Opportunities for Sustainable commercial White Charcoal production in Laos:

RESEARCH FINDING


PTT Consultation meeting, June 26th 2018

NAFRI

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Contents

1. Introduction

Potential Wood

- Mai-tiew

Burning in Kiln

- Raising temp. up to 1000 dc
- Pulled out, then covered by powder to cool

White Charcoal

- Hardness
- Calorific value
- Flammability
- Carbon, Hydrogen, Oxygen

- In Japan and Korea, many restaurants are prefer using white charcoal with the demand has increased rapidly over the past few years (Vientiane times, 2014).
- The Japanese market demand reaches 2,400 tons per year while the Korean market asks for 500 tons per year (Vientiane Times, 8 June 2016)

1. Introduction (cont.)

In the Lao PDR, WCP started in 2004 and has been growing steadily due in relation with this brisk demand from Japan and Korea;

In 2015, 65 firms produced white charcoal throughout Laos (Barney, 2016).

In 2016, exports reached over 11,156 tons with a total value of US$ 2,403,000 (US$0.22/Kg) (MoIE, 2018).

Mai Tiew is the main raw material used which harvested in forests or planted. Fast growing tree that easy self-regenerates

MAF approves yearly harvesting quotas of around 40,000 m^3 for Central and Southern provinces

a constant decline in the number of trees has been noticed in natural forests due to poor harvesting practices.

Mai Tiew plantations remains low, due to lack of technical guidelines, land zoning and allocation

1. Introduction (cont.)

- The main challenge for the sector is therefore to be able to supply a brisk and remunerative market, while ensuring a sustainable management of *Mai Tiew;*
- It matches the government's priority to encourage the sustainable utilization of local resources for commercial production in order to tackle poverty in rural areas (MAF, 2015);
- a goal might be achieved by implementing appropriate *Mai Tiew* harvesting rotations, and by expanding the number and area of *Mai Tiew* plantations through a participatory extension system

2. Research Objectives

The general objective of this research is to identify factors of sustainable commercial white charcoal production in Laos in order to provide policy recommendations to improve the white charcoal sector.

The specific research objectives are as follows:

- To understand the characteristic of all white charcoal production stakeholders which relating to three main issues: Production system, Marketing and Institutional environment.
- To examine and investigate the relationship between raw material suppliers, white charcoal producers with their supply and demand of the niche market.
- To describe and analyze harvesting practices of *Mai Tew* for charcoal production;
- To formulate a set of policy recommendations for further consideration by the government for sustainable white charcoal production.

3 Research questions

There are three key areas of research, which are categorized as follows:

<u>a/ Production system</u>

- How do villagers/factories find *Mai Tew*? On what type of land (individual land, community land, etc.)? Is this managed by the village/district? Are there any land issues related to the harvest of *Mai Tiew*?
- What are the current harvesting practices for *Mai Tew*? Are there any differences in harvesting practices (between provinces, between companies and farmers/villagers)?
- Are there standard requirements for harvesting Mai Tew? Are there any good harvesting practice? Suggestions for further consideration on the sustainable harvest of Mai Tew?
- How about the *Mai Tiew* resource have been harvesting and supplying for white charcoal over the past ten years?
- How does farmer earn income from harvesting/growing Mai Tiew; share of this activity in the total household income; intra-household division of labor for this activity?
- What is the best practice of Mai Tiew growing/harvesting?

b/ Marketing

- What is the current situation of white charcoal production in Vientiane and Bolikhamxay provinces?: number of people, traders, companies and workers involved in harvesting, trading and processing; incomes generated at various levels; volumes harvested, produced and exported; types of processing and value-adding opportunities;
- What is the market for white charcoal? Who are the main users? Where is white charcoal exported? Through which channels? How is it organized? Current prices for Mai Tiew and white charcoal;
- How is Organization of trade (map);
- Why are nationality of the investors invest in white charcoal production?
- How do the companies operate their white charcoal business? What is the process to obtain a business license and a quota for *Mai Tew*?
- Where do the companies source the *Mai Tew* from? Do they have a contract with the villagers/farmers? How do the companies determine the price of white charcoal/*Mai Tew*?
- What are the costs, benefits and profits for the company?
- Are there any production standards or market requirement for white charcoal?

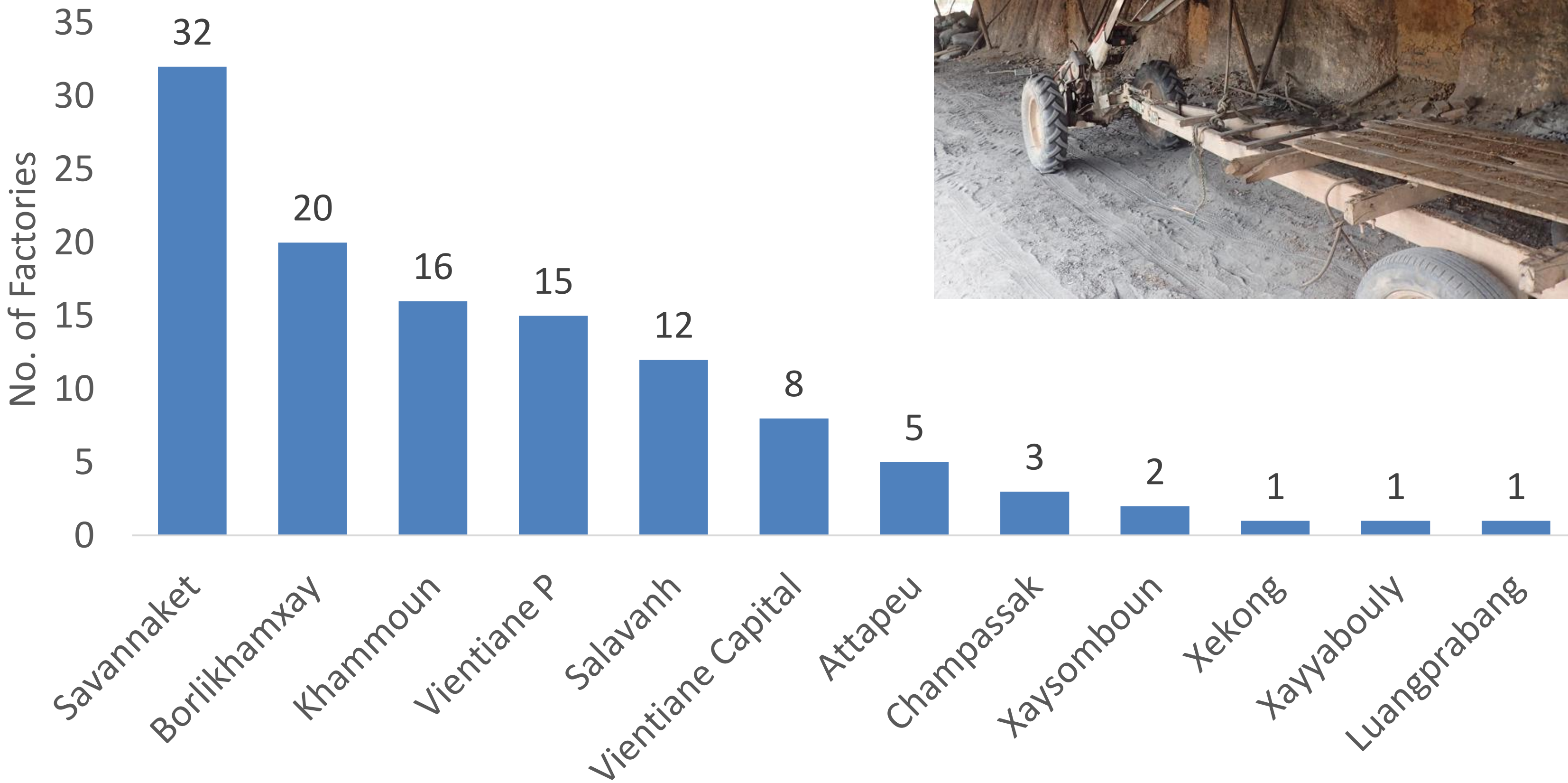
<u>c/ Institutional Environment</u>

- What are the roles and responsibilities for central, provincial, district and village authorities; business license approval process and requirements for white charcoal production; quota allocation process for *Mai Tiew*.
- What are the roles and responsibilities of the traders (collecting, storing, transporting, etc.)

