

**PROBLEMS HINDERING THE EXPORT OF WOOD PELLET
OVERSEA AND THE SUSTAINABLE DEVELOPMENT OF
WOOD PELLET SOURCE**



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OVERSEA AND THE SUSTAINABLE DEVELOPMENT OF
WOOD PELLET SOURCE**

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AND THE SUSTAINABLE DEVELOPMENT OF WOOD PELLET SOURCE**

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ABSTRACT

As the global warming become a global issue, countries around the world are turning together to solve or reduce the impact from greenhouse gas effect. Many rules and regulations have been asked to cooperate in such scheme. The so called “Paris Agreement” has been signed by countries around the world to reduce the greenhouse gas to the atmosphere. As the Act has been put on the counties, the raise of renewable energy or biomass fuel has been promoted for substitution of coal for power generation. Thus, the research has investigated the problem that may hindering the export of wood pellet oversea and the sustainability development of the wood pellet source, focusing in Thailand. To collect the data, one on one interview is conducted with 6 people in the business by using different interview guideline between interviewer and interviewees vary depending on the interviewees’ role in the business.

The result reveals that the interviewees identify 4 main problems that hindering the exporting of wood pellet and what could be in a way that may lead to problem of the sustainability of the rubber wood in the future. The 4 main problems that have been derived from the interview are rules and regulations, sustainable growth, logistic and technology. The interviewees have also point that what could be potential solution to solve or ease the above problems as well.

KEYWORDS: Wood pellet, Sustainability of rubber wood, Wood pellet logistic,
Wood pellet supply chain,

48 Pages

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CHAPTER I

INTRODUCTION

In this research paper, the focus would be on the factors that hinder the export of wood pellet in Thailand. To develop the research guideline, the interview questions have been developed to further investigate the factors that hinder the export of wood pellet in Thailand. It would provide indications for the country where Thailand currently stands in the current market and what potential Thailand has to enter into wood pellet supplier. It would be factors in the relevant parties that involve directly or indirectly in wood pellet market.

The research has been conducted in a way of interviewing the stakeholders based on the supply chain of wood pellet production. The interview has been conducted with the farmers, government officer, transportation company and the company that looks to invest into wood pellet production business. The interview has been analyzed into major factors that hinder the exporting of the wood pellet. This research will be based on the firsthand information from the author because the author directly involved in the business development for pelletizing and exporting the wood pellet.

In regard to the outcome of this research, the author would like to be able to identify the major problems that hinder the export of the wood pellet and how to develop the sustainable plan for forestry industrial to serve the wood pellet and lead to other relevant forestry issues as well.

From the interview, the factors that have been analyzed and identified have been broken down into four major problems. This research would provide the brief background of the wood pellet as well as the involved parties that currently drive the market. The information from the interview and researches from relevant sources will be analyzed in terms of the prediction of the market trend for wood pellet and what Thailand could become in the future. The following paragraphs would provide a brief description of wood pellet and its roles to the world.

According to wood pellet, many people might now not know what the wood pellet is and how it may affect everyone day to day life. The hot country like Thailand or other equator country regions might not be familiar with the household heating concept. Wood pellet can be used as a power plant fuel or used as household heating fuel. It might be used as a substitution of coal in the thermal power plant. The wood pellet provides alternative fuel source for coal power plant with cleaner emission. However it is not commonly used in the Asia Pacific region except Japan and Korea because these two countries have strict emission rule and regulations. The market size for wood pellet is now increasing from year to year. The market for wood pellet is now covering northern hemisphere countries such as United States, United Kingdom, Germany, Scandinavia and etc. However, within those countries except United States, the resources to produce wood pellet may become limited due to land size and rule and regulations within the country itself.

This is where Thailand could seek to be the potential supplier for wood pellet into the world, especially within the Asia Pacific region, focusing on Japan and Korea. However, due to the potential that Thailand has, there are some factors that hinder the process. Those factors could be separated into four major problems: 1) rule and regulations within the country and actual database of the rubber wood source 2) the sustainability of forest 3) logistic and 4) technology.

