improve the standard of living in these regions.

One way to execute this enabling environment is to bring the Kerinci government representative directly to the European buyers who adopt and apply sustainable sourcing and production needs. In this sense, the Cinnamon trade diplomacy mission was conducted in early November 2019 to learn and evaluate for improvement at the producer's level. Various spices companies have been visited to discuss and see their manufacturing process, from raw materials to consumer goods. Companies like Verstegen, Daarnhouwer, Royal Polak, and Unispices in the Netherlands were visited. In Belgium, a discussion with Rikolto, Ghent University, and Colruyt Group was also conducted to seek opportunities for an alliance for developing this commodity in the short term.

Figure 6.1 Cinnamon trade and diplomacy mission to Europe (2019).

Building such alliances is essential for the future of cinnamon trade from Kerinci Regency to the global market.

6.2.2 From science to regulation

Transferring knowledge from the scientific community to policymakers to develop evidence-based policy is known as "science for policy." Almost every legislative activity includes a scientific component, regardless of the subject or level of government.

Here are two cases of the AR that had initiated policy and regulation regarding sustainable harvesting. At first, the support from the Head of Kerinci Regency has proven a strong relationship with research focused on improving the sustainable harvesting technique of cinnamon bark in Kerinci Regency. In the news article published by Jambi News (13 January 2020) after the trade mission, he became more aware of the sustainable sourcing criteria of spices that the big spices companies explained in the Netherlands and Belgium.

Figure 6.2. Kerinci Regent Asks Citizens to Grow Cinnamon
Source: https://www.jambiupdate.co/read/2020/01/13/79432/bupati-kerinci-minta-warganya-gencar-tanam-kulit-manis.

Second, the AR is relevant for the goals of the Ministry of Environment and Forestry regarding the program of Social Forestry as shown in the State gazette number No. 105/2018 where reforestation (ecosystem restoration) is now defined. This new legal framework adopted by the Ministry goes in the direction advocated by this AR where ecosystem restoration will be aligned with the regulation of the Minister of Forestry Number P.39/Menhut II/2013 concerning Community Empowerment Through Social Forestry and Partnerships.

Figure 6.3 Indonesia President, H.E Joko Widodo handing over the decree of Social Forestry and S Land Objects of Agrarian Reform (TORA), source: www.menlhk.go.id.

Through this regulation, communities can plant 50% of the existing land with woody trees, including cinnamon. The remaining 50% may be planted with seasonal crops, such as corn, soybeans, wild rice, fruit, or coffee or it can be developed for livestock. President Jokowi also asked the community to maintain the preservation of existing forests. Assistance, integration, and collaboration between related Ministries/Agencies, as well as Provincial and District/City Governments need to be strengthened so that the social forestry program does not only considers the aspect of land distribution, but restoration efforts result in community welfare.

6.2.3 Synergizing government in global value-chain development

The global value-chain development put forward through Action Research in the cinnamon sector offers some lessons for effectively fostering supportive government relationships and services utilizing a bottom-up approach rather than the typical top-down policies. Through their work, the programs developed mutually beneficial relationships with their respective governments by demonstrating the value of their approach interventions and activities throughout the project. This proof of concept motivated government officials to take a greater interest in the value Initiative's impacts and support its programs through indirect and direct channels. As a result, the government actors supporting these programs became more involved in value-chain development and increased their outreach to small, micro, and informal enterprises. The good practices highlighted in the AR offered multi organizations involved in inclusive value-chain development of the cinnamon sector in Kerinci.

Understanding what benefits and support governments bring or need to have augmented early in a project’s design process can enrich the objectives or circumvent potential issues before they arise. Taking advantage of government engagement and collaboration in value-chain development projects can mean more sustainable, positive impacts in the business-enabling environment for small, micro, and informal enterprises, regardless of country or sector. Hopefully, these lessons will contribute to improved practices in value-chain development and lead to better targeted and more effective

cooperation between the government, bottom-up development initiatives, and the private sector organizations that comprise the market system.

Figure 6.2. The Regent of Kerinci and the Director General of Social Forestry, Ministry of Environment and Forestry in Kerinci Regency, live call with the author.