4. Literature review

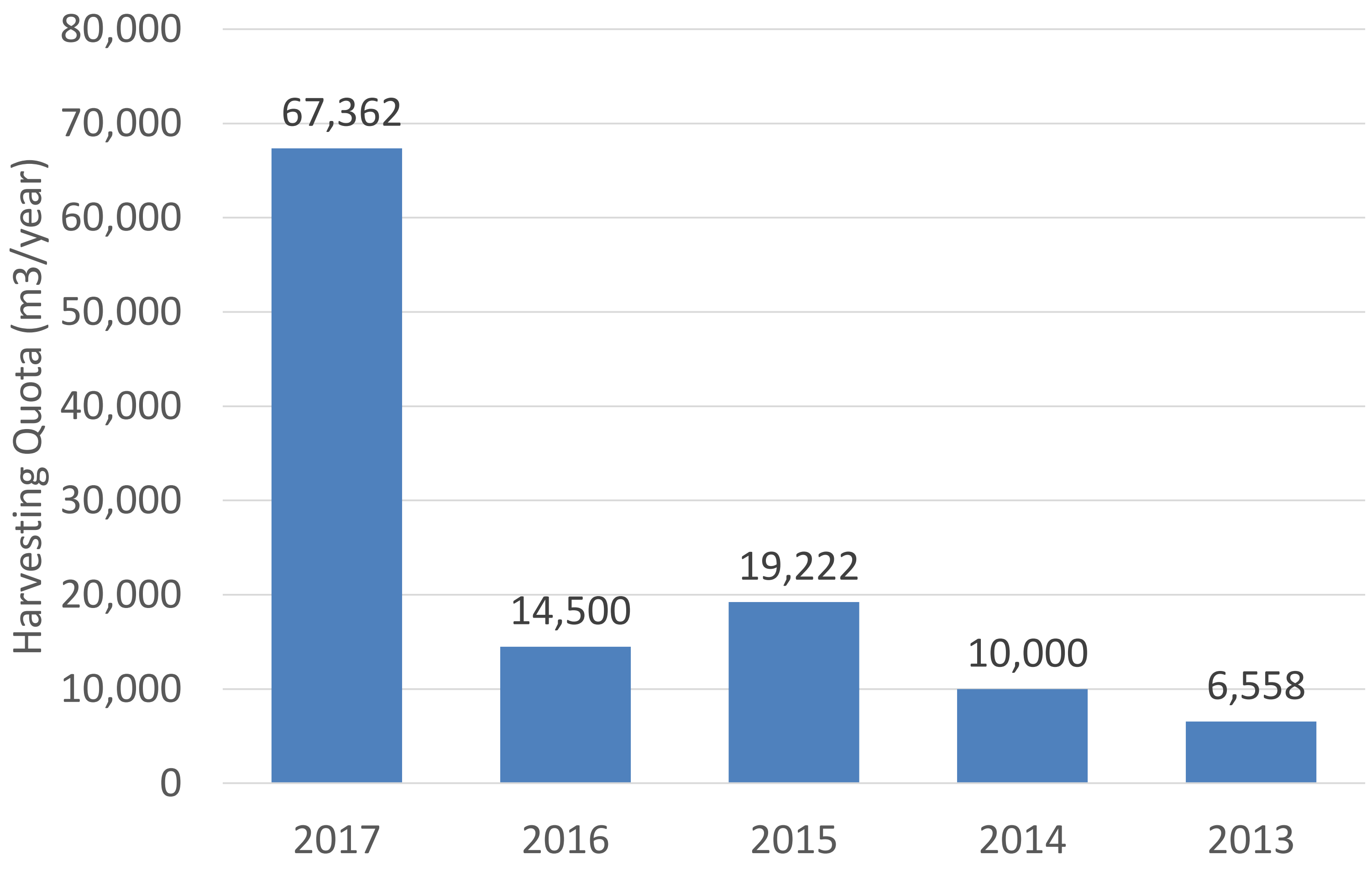
4.1 White Charcoal production in Laos

A. Entrepreneurs



Source: DoF, 2018

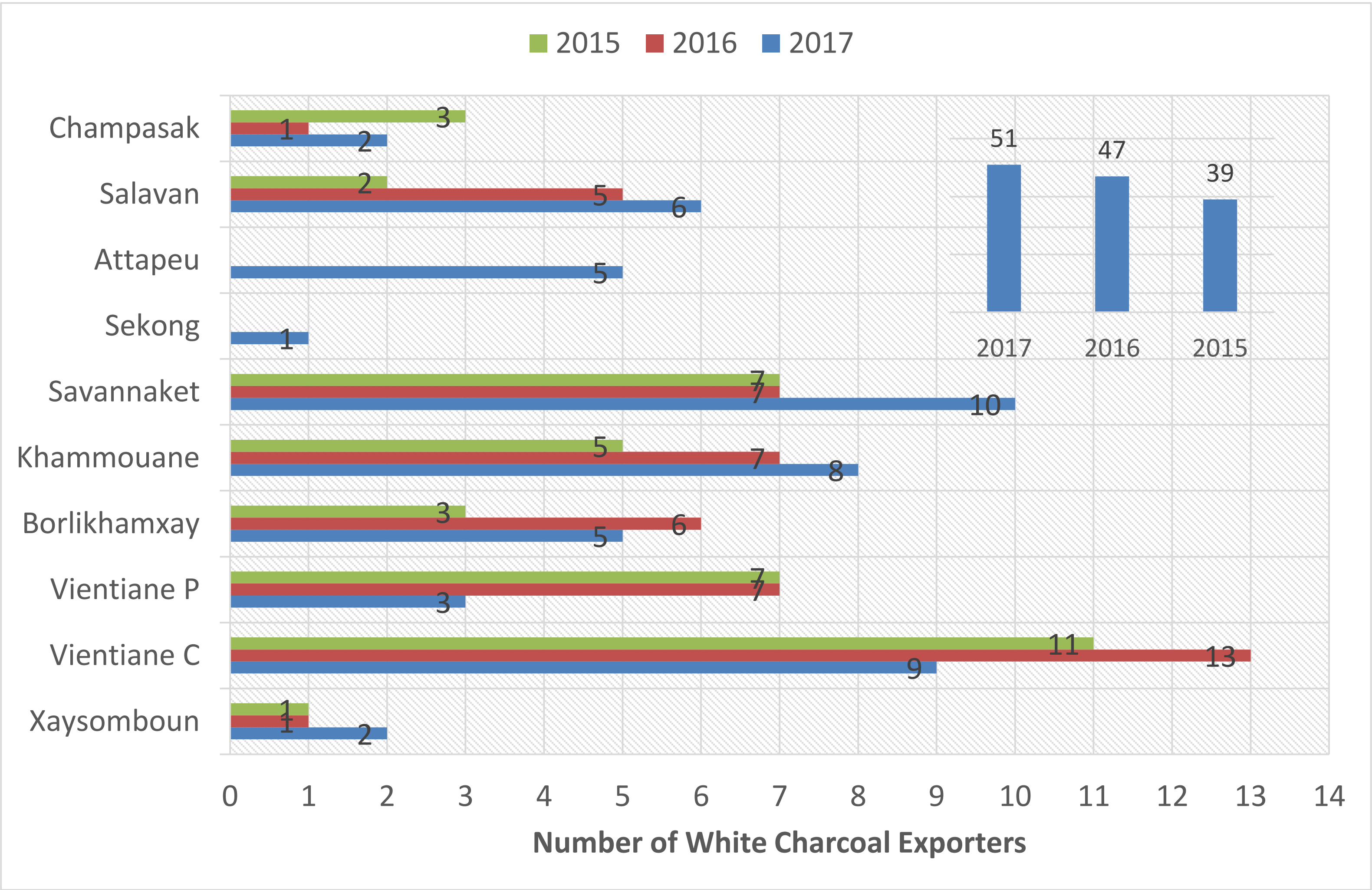
B. Mai Tiew Harvesting Quota



Source: DoF, 2018

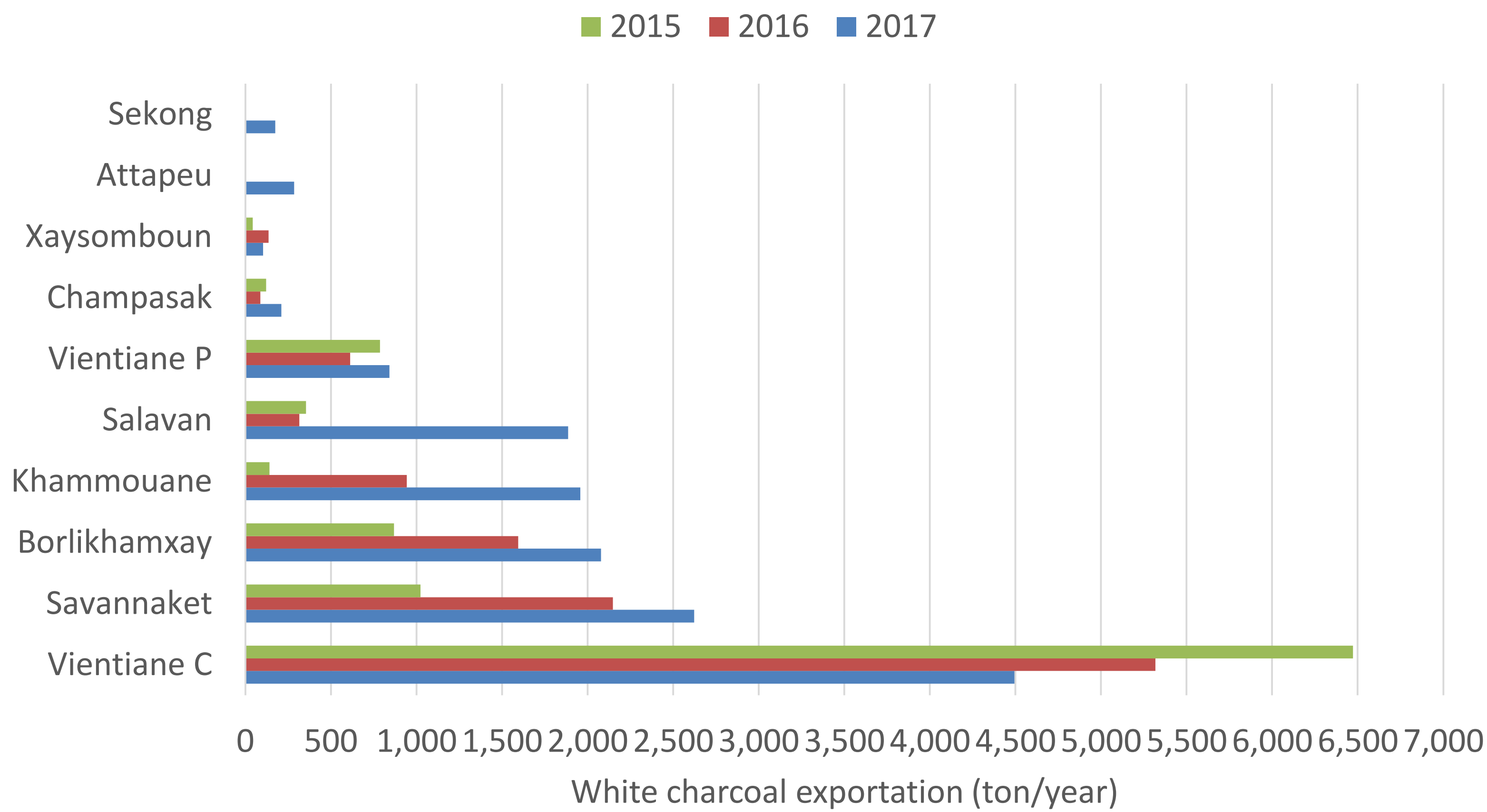
4.2 White charcoal marketing

4.2.1 Producers related Exportation



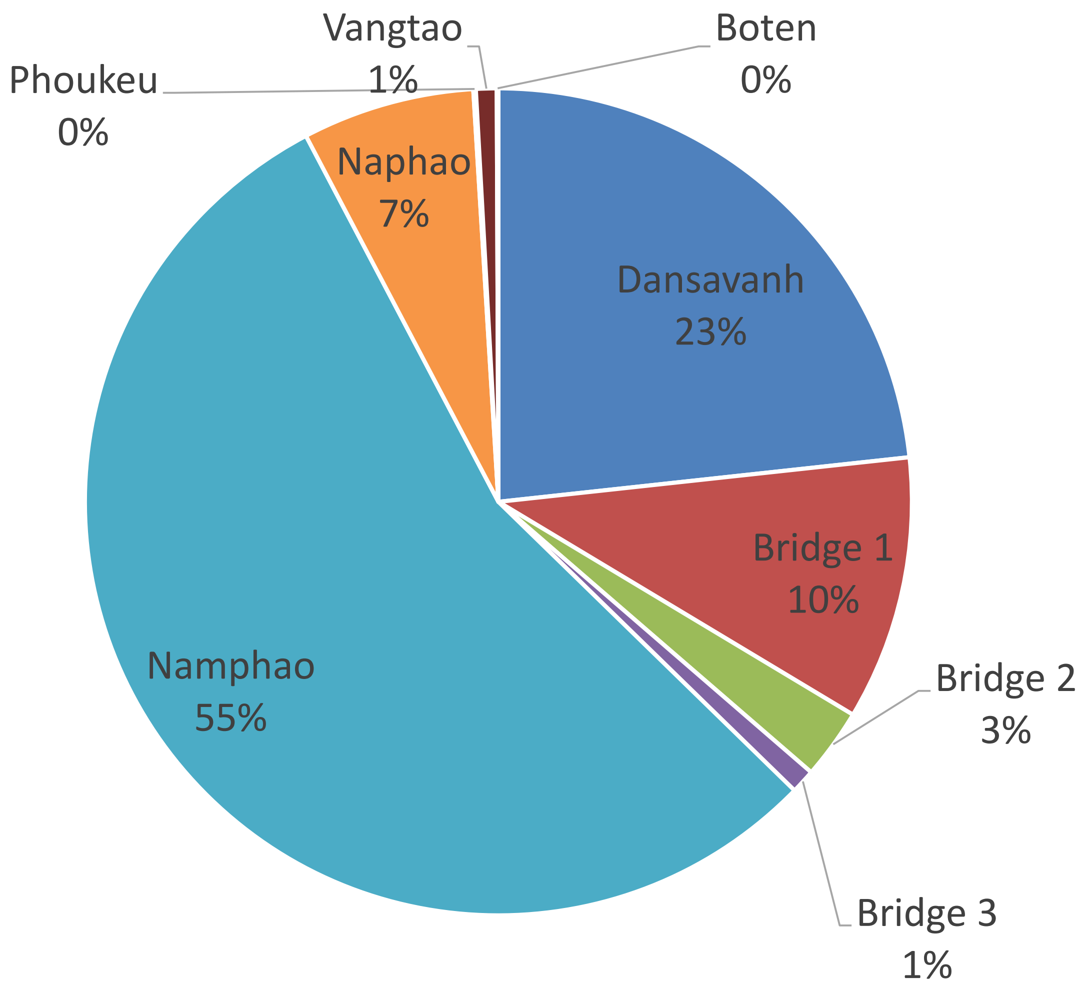
Source: DoIE (MoIC), 2018

4.2.2 Exportation of Lao White Charcoal



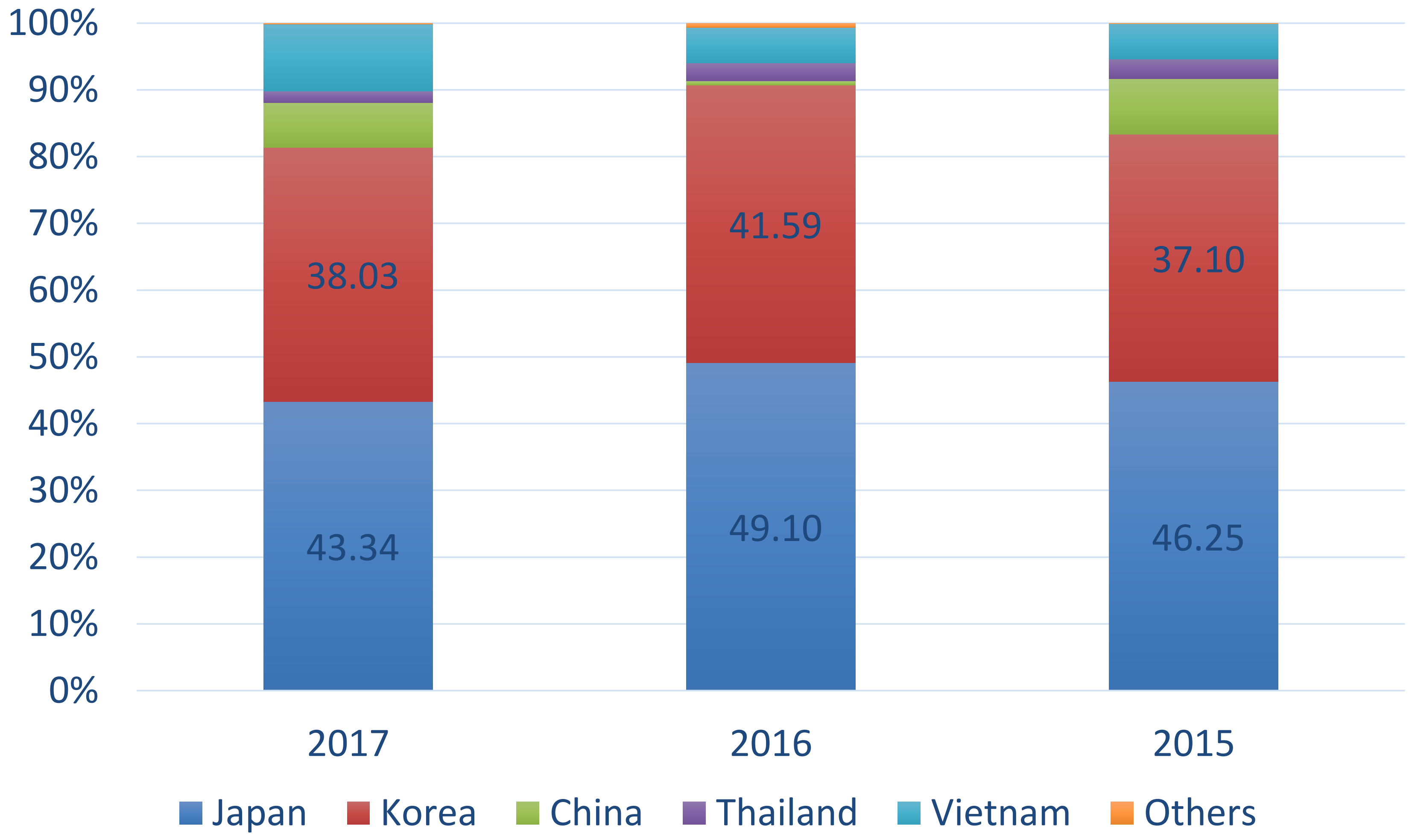
Source: DoIE (MoIC), 2018

4.2.3 Exportation related customs checkpoints



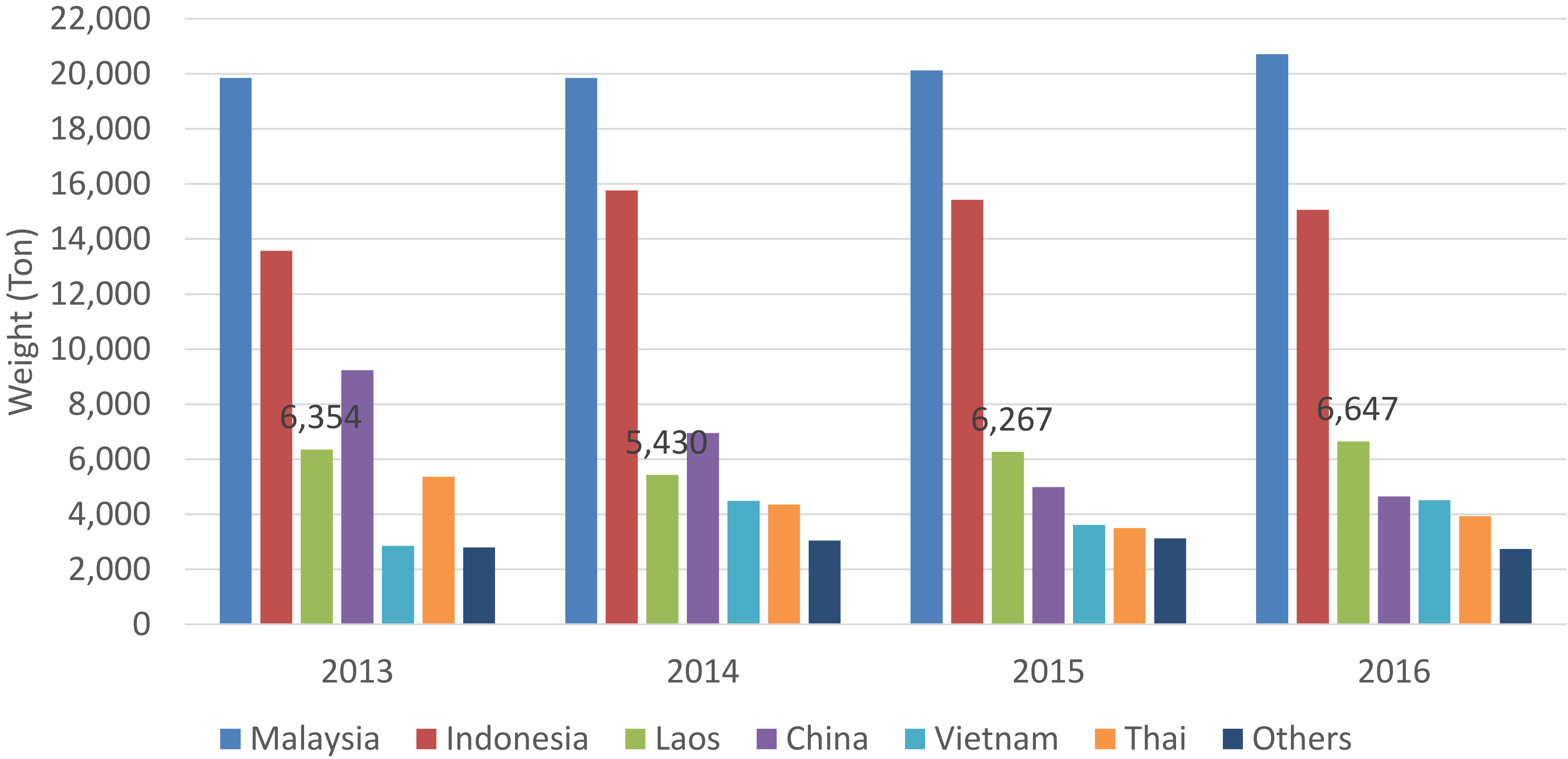
Source: DoIE (MoIC), 2018

4.2.4 Lao White Charcoal Market



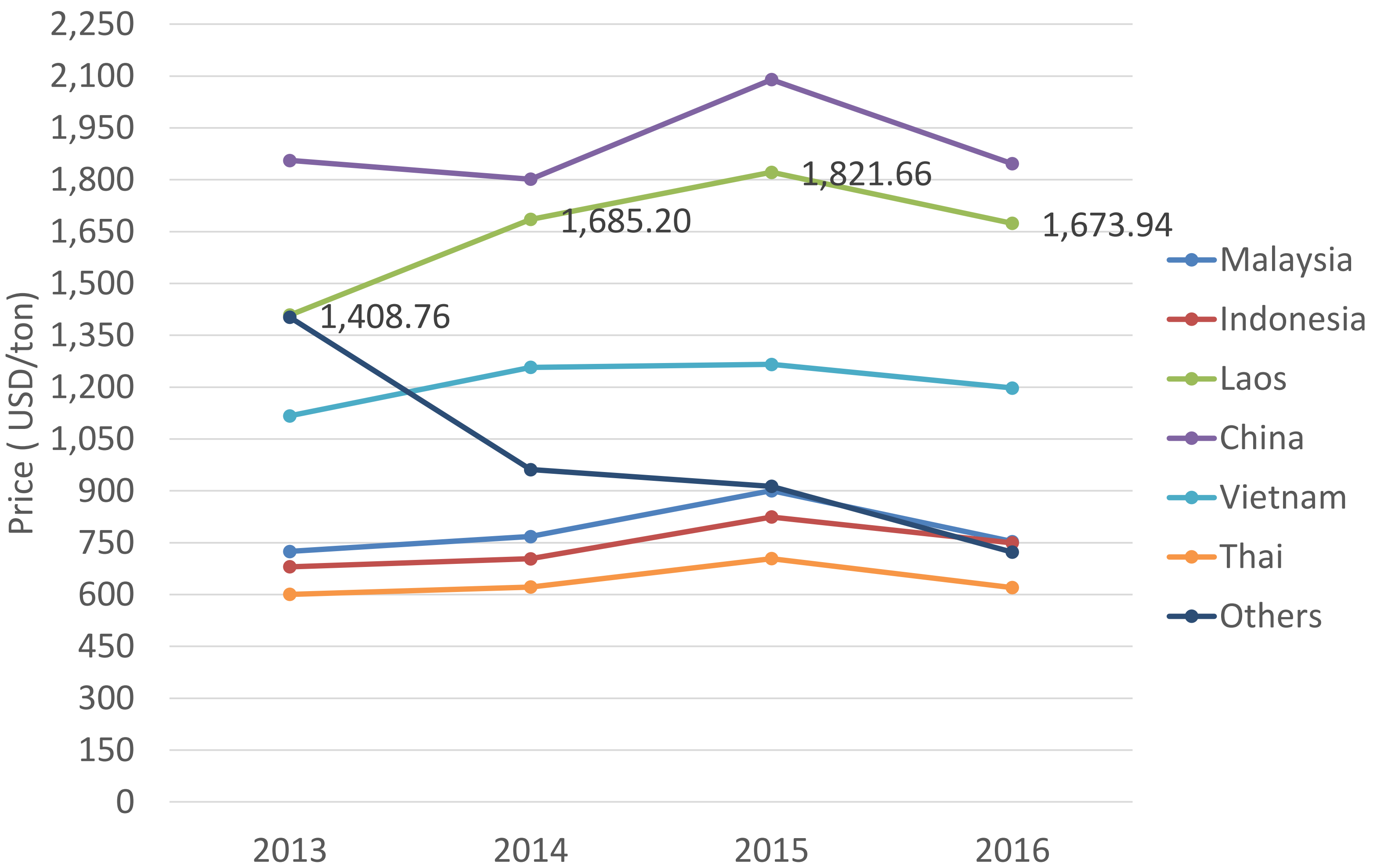
Source: DoIE (MoIC), 2018

4.2.5 Japan Import the White Charcoal Product



Source: Japanese Customs Office, 2017.

4.2.6 Import Price of white charcoal product in Japan



4.3 Government Policy related white charcoal production

1. Forestry law, No. 06/NA; Date 24 Dec. 2007

   Section 4: Forest Utilization
   Article 43: Utilize wood for construction poles and energy shall be undertaken only in the state permit areas and in only the areas of clearance for production activities.
   Article 48: Felling of planted tree; felling and transportation of planted tree for commercial purpose shall be report the timber's volume, weight to Village Forestry Unit except high value tree such prohibit tree have to request approval from PAFO which relating to requirement letter of DAFO.

2. Prime Minister's Ordinance No. 15/PM; Date 13th May 2016

   Clause 8th: Allow tree logging for energy purpose (construction poles, fuelwood, tree charcoal) where forest have a good management which local authorities has classified and allocated as an individual area of farmer and village, and in infrastructure area only.

4.3 Government Policy related white charcoal production (cont.)

3. Mininster of MAF No. 0050/MAF; Date 18 Sep. 2017. Advisory on Maitiew logging and Transportation

Clause 2: Mai Tiew harvesting and Transportation;

- PAFO shall be collaborated with relevant stakeholders to conducting the Mai Tiew inventory and register plantation or certified natural Mai Tiew area of village, enterprise, individual area of farmer, is to use as basic data for verifying the transportation and Original of Mai Tiew.
- PAFO shall be motivated and promoted local farmer to set up the association of Mai Tiew Plantation and Rehabilitation for White charcoal production.
- Annual Mai Tiew harvesting quota plan, PAFO shall be submitted to DoF before 30 September in every year, is for request approval of government.
- Felling and transportation of Mai Tiew where practiced in registered plantation or rehabilitation. The owner could be harvested all year throughout certification of village forestry unit and village authority.
- Felling and transportation of Mai Tiew were harvested in Village Forest area where out of management would be inspected by DAFO, is to get transportation permit.
- Felling and transportation of Mai Tiew in infrastructure development area and clearance area for agriculture activities have to monitored and certified by Provincial Forestry Office.

Clause 3: Internal and external transportation of White Charcoal product was made from Mai Tiew;

- Internal transportation (District to District), DAFO shall be certified;
- Internal transportation (Province to Province), PAFO shall be certified;