The first issue is rules and regulations to export wood pellet into countries such as Japan and other European countries. They would require supplier to state the origin of wood and the forest planning is required to be submitted. As the certification body within the country is very limited, mostly it would need to use 3rd party from oversea to certify it. To certify the planning for sustainable growth of the forest, the farmer would need to be educated. The local government and authorities do not fully understand the process of helping the farmers to become certified wood supplier. Another problem that may fall into this problem is the actual planting area for forestry. There are couple million rias of rubber wood planting that is not registered with the Rubber Authority of Thailand (RAT). In consequence, the officials do not have the actual data of many robber woods which have been planted within the country and it has been hindering the process of sustainable replacement of the forestry. There is also another factor that hinders the process of replanting and smart cutting. That is, the

government launched the campaign to reduce the rubber tree within the country because latex becomes over supply within the country.

Secondly, the sustainable plan to grow and cut down rubber wood plantation. This problem is also related to the first problem, regarding the actual data of plantation area. However, the plan that the government and local authority need to help setting up has not been fully materialized at the moment. The information and incentive have not been provided sufficiently to the local farmers to participate in the program. As the sustainable plan is needed to consider as the overview (entire country) of the rubber wood planting with lack of actual data base of plantation area. The problems will happen to the government to plan the sustainable plan with limitation of firsthand information. Another thing to take into consideration is the standard to comply with international standard. The sustainable forestry plan requires certain steps, certain records and requires effort to be put in the process.

The third problem is logistic within the country. Most of the plantation areas are in the southern part of Thailand and the areas are still lacking the logistical network in terms of factories and transportation. Currently, the factories for wood pellet are expanded all over the southern region and the investment cost to build factory is high. The machine is bought from Europe and it could cost approximately hundred million Thai Baht depending on the capacity of the plant. In the contrary, if the machine is bought from China or local suppliers, the quality of the products seems to be out of standard to export to US, Europe, Japan and Korea. As the sources of raw materials (rubber wood) are spreading over the region with limited factories to turn the rubber wood into wood pellet, it requires a long haul of transportation which creates the problem of increasing the production cost for the wood pellet. Another problem for transportation is the exporting process, at the moment to export wood pellet outside the country. There are limited number of ports that are capable of having large cargo ship coming in and receiving from the nearby ports in the southern of Thailand. There is a big lot of wood pellet requirement which need to be shipped to Lam Cha Bang port first before shipping to final destination so that it would create overhead cost for the producer.

The last problem is technology because there is no local supplier that could comply with international standard. The quality of the product cannot meet the

international standard due to lack of support from the government to increase R&D for this sector. As the machine cost is still high, it hinders Thai supplier to compete with international market. Moreover, pelletizing requires know how in order to get the right product specification which Thailand does not currently full proceed at the moment. Kasetsart University (KU), department of forestry is currently doing the R&D for this at the moment, but it does not receive the wide range of support. Also as of now, there is new process which upgrades product quality to another level with additional cost and know how. This process is to turn regular “white” pellet to be “black” pellet which increases the durability of the pellet as well as the heating value of the pellet. This pellet can be used as direct substitution of coal for the thermal power plant without small modification to the power plant. The technology that turns white pellet to black pellet is still lacking within the country. KU is doing some R&Ds for this but it is not for the commercial operation because the production size wood requires more than 20 t/h for commercial production in order to meet the economics of size to sustain the business.

For the author, this topic is one of his interests because author sees the potential of Thailand to be successful in exporting the pellet to the world. However, the author would like to point out that there are certain things that hinder the ability of Thailand or our local pellet suppliers to compete with the world market. As the world focuses more on clean energy due to Paris Agreement and increases awareness of Global Warming issue, wood pellet is good alternative source of fuels for the future and another way to generate revenue stream for the country and local businesses.