Figure 6.3. The Regent of Kerinci and vice-minister of Minister of Villages, Development of Disadvantaged Regions

The role of the government, either local or national, maybe to focus on increasing the area of cinnamon plants in the field, and cinnamon nurseries, making farm business roads, and fostering harvesters and cinnamon traders toward sustainable production.

6.3 FURTHER RESEARCH OPPORTUNITIES

Findings from the Action Research conducted in this thesis have provided knowledge and opportunities in the sustainable sourcing and production of *C. burmannii* in line with

the primary goal of value-chain development. However, still, there are many research opportunities for further development of the findings from this doctoral study:

1. Post-harvest handling and equipment, implementation of SNI/ISO Cinnamon standardization, quality testing laboratory facilities, and strengthening associations of traders and exporters of cinnamon are physically needed for further development.
2. To effectively maintain cinnamon production in the Kerinci Regency, specific measures must be implemented to support different aspects of the species. One of the key issues is introducing measures related to allowing tree growth until ready for bark harvesting. The tree must reach a minimum age of five years old before meeting harvesting requirements. Therefore, measures that recognize the importance of regeneration must be implemented.
3. Monitoring growth, production, and harvest are essential for cinnamon. Promoting sustainable harvesting methods is crucial to reduce the threat to the species. Capacity strengthening of village forest committees and awareness building to major stakeholders is crucial for effective management and governance. Establishing forest nurseries can provide significant economic and ecological benefits and increase access to plants relieving pressure on natural forests. Considering the high commercial value of cinnamon, it is likely to be a popular selection among harvesters.
4. The results of this PhD put forward the need for exploring ”payment models” (e.g., “Payment for Ecosystem Services" promoted by RIKOLTO) to further support cinnamon production and involving change agents and other stake holders to comply with sustainable harvesting practices.

APPENDICES

I. Assembling a research team in 2017

The work started by forming a research team that applied the above-explained self-reflective spiral of action cycles of planning, acting, observing, reflecting, and then re-planning at the pilot visit.

Figure Appendix 1. Forming a small research team.

The team comprised five researchers: (1) a member of the Agricultural Technology Research Center in the Jambi province, which had previously worked in the Kerinci and who wanted to improve its way of working with people by applying an action research approach; (2) a member of Rikolto, a Belgian NGO that had previously worked in the village of Talang Kemuning village and work together with a farmer group named TAKTIK; (3) a member of the Center of forest standardization, Ministry of Environment and Forestry that focus on the establishment of standards for the sustainable management of forests; (4) a member of the Kerinci Forest Management Unit (FMU) responsible for forest governance, planning, forest management, monitoring, and stakeholder engagement and myself.

II. Cinnamon expedition

From 2017 – 2019, various places were visited in Indonesia to understand the local value and production of cinnamon to enable the improved opportunity for sustainable cinnamon bark harvesting in Kerinci Regency. The expedition started from North

Sumatra, and in total, there were 15 areas visited (excluding Kerinci) to understand cinnamon production completely. The expedition aimed to create a tool for adapting the learning environment in AR objectives.

Table. **Expedition locations**

Visited location	**Year**	**Regencies**
Aceh Province	2017	Padang Lawas
West Java Province	2017	Lembang subdistrict
Central Java Province	2017	Boyolali
Bali Province	2017	Tabanan
Yogyakarta Province	2018	Yogyakarta
South Sumatera Province	2018	West Lampung and South Oku
Jambi Province	2018	Batang Merangin
North Sulawesi Province	2019	Minahasa
West Sulawesi Province	2019	Mamasa
South Sulawesi Province	2019	Pinrang
West Borneo	2019	Kubu Raya
South Borneo	2019	Loksado
West Nusa Tenggara	2019	Manggarai
Papua province	2019	Keerom and Merauke

The second area visited was North Sumatra, Padang Lawas Regency (Palas), located about 15 Kilometers from the center of the capital city of Sibuhuan. This location is known for producing cinnamon. In one of the sub-districts, Sosopan, almost all residents are involved in cinnamon harvesting. This sub-district area is located on the slopes of the Bukit Barisan foothills. Villagers from Siundol Dolok, Ulim, and Aek Bargot, collected the bark daily around hillsides and protected forest areas. For decades, the community

Sosopan has relied on cinnamon forest plantations as a vital source of income. Most of its community still lives below the poverty line.