- External transportation (Province to overseas market) shall be certified by Provincial Forestry Office, Industry and Commerce Office and then approved by PAFO.

Clause 4: Measure unit and fee-charge
Mai Tiew volume would be used Cubic meter (m^3) as measuring unit. For collect fee and charge shall be used currently version of Ordinances of the Laos’s President.

4. Value Added Tax Law; no. 52, date 23 July 2014

Article 16: Rate of VAT.
Clause 1: it is the rate of 0% of export value of the commodity in finish product.

5. Tax Law; no. 70/NA, date 15 Dec. 2015

Article 29: Profit Tax rate.

Clause 1: 24% of cost profit tax rate is for national and international individual enterprises.

Article 33: the identification lum sum cost profit tax of each component.

Clause A: 3% for component of agricultural and industrial production.

Clause C3: 20% for component of logging and trading of woods, NTFPs and metal.

Clause C4: 5% for logging of tree planting and trading of wood planting.

Article 57. Contractual tax

(-) the revenue not more than 12 million would get an exemption of the tax, the income > 12 – 50 would be paid the absolute tax not more than 600,000 kip/year.

(-) the revenue 50 – 400 million kip/year, the enterprise would practice the direct investment rate of: the revenue between 50 – 120 million kip, the enterprise would pay 4% of the trade tax. The income between > 120 – 240 million kip, the enterprise would pay 5% of the trade customs. The revenue between > 240 – 400 million kip, the enterprise would pay 6% of the trade tax.

Article 48: Revenue tax rate

Clause 2: Revenue of gross profit is charged: 10%.

Clause 5: Revenue from the business activities is charged: 10%.

Article 74: Penal section

Clause 2: wrongly declare of revenue, not complete tax, the first offending would be repaid back the tax plus the penalty of 20% of the tax.

6. Edict on Natural resource depletion fees; no. 001/President, date 15 Dec. 2015.

Article 6: fee rates for NTFPs

Clause 7: for Charcoal, the fee rate is 20% of export value.
Clause 15: for Mai Tiew, the fee rate is 10% of export value.

7. Edict on List of Goods and Export duty rate; no. 002/President, date 27 Apr. 2012.

Article 2: List of goods and export duty rate
Clause 33: duty rate for export charcoal products, 15%.

8. Edict on Fee and charge; no. 003/President, date 26 Dec. 2012.

Section 1: Finance section
Article 1: issuance of permission: 30,000 kip/time
Article 9: issuance of customs: 30,000 kip/time
Section II: Industry and trade sectors.
Article 13: issuance of goods origin from 40,000 – 100,000 kip.
Article 17: Technical service.
Clause C: certificate on goods origin: 10,000 kip/set
Section VIII: Agriculture and Forestry sector.
Article 41: Customs on issuance of activities on forestry, irrigation and agriculture.
Clause 4: issue of permission on NTFPs activities: 100,000 – 300,000 kip/time
Clause 6: issue of NTFPs shipping: 30,000 kip/time.
Clause 9: issue of sanitation of export plant: 25,000 kip/time
Article 42: Agriculture and forestry service.
Clause 1: issue of sanitation of plant: 15,000 kip/time, inspection of products from natural and planting: 10,000 – 65,000 kip/time
Clause 4: customs for reforestation: it would be paid for 100,000 kip/ton and management 20,000 kip/ton.

9. Borlikhamxy Governor Cabinet Office, Issued an Advisory no. 097, date 27 Mar. 2017

Fee, charge and tax rate for white charcoal products in Borlikhamxay

- Natural resources fee: 6,000 Kip / cubic yard.
- Forest rehabilitation fee: 1,000 Kip / cubic yard.