CHAPTER II

LITTERATURE REVIEW

In this section, it would focus more on the history of the pellet, why now pellet is became more popular in stakeholders within the market. The author would like to start with the history of the wood pellet. Wood pellet or pellet is a biomass fuel that came from drying and pressing into a pellet. Figure 1 below represents wood pellet:



Figure 2.1 Wood Pellet

Wood pellet can come from saw duct, wood chip, rice husk, or other wooden wastes from lumber or agriculture industry. Wood pellet was introduced into market around 1970 when the oil crisis hit United States and required people to look into alternative fuel for their stoves to heat their residents. After the oil price recovered, wood pellet faded away from the market but it rose back again in the late 90's and then wood pellet slowly gained its popularity. To produce wood pellet, it requires substantial of capital to build pelletizing plant as well as substantial feedstock. As the time passes, new technology has been developed for pelletizing to extract more heating value from the pellet.

At the moment, beside that pellet that has been write up in the beginning. Now it will be called “white pellet”, the other type of pellet is “black pellet”. For black pellet, it requires another step for the process which is roasted of the material. There are two techniques that could make black pellet. The first one is torrefaction and the

second one is steam explosion. Each of them requires good amount of engineering study. Both have advantages and disadvantages. In terms of comparison between white pellet and black pellet, black pellet provides higher heating value and higher durability so that it would be more convenient to handle black pellet in terms of logistic. However, black pellet's current price is about 20% higher than white pellet. In terms of technology for black pellet, there are not many companies investing in R&D due to their high investment cost and the market is still small comparing to the investment cost.

Since exporting wood pellet is still limited at the moment to countries, RAT is looking for the way to improve and make exporting wood pellet as one of the main export businesses. Currently RAT is coordination with department of forestry, Kasetsart University "KU" to help farmers and investors for developing substantial plantation plan for raw materials such as rubber wood or other fast growing species of tree. In order to be able to export wood pellet to countries such as Japan or in other regions such as North America or Europe, raw materials need to be certified by Forest Stewardship Council "FSC" which creates some burdens to either farmers or investors. First, it creates another cost to investors or farmers to certify their wood. Secondly, farmers have plan to plant their tree to sustain each life cycle. Depending on the wood itself, cycle for planting would be different. Eucalyptus will only take 6-7 years to grow while rubber wood will take 20-25 years before farmers cut it down because rubber wood provides latex in its early years and the cost of latex each year is still outrun since the early cutting.

Now, the author will discuss about world exporting of wood pellet. The exporting is rising rapidly in all continents of the world due to COP 21 and government is providing more incentive to either the producers or consumers. Figure 2 below represents global pellet production from 2010 to 2020 in 5 years' increment:

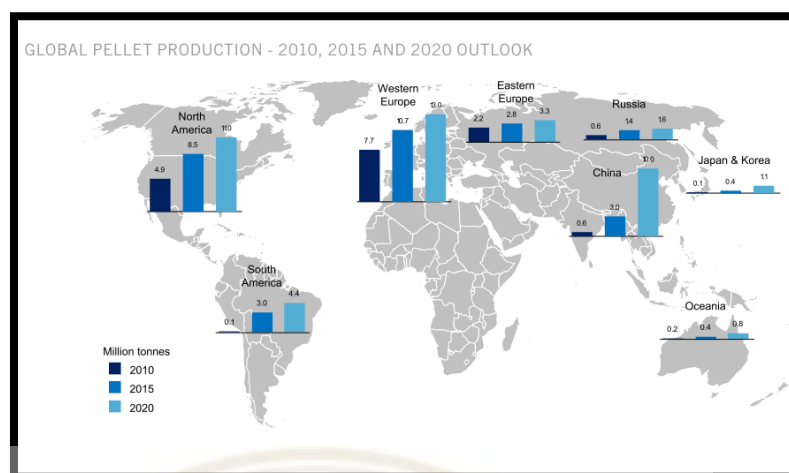


Figure 2.2 Wood Pellet Production

The production is depending on each country's resource as per the bar chart representing production for each year. China could become a main supplier in the near future due to their resource and they are preparing all requirements to meet international standard for pelletizing. Another thing that could make China become a main exporter is technology which has been implemented. Even though it is still one or two level below Europe standard in terms of machinery, eventually China will get there. Thailand might not be there on the map but Thailand has capability to be in the top 20 nations for exporting wood pellet because Thailand has the natural resource to make it happen. Nevertheless, it needs to come with sustainable planting plan accordingly; otherwise in the future, raw material will be scarce.