Figure Appendix 2. Expedition documentations.

III. Farmers engagement: group discussion(s)

The expedition to different cinnamon production areas allowed sharing with potential change agents sustainable harvesting practices. To move a community towards sustainability, stakeholders must engage in collaborative learning to challenge current practices.

Figure Appendix 3. Focus group discussion in Kerinci, Sumatra.

Figure Appendix 4. Focus group discussion in Loksado, Borneo.

The groups were encouraged to share their experience and suggest an issue relevant to their practice. The function of the discussion group is to test the idea and to generate knowledge from the broader community before action is implemented toward sustainable harvesting. Various opinions were discussed during a total of six meetings. Here, the focus was to identify needed changes and the direction changes take. The group, therefore, generated the interventions that could be implemented to improve the current situation.

The learning group was encouraged to question value-chain improvement, especially regarding unsustainable harvesting practices. The group then focused on exploring the issue in more detail and the relation of such an issue to the other factors (technical and environmental factors). Further focus group meetings were conducted to collect pertinent data on a topic discussed. Upon entering the AR cycle, the learning group identifies that learning from other regions and producers can be a comparative advantage. The comparison may identify better forest management practices and other factors related to this issue, such as communication, agroforestry, biodiversity, and marketing.

IV. Stakeholder engagement: workshops on value-chain development

The value-chain development workshop was the opportunity to empower cinnamon stakeholders to sell added-value products by improving the access of Indonesian

cinnamon to markets, facilitating a better functioning of markets, and promoting the flow of knowledge and resources along value-chain actors. Value-chain interventions can enable the producer to benefit more from market development and take advantage of some of the opportunities offered by domestic and global markets.

Focusing on the value-chain and the linkages between the firms as well as the service markets and enabling environment questions, VC analysis allows to diagnose of underlying constraints affecting the performance of the chain, mobilizes stakeholders through their involvement in the diagnosis, and problem-solving and support more effective relationships between firms in the chain. The research focuses on how to create a learning environment among actors. It brought together stakeholders more participative in problems solving.

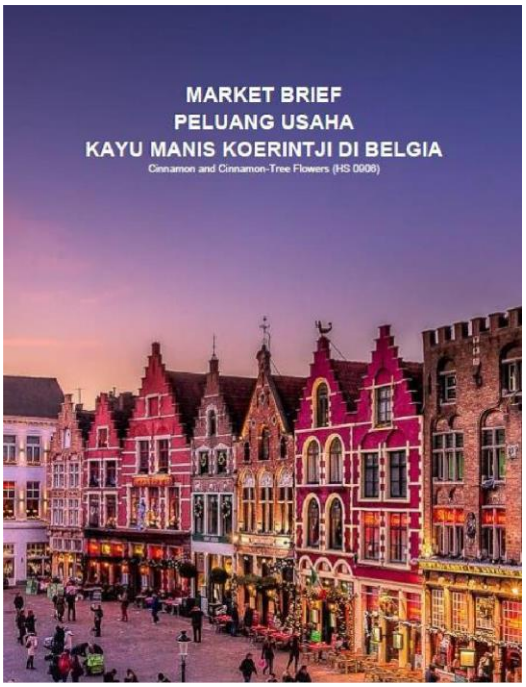
Figure Appendix 5. Workshop in Kerinci with relevant stakeholders.

The participants followed the problems solving process using the “business model canvas.” The researcher taught the methods during the summer course in ITC-ILO on Value-chain Development from Science to Action in Turin 2017.

It was evident from the discussion that most stakeholders were aware of the advantages of sustainable production to gain more trust from buyers that meet their sustainable sourcing criteria of spices. They preferred to be more conscious of the environmental impact that can lead to higher farm-gate prices. The next step was experimenting on the field with the change agents to test the theory of change.