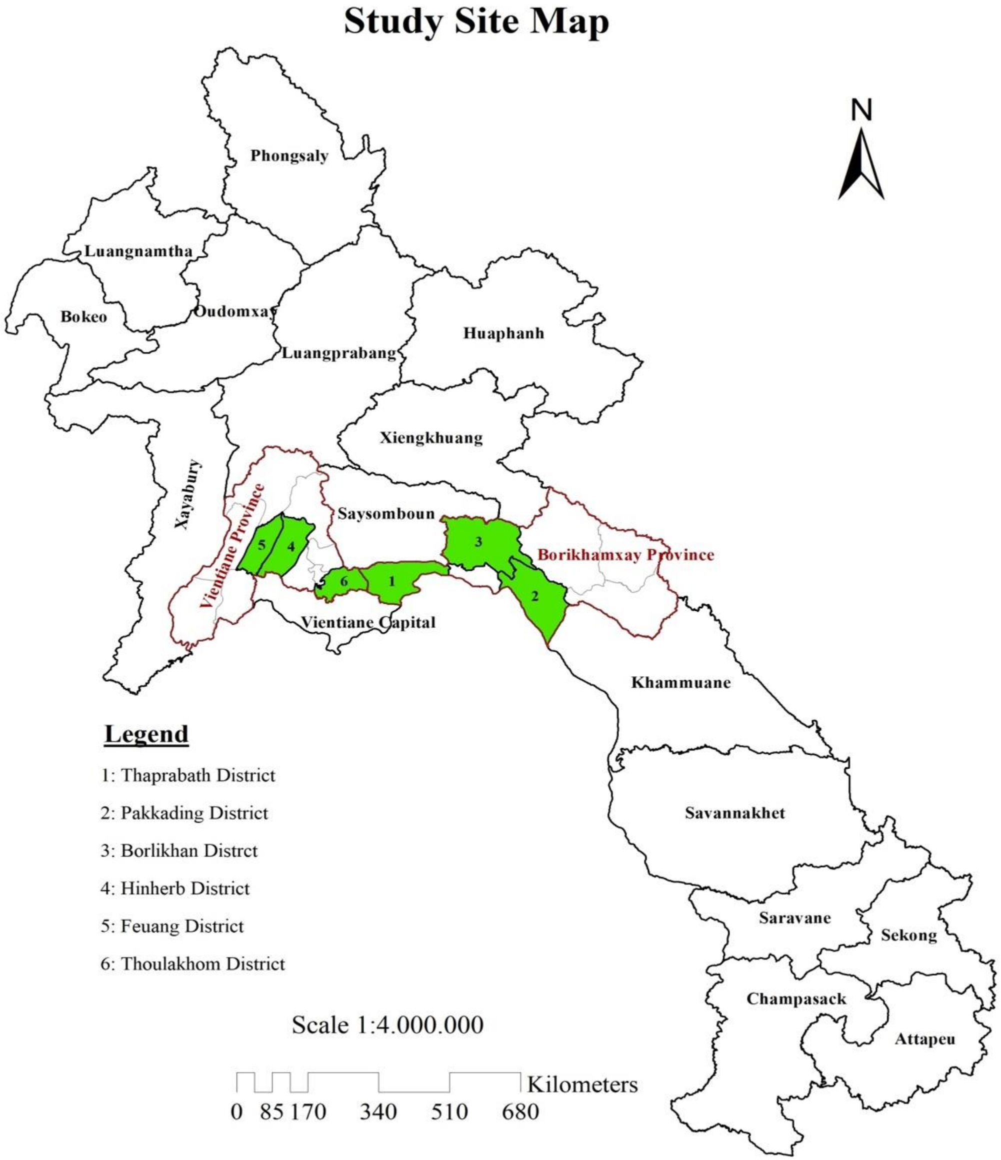
1. Mai Tiew harvesting tax, is for transport to factory;
1.1 VAT: harvesting value or per invoice x 10%
1.2 Profit tax: harvesting value or per invoice x 20% x 24%
1.3 Transportation tax (exemption for factory's vehicle) transport value x 10%

2. Tax on Internal transportation;
2.1 VAT: invoice x 10%
2.2 Profit tax: invoice x 3% x 24%
2.3 Transportation tax (exemption for factory's vehicle) transport value x 10%

3. Tax on External transportation, export to overseas market;
3.1 VAT: invoice x 10%
3.2 Profit tax: invoice x 3% x 24%
3.3 Transportation tax (exemption for factory's vehicle) transport value x 10%

5. Research Methodology

5.1 Study Site



5.2 Target Areas and Sampling

The research team intends to conduct surveys in two provinces on the basis of the number of smallholders and companies operating in province, as follows:

- Government authorities (DOF/MAF, MOIC) for institutional survey): 34 person
- Village heads: 20 people
- Villagers, growers, collectors: 145 people
- Entrepreneurs: 47 people (10 Company Owners, 10 factory managers, 10 specialist, 10 workers and 7 exporters.

5.3 Methods

The research was included the following steps:

- Desk/Literature review: compilation of existing research finding reports, statistical reports and Lao government policies relevant to white charcoal production.
- Qualitative and quantitative interviews: key stakeholders were targeted for interviews to understand the economics of charcoal production as well as the practices and perceptions of growers and collectors concerning the sustainable management of the Mai Tiew resource, etc.
- Field observations: based on the researchers personal and field experience on white charcoal plantation in the Lao PDR.

The main element for queries and data collection consist of three components:

(1) Production system;
(2) Trade and marketing;
(3) Institutional environment

The related stakeholders include:

(1) White charcoal production companies’ owners/manager, factory directors, white charcoal production specialists and workers;
(2) White charcoal export companies;
(3) End user’s representative;
(4) Raw material suppliers/villagers;
(5) Relevant authorities and supporters such as: grass root level (village authority), local level (PAFO/DAFO, PICO/DICO, PFO/DFO) and Central level (MAF and MoIC).

6. Research Finding

6.1 Production system

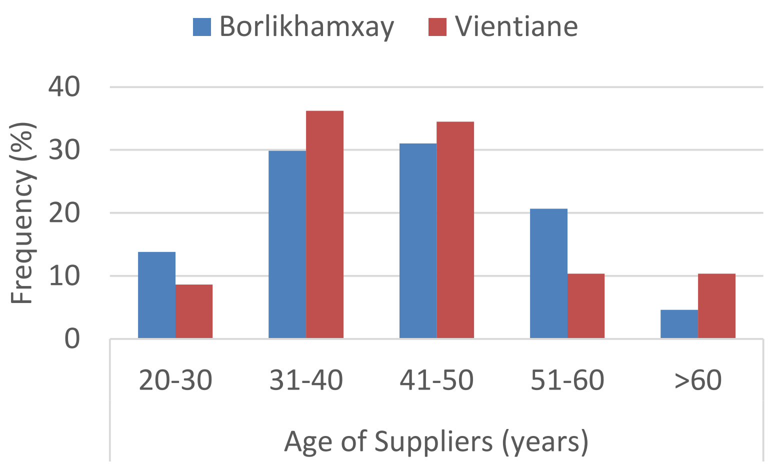
6.1.1 White Charcoal production status in Borlikhamxay and Vientiane province

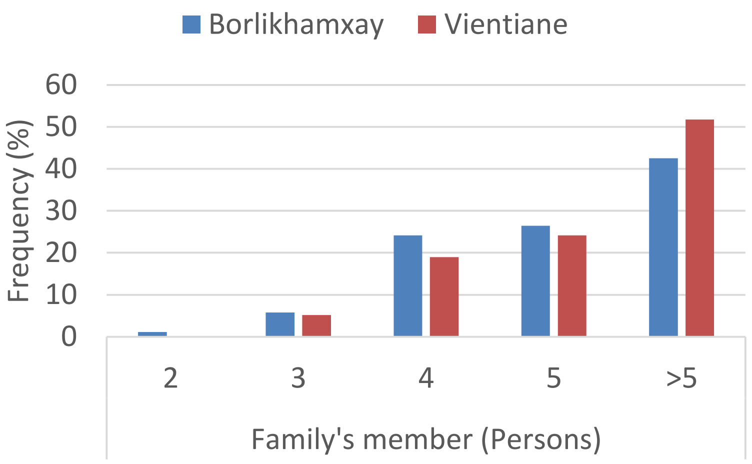
No.	Provinces	Factories			Kilns		
		2013	2017	Changed	2013	2017	Changed
1	Borlikhamxay	23	18	-5*	418	398	-20*
2	Vientiane	16	15	-1*	356	293	-63*
Sum Total		39	33	-6*	774	691	-83*

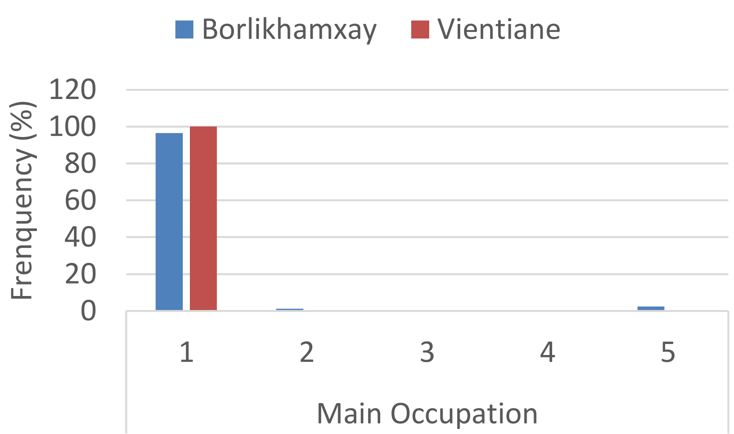
Source: field survey, 2018; DoF, 2018

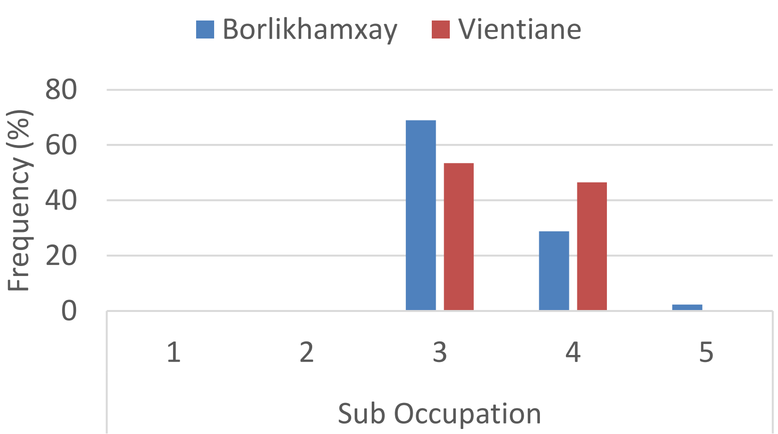
6.1.2 Raw material suppliers

a. Sampling suppliers characteristic





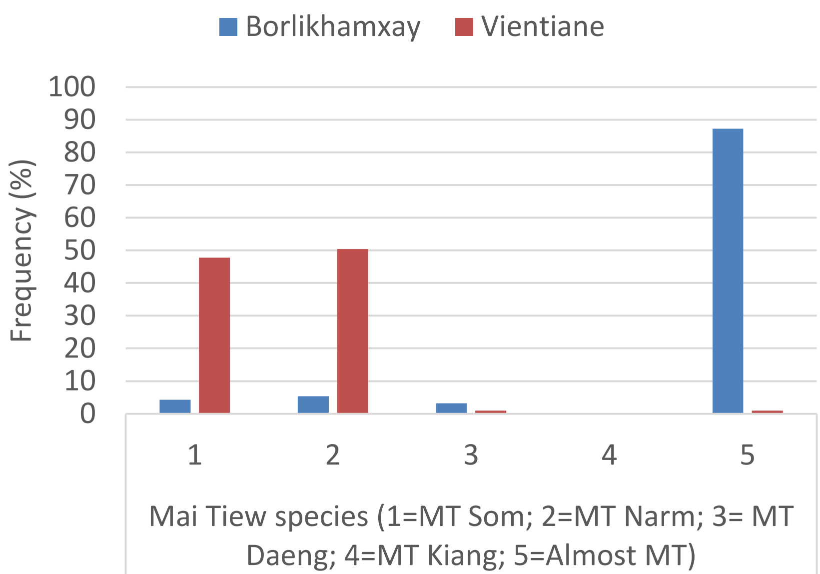


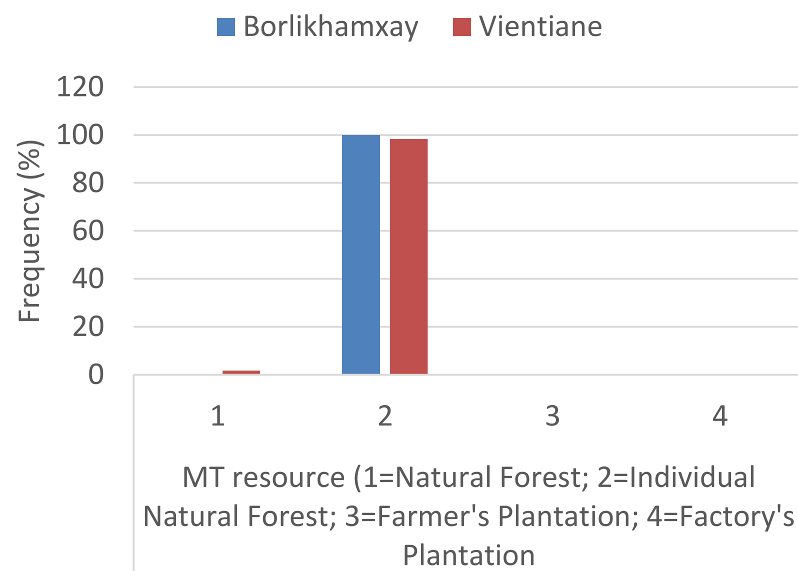


Note: 1=paddy rice; 2=Upland rice; 3=cash crop; 4= livestock; 5=Others.

Source: field survey, 2018

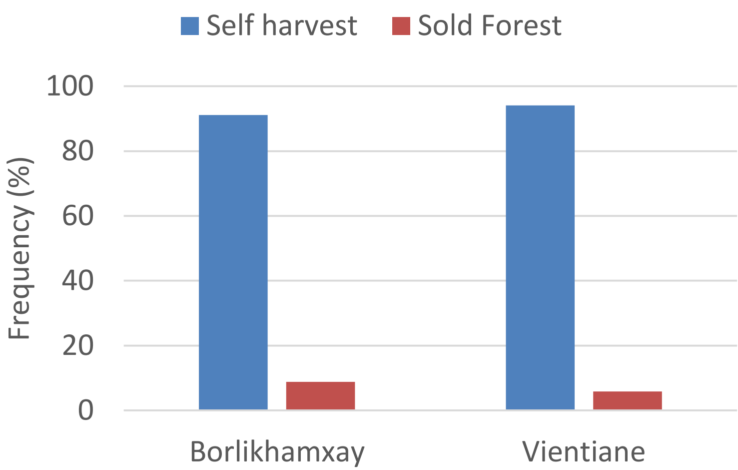
b. Mai Tiew species related resources area

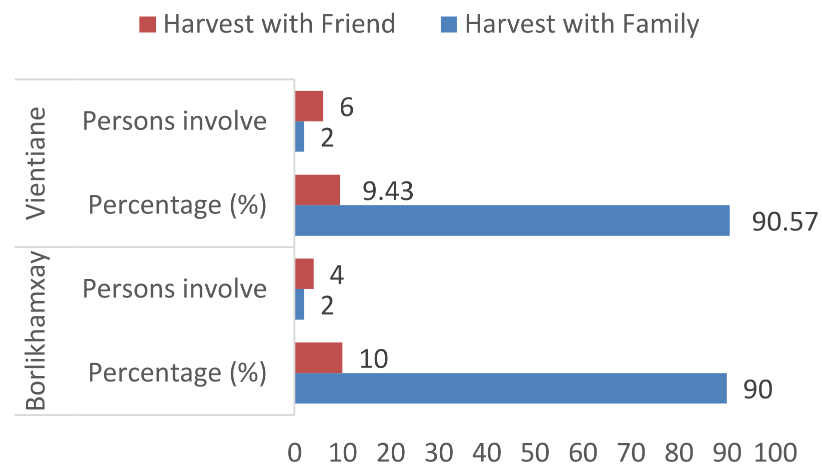


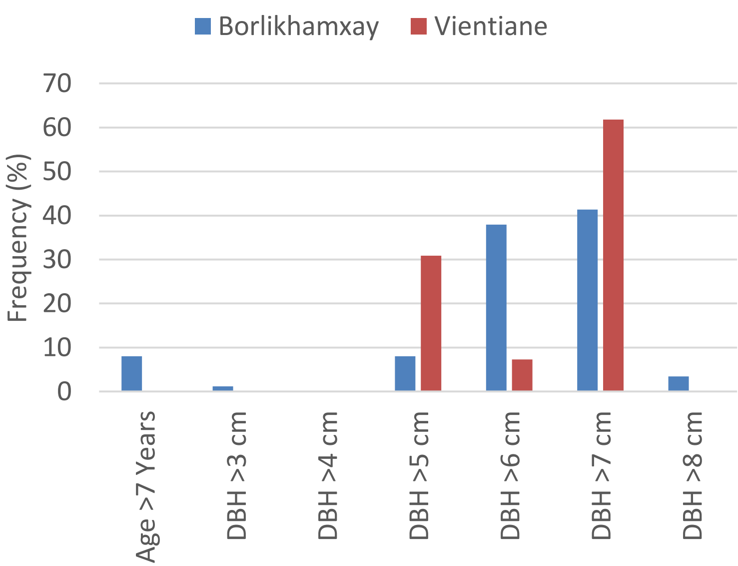


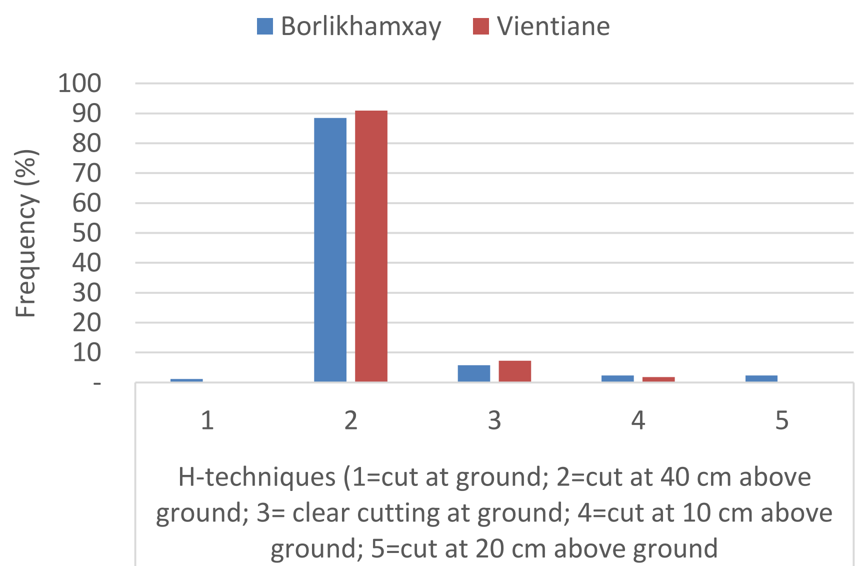
Source: Field survey, 2018.

c. Mai Tiew harvesting practices and supply

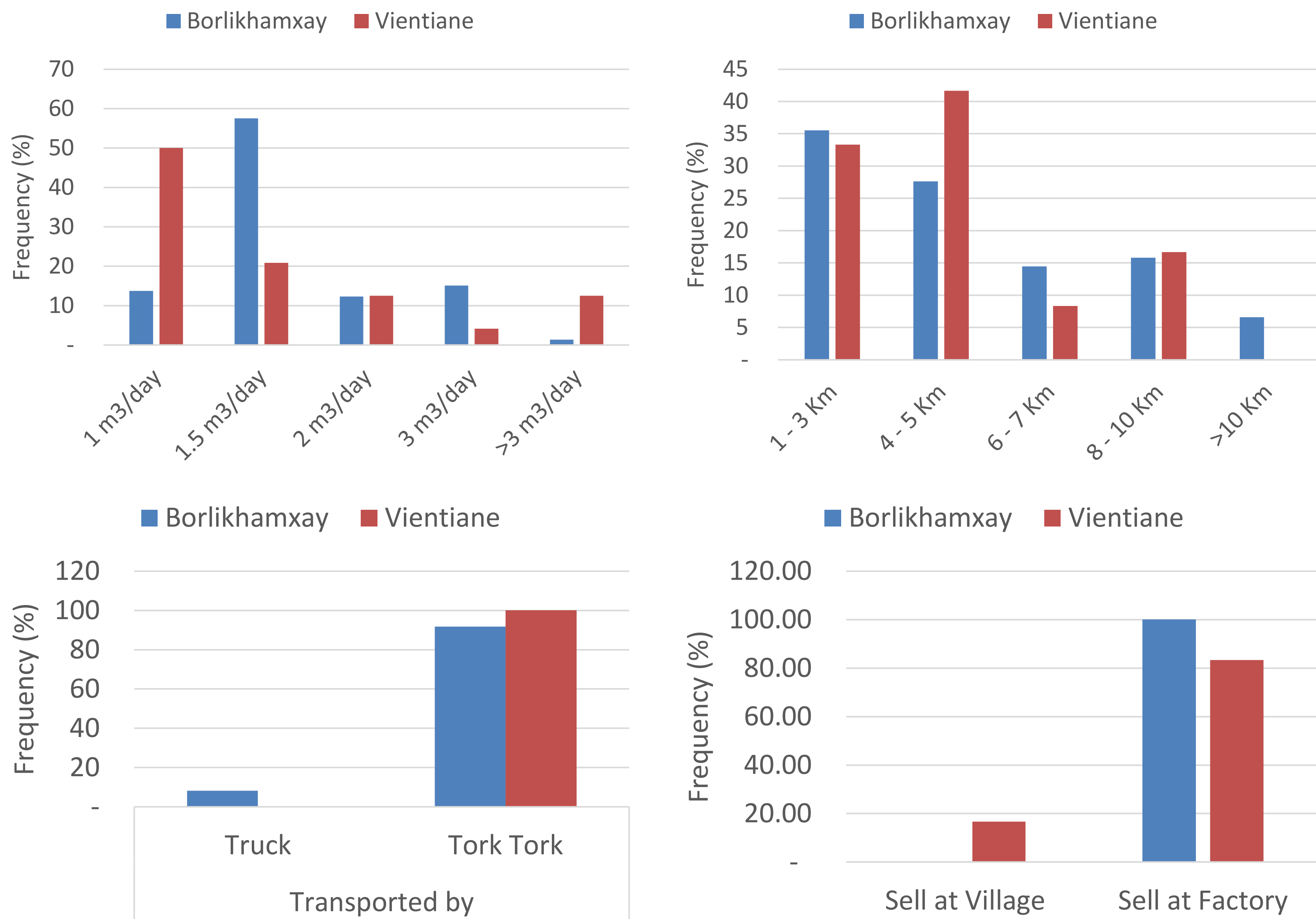






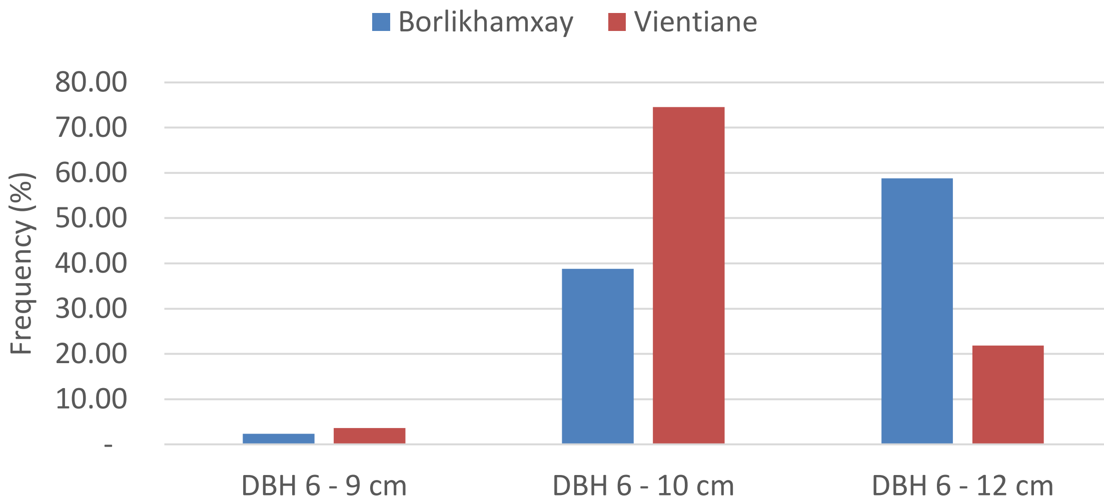


Source: Field survey, 2018.

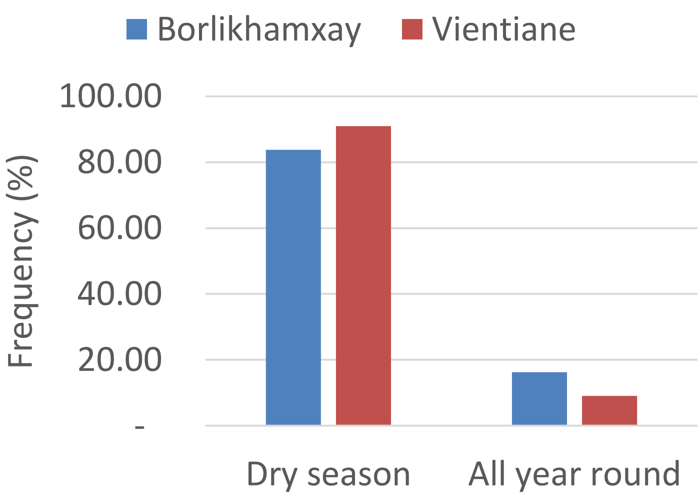


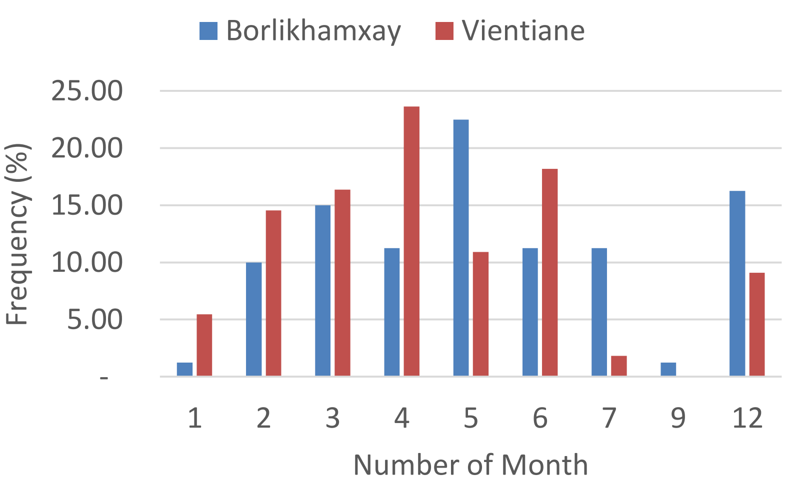
Source: Field survey, 2018.

d. Mai Tiew standard requirement



e. Annual Harvesting Capacity



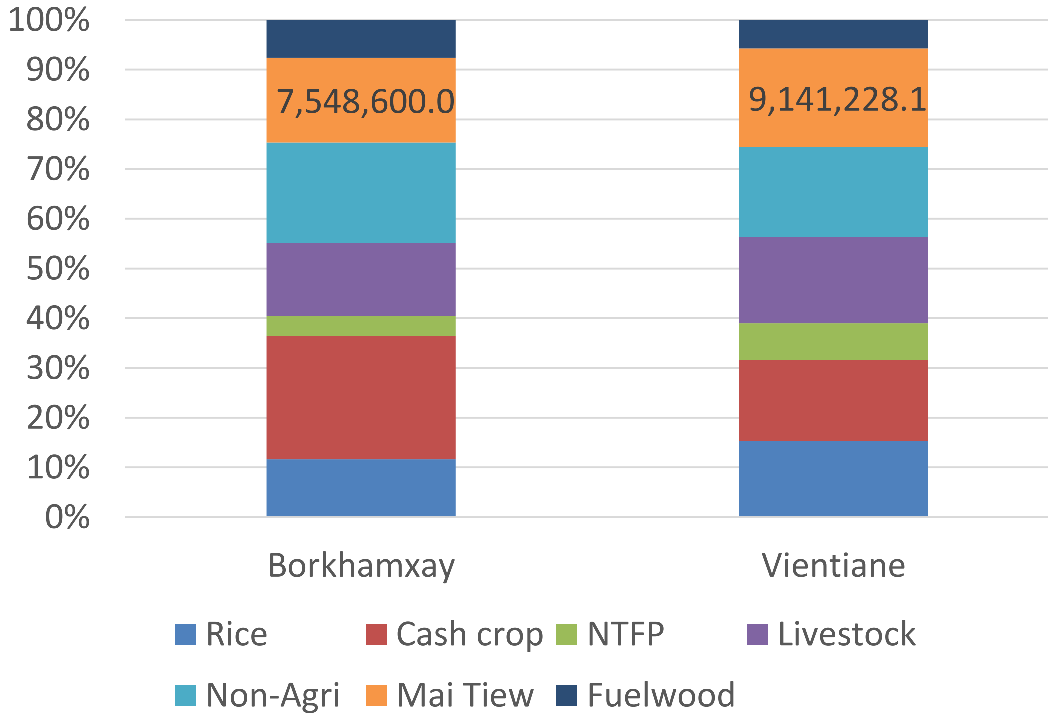


Source: Field survey, 2018.