V. Cinnamon handbook for the Belgian market

The ministry of trade Indonesia, in 2018, supported the creation of a brief market handbook.



Belgium offers an excellent opportunity to trade cinnamon from Indonesia. Several downstream industrial companies use this spice as a complement to their products. Meanwhile, many retail market sellers and supermarkets sell in the form of sticks or powder to Belgian consumers. The need for cinnamon as per the growing trend of healthy lifestyles and the image of an eccentric and unique taste. The figure below shows the number of Belgian cinnamon purchases from Indonesia, valued at $ 398,000 in 2017. Cinnamon export value to Belgium has increased consumer interest in using this spice to complement dishes. The following table shows the import value of Korintji cinnamon commodities to Belgium from 2010 – 2017.

Table Appendix 1. Cinnamon commodities import value, Belgium from Indonesia

Period	Trade Flow	Reporter	Partner	Code	Trade Value	NetWeight (kg)	Quantity Unit	Trade Quantity
2017	Import	Belgium	Indonesia	906	$398,319	327,257	8	327,257
2016	Import	Belgium	Indonesia	906	$300,873	162,953	8	162,953
2015	Import	Belgium	Indonesia	906	$190,394	102,022	8	102,022
2014	Import	Belgium	Indonesia	906	$157,166	82,432	8	82,432
2013	Import	Belgium	Indonesia	906	$91,754	63,230	8	63,230
2012	Import	Belgium	Indonesia	906	$415,988	270,783	8	270,783
2011	Import	Belgium	Indonesia	906	$493,405	308,989	8	308,989
2010	Import	Belgium	Indonesia	906	$476,303	329,559	8	329,559
2009	Import	Belgium	Indonesia	906	$297,927	290,724	8	290,724
2008	Import	Belgium	Indonesia	906	$746,335	603,115	8	603,115
2007	Import	Belgium	Indonesia	906	$267,737	306,158	8	306,158

VI. Communicating the Impact of science communication approaches

One of the suggestions from the research team is to create social media as a communication channel, as thousands of cinnamon harvesters have been in the sector and need to be educated. Another interdisciplinary approach was taken for the AR on communication strategies in the model of science communication (SC). SC has become an impressive tool for engagement.

The first phase of SC is to create a social media platform for Indonesian cinnamon. Social media such as Twitter and Facebook are new communication tools for rural communities, enabling the creation of rural social networks. Increased use by harvesters of 'mobile digital devices and better rural access to broadband services has been enhanced so that SM is being used to support farming decisions and practice of informing and inspiring the public about scientific knowledge. For direct communication, we created the WhatsApp group.

Figure Appendix 6. WhatsApp groups of Indonesian cinnamon.

This communication channel was the perfect engagement among producers and growers around Indonesia. The unique experience and harvesting method were shared among peers, creating an opportunity for changes. The impact of scientific knowledge of value-chain opportunities has been an opportunity to create a monthly talk show called CinnamonTalk.

Figure Appendix 7. Cinnamon talk series.

The topic presented by invited speakers was not directly to cinnamon but relevant to the opportunity for Indonesian spices to be accepted in the global market. The most suitable furthermore is to share the science through Science Figured Out, a project collaboration between SciMigo and Ghent University, as can be accessed here: https://www.sciencefiguredout.be/story-cinnamon.

VII. Forum discussions and Gatherings Engagement Activities

To share the AR approach and involve broader stakeholders in the VC of the cinnamon sector, the Research team-initiated forum discussions and gathering across Indonesia.

The mission statement of the activities was to exercise the findings and receive insights towards creating a System Operating Procedure Handbook of Harvesting and a tailor-made certificate (standard).

Regional Seminar (Kerinci), October 2018

International Forum of Indonesian Cinnamon (InFIC), Jakarta, October

Cinnamon Syphosium (Kerinci), January 2019

Cinnamon Conference (Manado), January 2019

Cinnamon in Social forestry, (Banjarmasin), October 2019

Cinnamon Science Forum, (Ghent) November 2019

Figure Appendix 8. Forum discussions and Gatherings Engagement Activities.

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