No.	Provinces	No. of Harvest (time/month)	Volume (m^3/time)	Volume (m^3/year/hh)
1	Borlikhamxay	8.47 (±0.74)	2.18 (±0.18)	102.91 (±12.39)
2	Vientiane	8.21 (±0.90)	3.06 (±0.43)	202.87 (±57.46)
Average		8.34	2.62	152.89

Source: Field survey, 2018.

f. Income generation of farmers



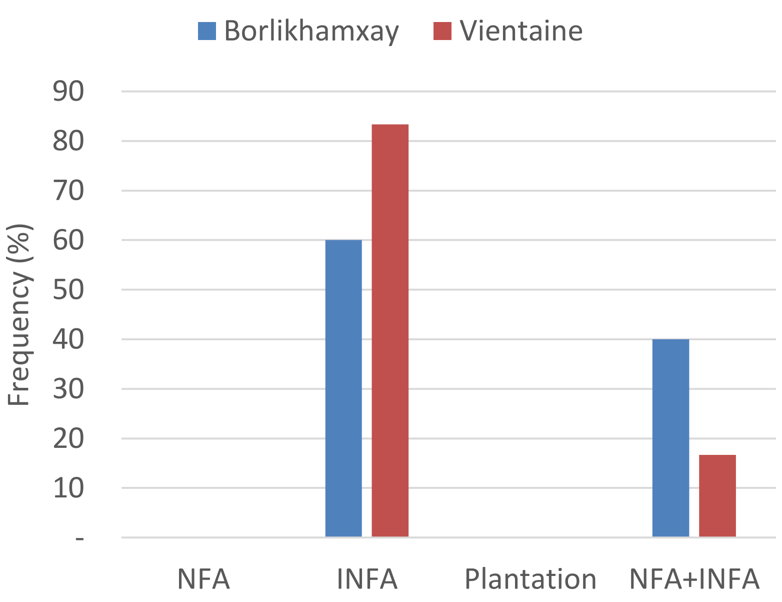
Source: Field survey, 2018.

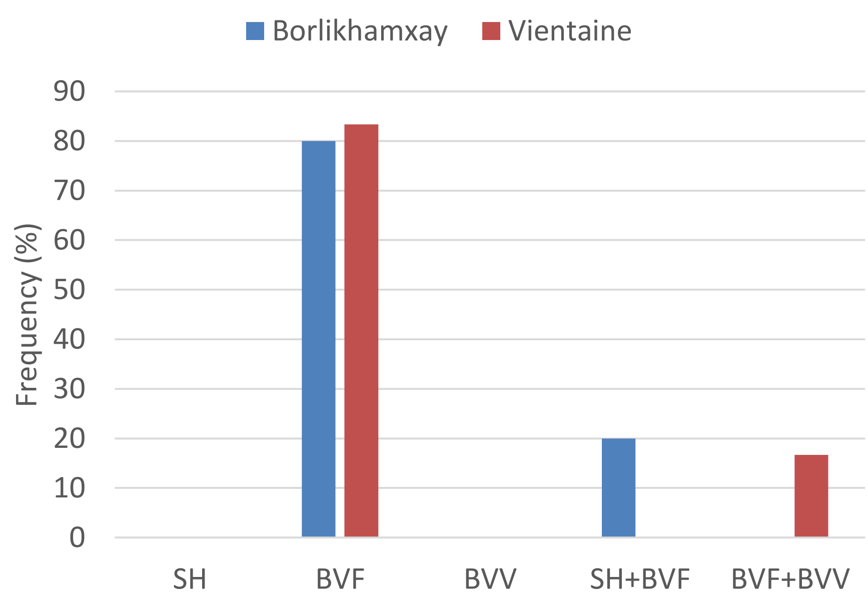
6.1.3 White charcoal producers

a. Raw material requirement related management

No.	Provinces	Mai Tiew (m^3/year)		Fuelwood Mai Tiew (m^3/year)		Changed (%)
		2013	2017	2013	2017	
1	Borlikhamxay	42,636	40,596	11,704	11,144	-4.78
2	Vientaine	36,464	30,011	9,941	8,182	-17.70

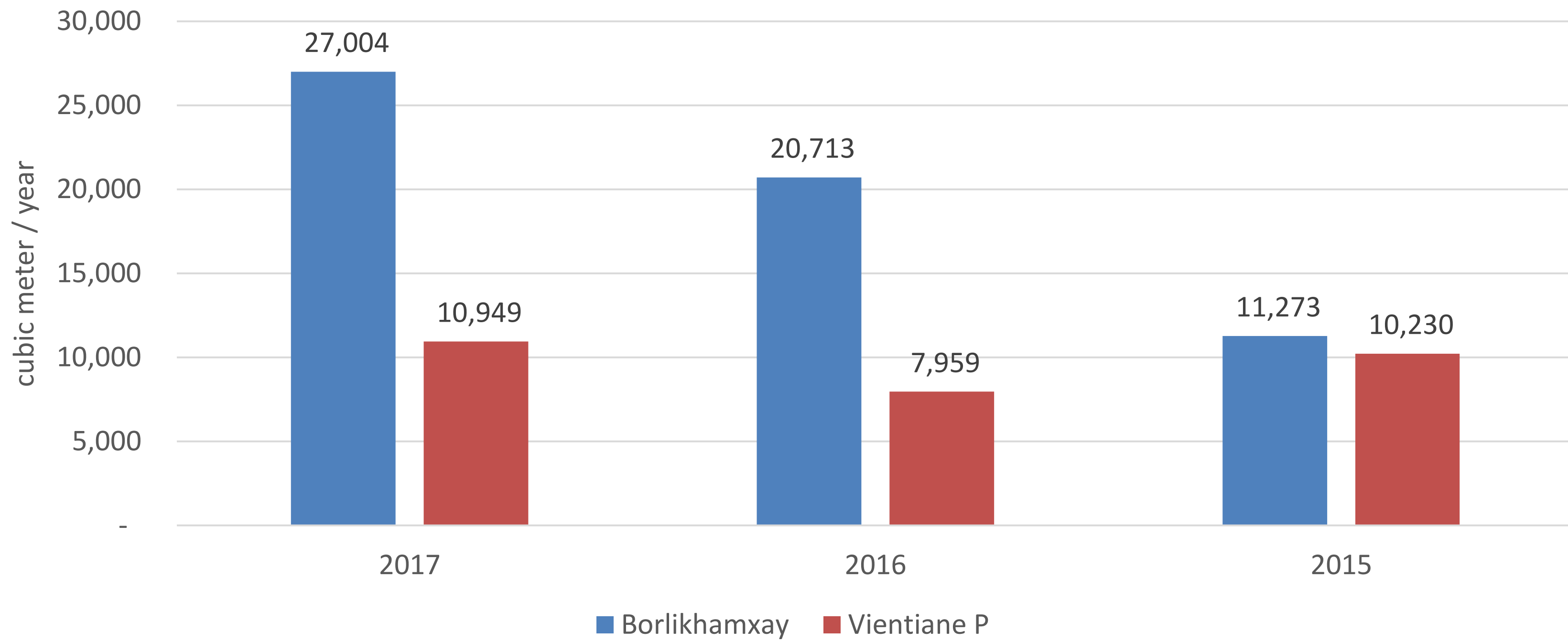
Source: Field survey, 2018.





Note: NFA=Natural Forest Area; INFA=Individual Natural Forest Area; SH= Self-Harvesting; BVF= Buying from Villagers at Factory gate; BVF=Buying from Villagers at Village

b. Mai Tiew utilization for White charcoal production

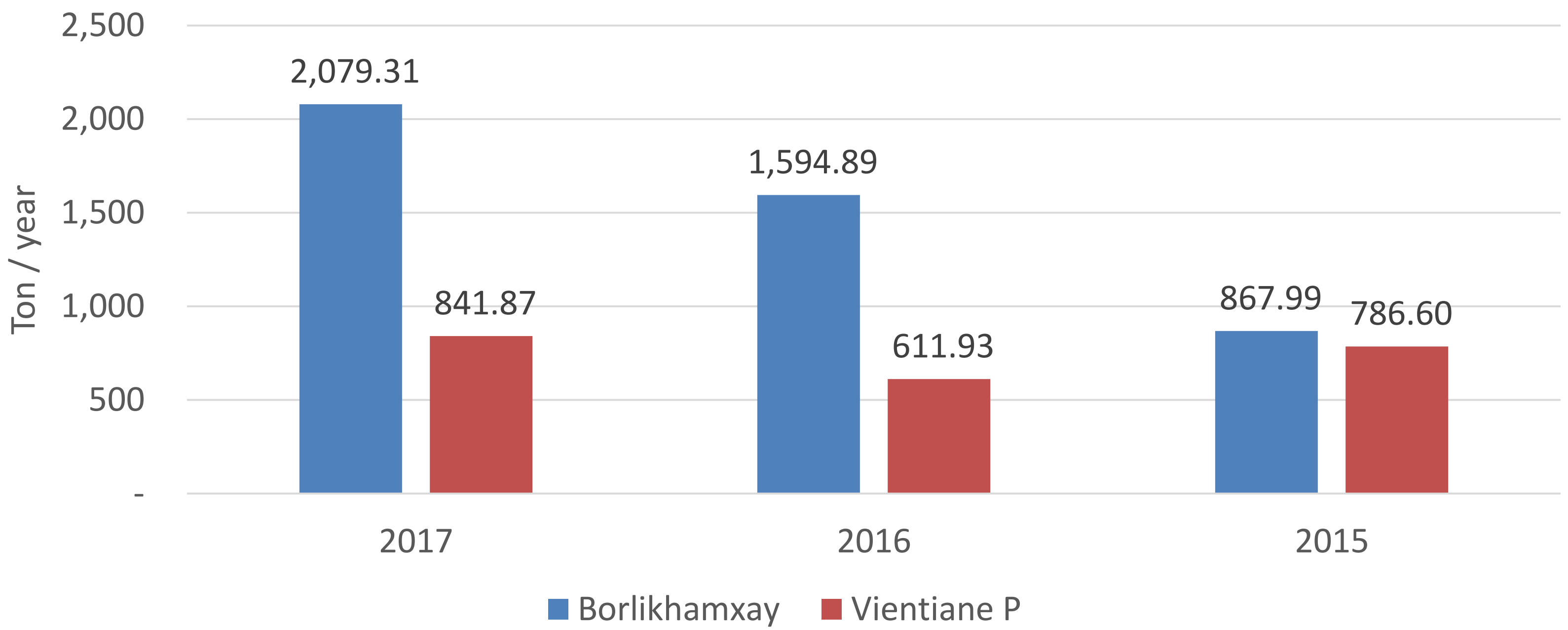


c. White charcoal processing

No.	Province	Kiln performance (time/year)	Kiln Capacity (m^3/kiln)	Fuelwood cons. (m^3/time)	Yield (Kg)
1	Borlikhamxay	10	10	2.8	770
2	Vientiane	11	9	2.50	692
Av.		10.5	9.5	2.65	731

Source: Field survey, 2018.

d. White Charcoal product



Source: Field survey, 2018.

c. Grading, Packing and Storage

No.	Grading classification	Specification (cm)		Weight (Kg)	Packing type	Storage	Market standard
		Length	Diameter				
1	L-5-R	21 - 27	4.5 - 6.0	15	Paper box	Warehouse	Japan
2	L-4-R	21 - 27	3.5 - 4.5	15	Paper box	Warehouse	Japan
3	L-3-R	21 - 27	2.5 - 3.5	15	Paper box	Warehouse	Japan
4	L-2-R	21 - 27	2.0 - 2.5	15	Paper box	Warehouse	Japan
5	L-1.5-R	21 - 27	1.5 - 2.2	15	Paper box	Warehouse	Japan
6	M-5-R	11 - 20	4.5 - 6.0	15	Paper box	Warehouse	Japan
7	M-4-R	11 - 20	3.5 - 4.5	15	Paper box	Warehouse	Japan
8	M-3-R	11 - 20	2.5 - 3.5	15	Paper box	Warehouse	Japan
9	M-2-R	11 - 20	2.0 - 2.5	15	Paper box	Warehouse	Japan
10	M-1.5-R	11 - 20	1.5 - 2.2	15	Paper box	Warehouse	Japan
11	S-4-R	5 - 10	4.0 - 6.0	15	Paper box	Warehouse	Japan
12	S-3-R	5 - 10	2.5 - 4.0	15	Paper box	Warehouse	Japan
13	L-5-C	21 - 27	4.0 - 6.0	15	Paper box	Warehouse	Japan
14	L-3-C	21 - 27	2.0 - 4.0	15	Paper box	Warehouse	Japan
15	M-5-C	11 - 20	4.0 - 6.0	15	Paper box	Warehouse	Japan
16	M-3-C	11 - 20	2.0 - 4.0	15	Paper box	Warehouse	Japan
17	S-5-C	5 - 10	4.0 - 6.0	15	Paper box	Warehouse	Japan
18	S-3-C	5 - 10	2.5 - 4.0	15	Paper box	Warehouse	Japan
19	S-2.5-C	5 - 10	2.5 - 4.0	15	Paper box	Warehouse	Japan
20	SS	3-5	1.4 -4.0	10	Paper box	Warehouse	Korea
21	L	10 - 15	-	10	Paper box	Warehouse	Korea
22	M	5 - 9	-	10	Paper box	Warehouse	Korea
23	S	2 - 4	-	10	Paper box	Warehouse	Korea
24	SS	2	-	10	Paper box	Warehouse	Korea
25	Mixed	-	-	15 - 25	Plastic bag	Warehouse	Exporter

Source: Field survey, 2018; www.eisei.asia

6.3 Trade and Marketing

6.3.1 Producers and Exporters

No.	Provinces	Local producers	Producers/Exporters	Total
1	Borlikhamxay	13	5	18
2	Vientiane	11	3	14
sum total		24	8	32

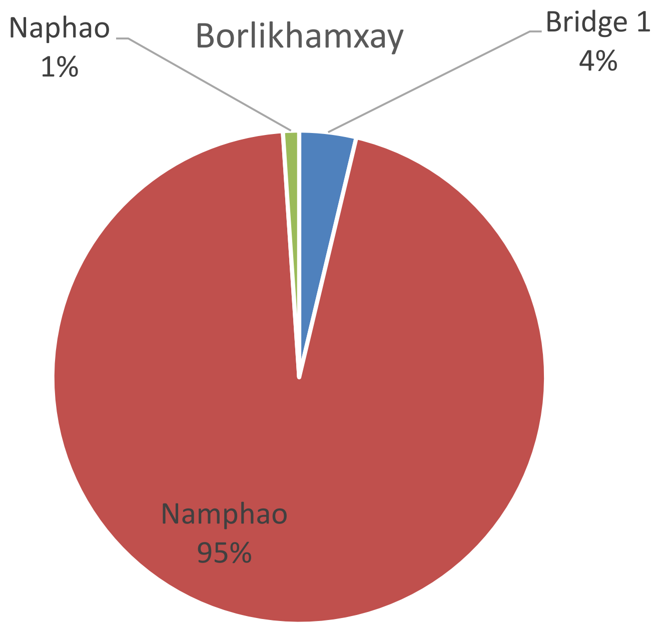
Source: field survey, 2018; DoIE (MoIC), 2018.

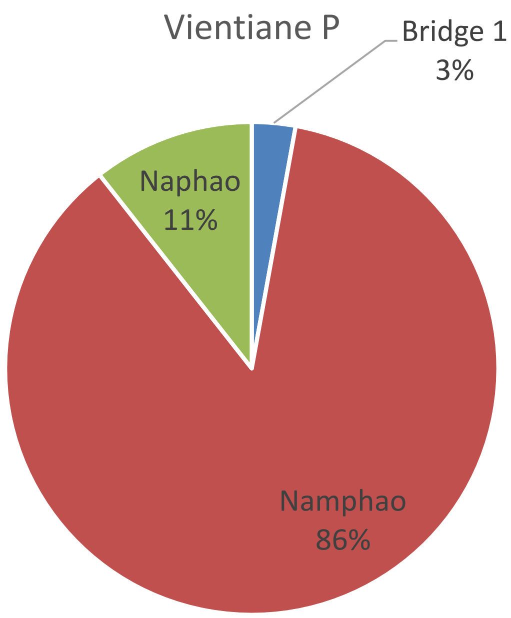
6.3.2 White charcoal exportation related Market

No.	External Market	Borlikhamxay				Vientiane			
		2015	2016	2017	%	2015	2016	2017	%
1	Japan	195.50	846.29	1,332.39	52.27	249.60	132.53	511.03	39.87
2	Korea	636.49	631.61	293.71	34.38	497.00	479.41	330.85	58.35
3	China	16.00	22.50	241.38	6.16	-	-	-	-
4	Thailand	20.00	74.41	78.78	3.81	-	-	-	-
5	Vietnam	-	20.08	133.05	3.37	40.00	-	-	1.79
Sum total		867.99	1,594.89	2,079.31	100	786.60	611.94	841.87	100

Source: DoIE (MoIC), 2018.

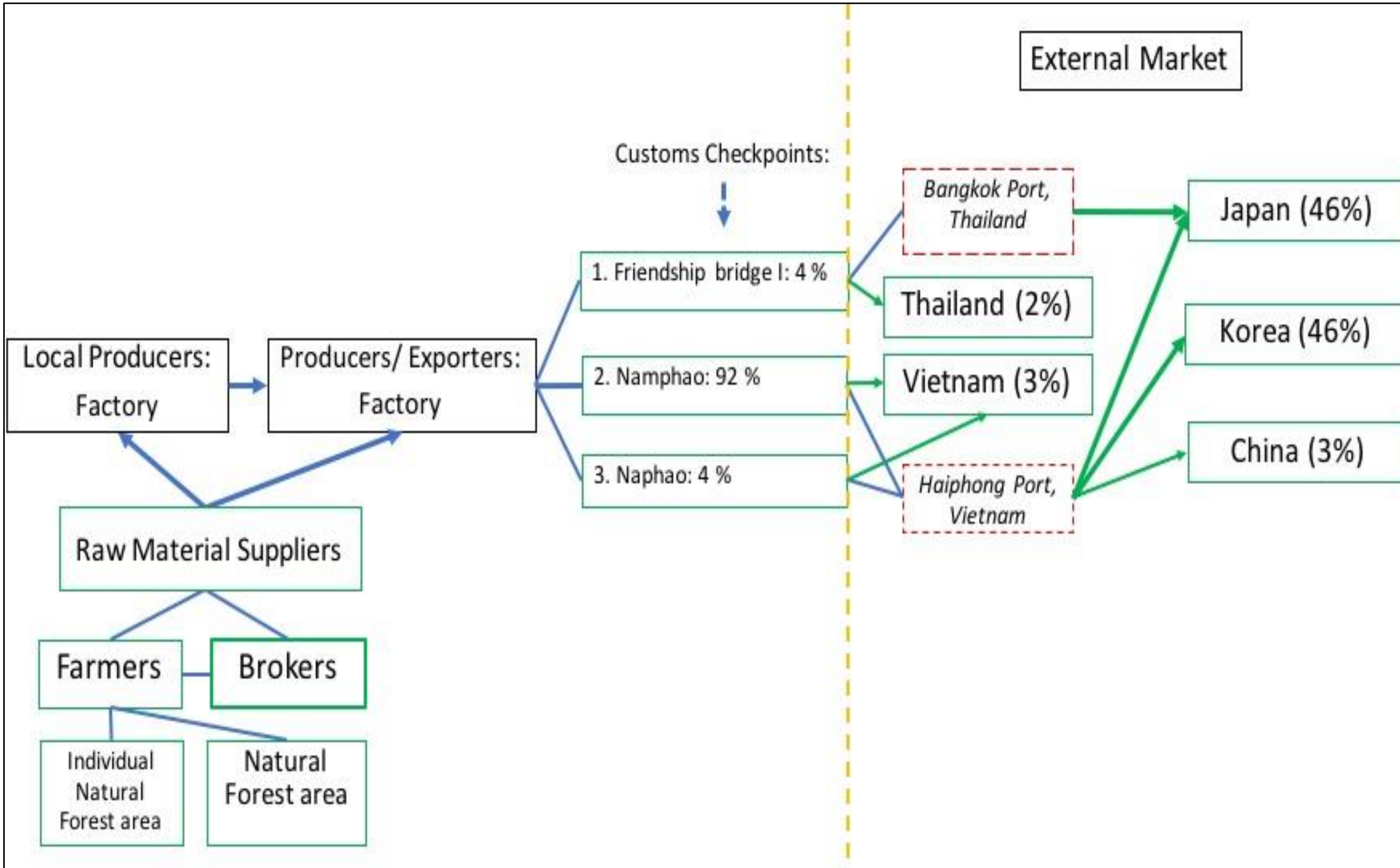
6.3.3 Exportation Channel





Source: DoIE (MoIC), 2018.

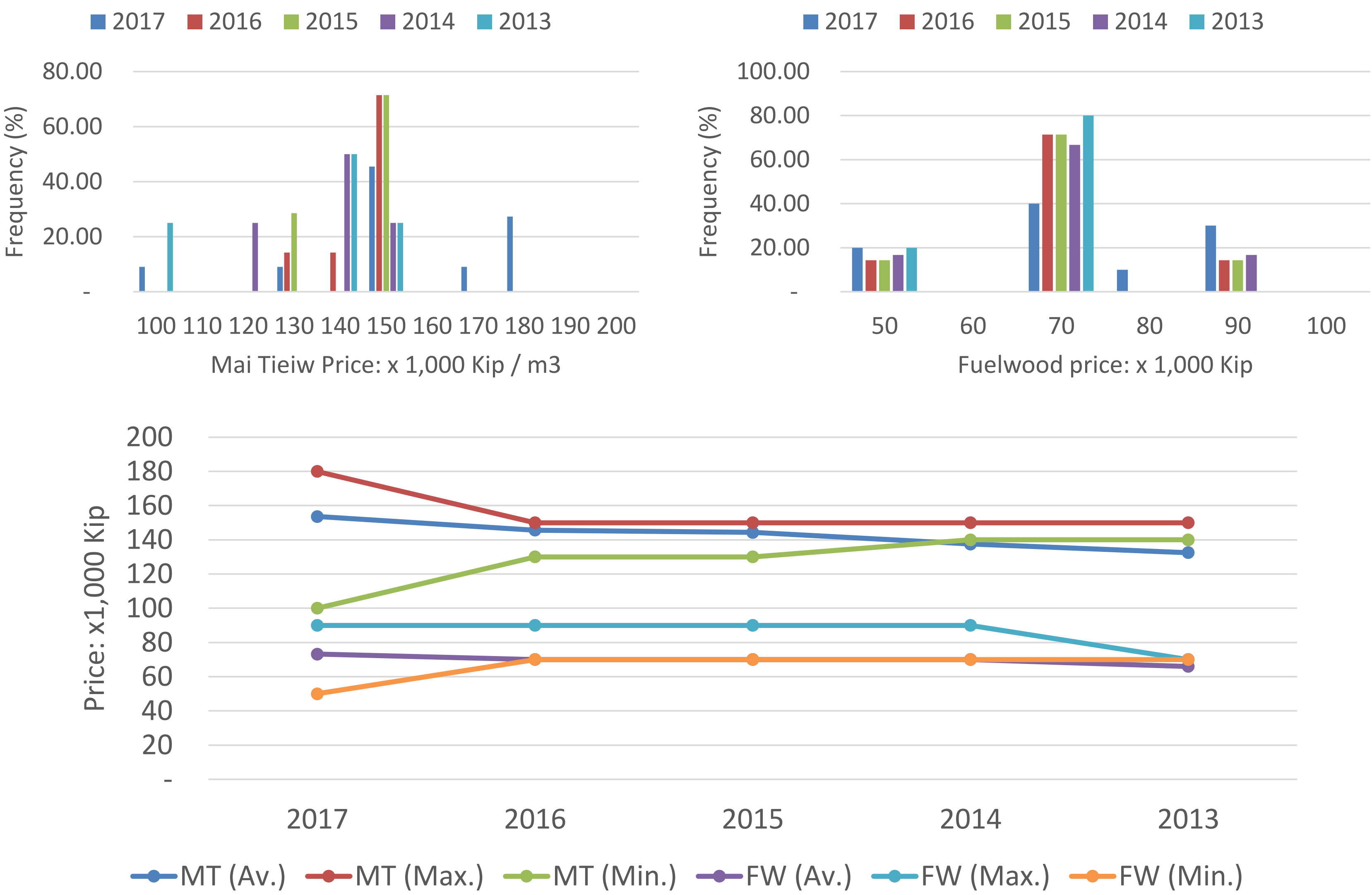
6.3.4 Market Chain



Source: field survey, 2018; DoIE (MoIC), 2018.

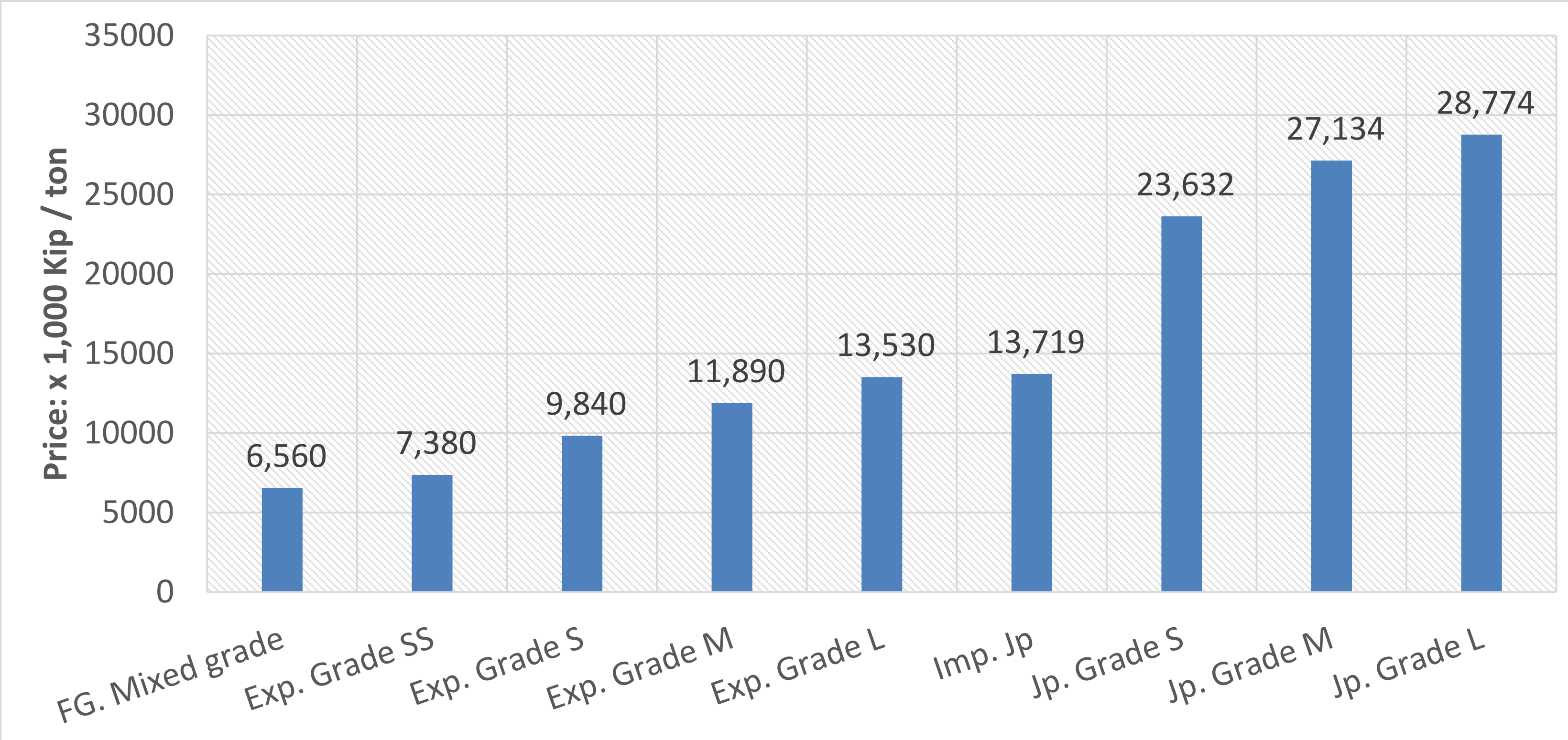
4.3.5 Mai Tiew and White Charcoal Value added

a. Price Characteristic of Raw Material



Source: field survey, 2018; DoIE (MoIC), 2018.

b. Price of White charcoal



Source: Field survey, 2018. www.eisei.asia (2018).

c. Value added

Supplier:
Supply RM

- Mai Tiew: 13.25 m^3
- Fuelwood: 3.63 m^3
- Value: 2,301,000 Kip

Local Producers: Produced WhC in 1 ton

- Value: 6,560,000 Kip/tons
- Value added: + 4,259,000 Kip / ton

Exporters:
Grading & Packing

- Value: 7,968,000 Kip/ton
- Value added: + 1,408,000 Kip / ton

Exporters: Export WhC to Market

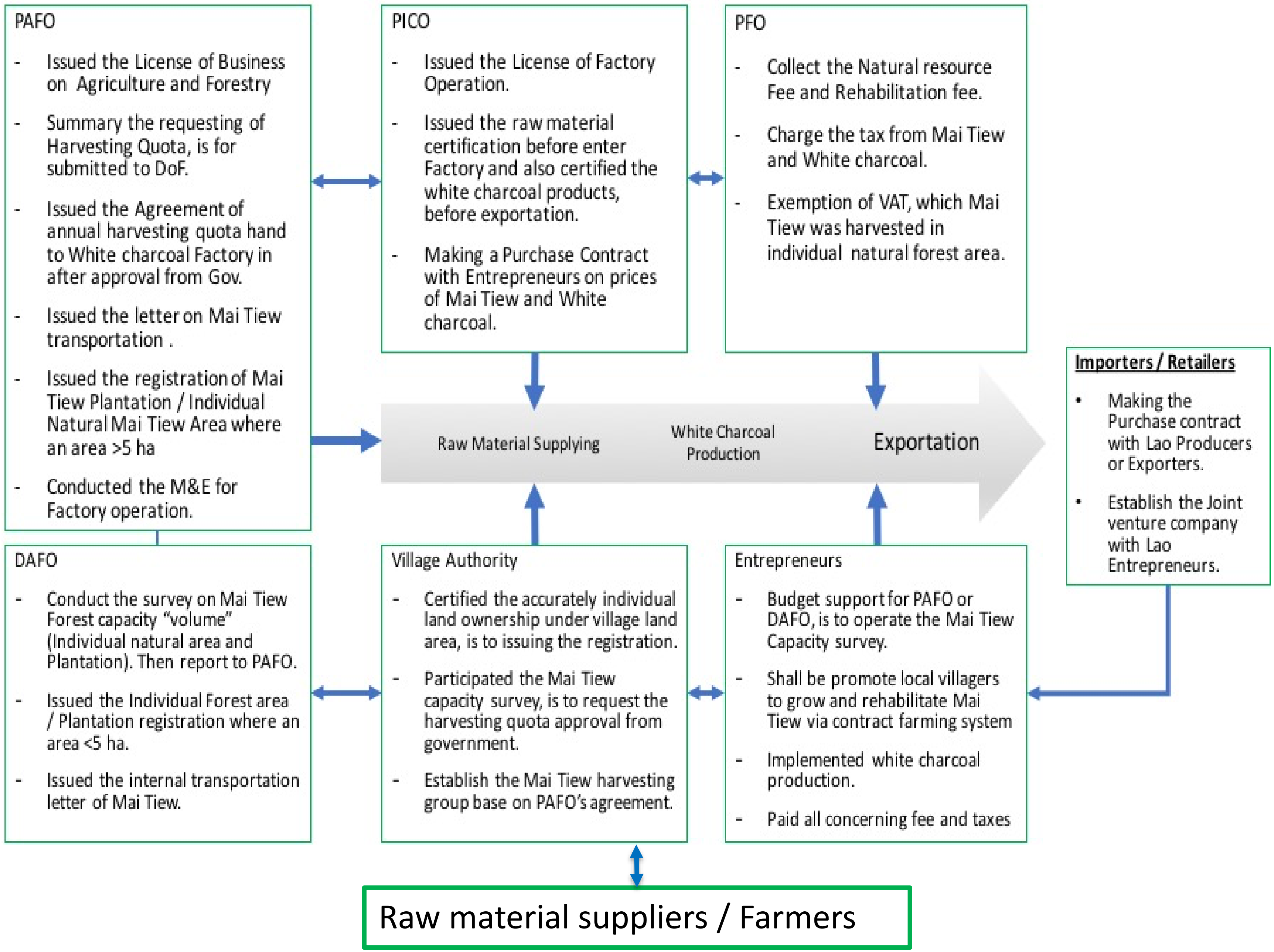
- Value: 11,480,000 Kip/ton
- Value added: + 3,512,000 Kip / ton

Importers / Retailer

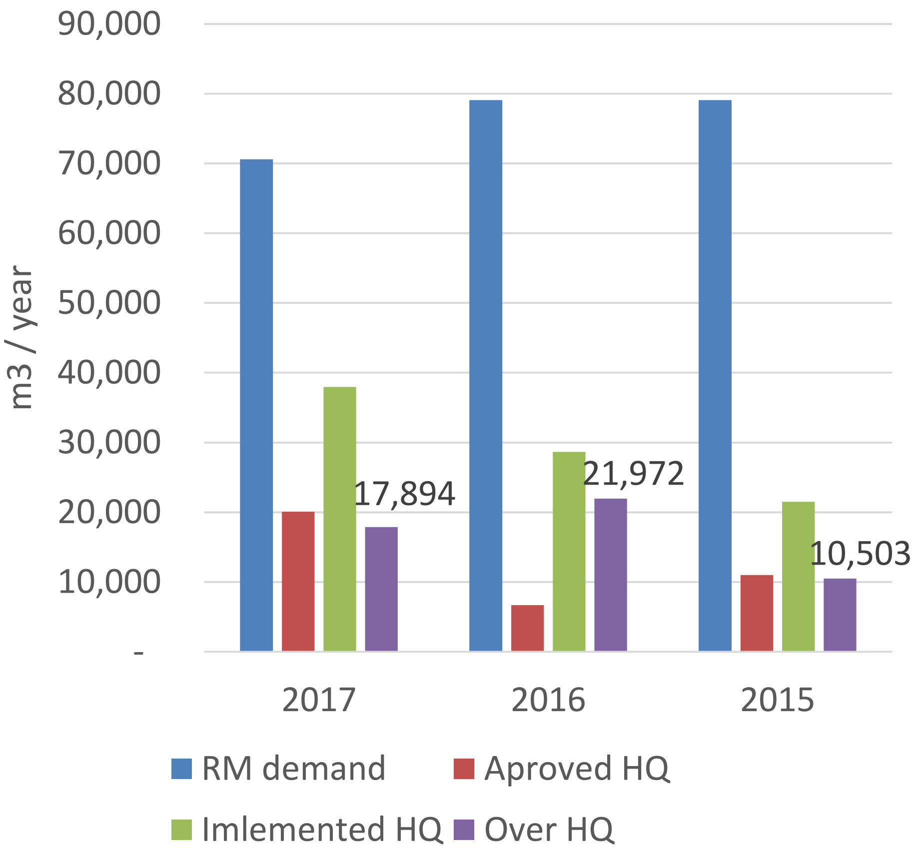
- Value: 25,584,000 Kip/ton
- Value added: + 14,105,000Kip / ton

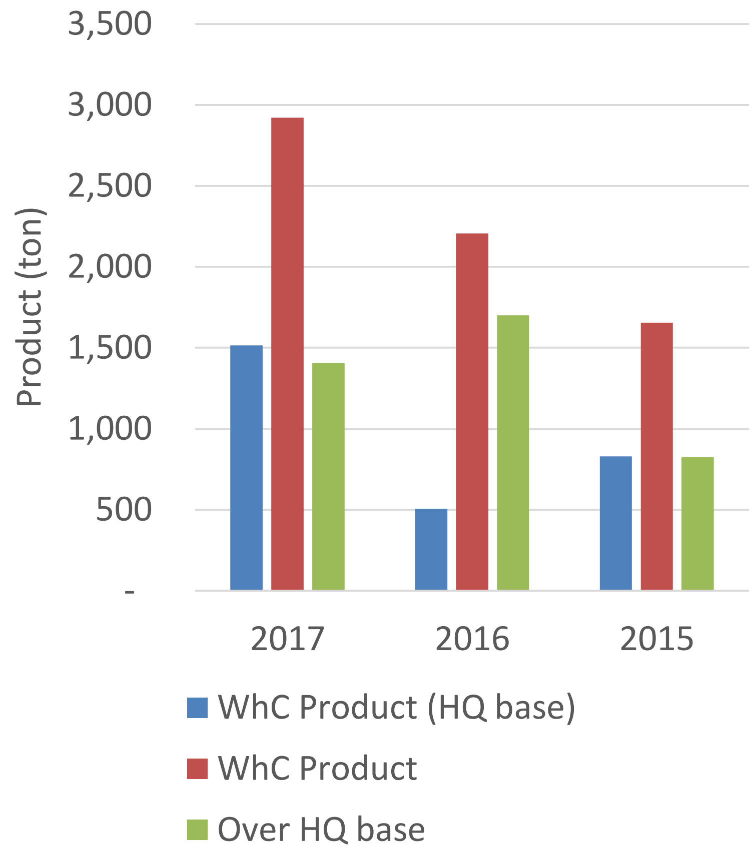
Source: Field survey, 2018. www.eisei.asia (2018).

6.4 Institutional Environment



6.5 The relationship between Approved Quota and implemented Quota





Source: Field survey, 2018; DoIE (MoIC), 2018; DoF, 2017.

6.6 Opportunities and Challenges

6.6.1 Opportunities

1. Almost Mai Tiew species are suitable to making white charcoal with classified as a fast growing tree which provide a short harvesting rotation of 5-7 years.
2. Mai Tiew has been harvested by local farmers on where an area of their own individual forest land, which covered more than 95% of the potential source.
3. Local farmers have their own knowledge of harvesting techniques, which identified as a good practice.
4. Production standard is required stem size of 6 – 12 cm in diameter of which shall be provide a chance for local farmers to generate the income by short rotation.

6.6.1 Opportunities (cont.)

5. Mai Tiew provided and shared about 17% - 19% of total household income.
6. Some Entrepreneurs have increased the demand of Raw Material result white charcoal product export to the market raise up in year by year.
7. Price of Raw material (Mai Tiew and Firewood) had been grown up caused to attracted the local farmers want to harvest more.
8. Price of White charcoal product is seemed stability in 5 years round result to attract more number of producers.
9. Both External market, Japan and Korea have an order a number of white charcoal product quantity from Laos was increased.
10. Government have strongly support to produced the white charcoal, which allowed tree harvesting for energy purpose where an area of individual forest land.

6.6.2 Challenges

1. Mai Tiew supplying resource are mainly from individual natural forest area, are not really from plantation.
2. The number of White charcoal factories were increased, caused to require more Raw material supply while lack of sustainable raw material management plan.
3. In some villages, farmers have more interested to growing the cash crop result to decreased the raw material supply capacity due to land use changed.
4. There is not balance between white charcoal factory capacity and Raw material resource capacity due to lack of potential resource assessment before issuance of a permission of white charcoal factory establishment.

6.6.2 Challenges (cont.)

5. Regulation enforcement of the local authorities have not been practiced on the same way.
6. The collaboration among local authorities are still not well performed such: number of factory is over raw material resource capacity in some districts.

7. Conclusion

- Mai Tiew and Firewood are classified as a main key factors to served and supplied the white charcoal production, which more than 95% was harvested in an individual forest area of farmer.
- Local farmers have been felled Mai Tiew in the duration of 4 – 5 months on dry season from November to July with harvested volume of 100 – 200 cubic meter in an average per household per year.
- Harvested Mai Tiew was contributed the income of 7 - 9 million kip per household per year which shared about 17% to 19% total annual household income.
- The number of white charcoal producer in Borlikhamxay and Vientiane province had reduced from 39 factories in 2013 to 33 factories in 2017 due to raw material supply decreased.

7. Conclusion (cont.1)

- Mai Tiew harvested volume in Borlikhamxay was increased from 11,273 cubic meter in 2015 to 27,004 cubic meter in 2017, which over approved quota, while Vientiane province is practiced under quota.
- White charcoal production rate is about 1 ton = 13.25 m3 Mai Tiew and 3.63 m3 firewood.
- White charcoal production in Borlikhamxay was increased from 867 tons in 2015 to 2,079 tons in 2017 while Vientaine province was not much changed from 798 tons in 2015 to 841 tons in 2017.
- Almost white charcoal product was exported to overseas market. Japan and Korea are mainly market which shared about 92% (Japan 46% and Korea 46%), of which 96% of total product was export through Haiphong port in Vietnam.

7. Conclusion (cont.2)

- Price of Mai Tiew is about 150,000 Kip/m3 (Max. 180,000 Kip/m3 and Min. 100,000 Kip/m3, while price of white charcoal product is raised up from 6,560,000 kip/ton at factory gate to 26,500,000 kip/ton in Japan market (retailer).
- Value added from raw material supplier to retailer is about 23,284,000 kip / ton totally.

8. Recommendation

1. Are there measures and methods for sustainable Mai Tiew forest/Plantation management?

No.	Recommendations	Why	How	Who
1	Demonstration of individual natural Mai Tiew forest management techniques	To develop the growth model of natural Mai Tiew forest and supply rotation	Establish demonstration plot to measure tree grow	NAFRI, DoF and PAFO
2	Making the five year sustainable Mai Tiew Forest management plan/strategy	To ensure sustainable Mai Tiew supply to the factory	Collaborated with all stakeholders.	DoF, PAFO
3	Establish Mai Tiew Plantation and Conserve Individual Forest area	To sustained the raw material resource	Registration and collaborated with local suppliers.	White charcoal Entrepreneurs, DAFO, PAFO, DoF.
4				

- **Do you have some more recommendations?**

2. Are there measures and methods for sustainable trade and marketing management?

No.	Recommendations	Why	How	Who
1	Set up appropriate price of Mai Tiew and firewood	Attract local supplier, interest to involve more on Mai Tiew activities.	Investment cost analysis	DoF, MoIC, NAFRI…..
2				
3				
4				

- **Do you have some more recommendations?**

3. Are there appropriate policies support to sustainable Mai Tiew forest/Plantation, trade and marketing management?

No.	Recommendations	Why	How	Who
1	Demonstration of five years harvesting quota approval	Government has promoted to registration of individual natural Mai tiew forest area and Plantation	Refer to five years Mai Tiew Forest management and Plan/strategy.	DoF
2				
3				
4				

- **Do you have some more recommendations?**

Thank you

Questions and comments