From now on, the author will focus pelletizing business in Thailand. Currently, there are two to three major exporters of wood pellet in Thailand. Their exporting destination is Japan and South Korea. Source of their raw materials for pelletizing is rubber wood from southern region of Thailand or from eucalyptus waste coming from pulp industry in the eastern region of Thailand. All of them are currently producing white pellet. None of the big companies is going for black pellet at the moment. For their business model, they are using contract farming as their supply base. They will either do the contract farming directly with farmers or sometimes do it with sawmills. It creates some entry barriers for newcomers into this business. Below figure shows the value chain of the business:

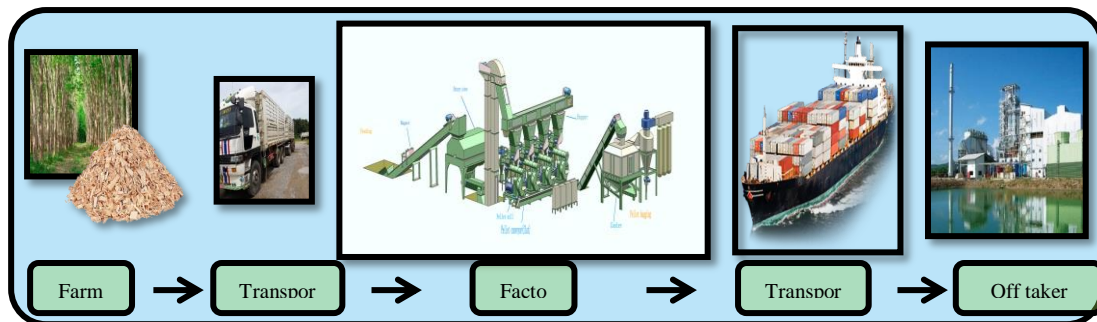


Figure 2.3 Wood Pellet Value Chain

As the big players in Thailand are getting into the pelletizing business, it makes even harder for newcomers and small producers to get into business because big players might have their own plantation so that it reduces the need to seek the first step in the value chain. Another thing that makes big players with their own plantation have edge over small players is the ability to get the wood certification. If business owners would like to capture bigger market size, the origin of the wood need to be certified by international certification body.

Within country, the government is now starting to implement rules and regulations as well as provide funding to help the pelletizing business. Thailand is slowly getting specialist within the country to be a local certification body. Therefore, it would provide some foundation in the future to help the pelletizing business and as the farmers and investors get involve into the process, it should reduce hindrance of producing and exporting the pellet outside the country.

Another aspect that could recently be a problem is the supply in the future because the rubber wood takes longer time to grow comparing to other kinds of plants. The plan needs to be put in place in order to balance the rubber wood planting and other kinds of fast growing plants. Actually, rubber wood provides other kinds of products from its latex. So far, the government only has plan to encourage farmers to plant other kinds of woods to reduce the number of rubber wood within the country and to stimulate the demand and supply which will increase the price in the market later.

As the government has plan to develop rubber city in the southern region of Thailand, the infrastructure has been improved within the region. The deep sea port has been currently on the development plan and the railways and roads would be expanded to support the cargo transportation. This support should increase the number of marine freight that would come and do business in the southern region.

The article wrote by Ron Kotrba on November 16th, 2016 also supports the theory that Thailand has potential to be one of the main supplier of the wood pellet. However, his article focuses on the entire biomass market, not only the rubber wood. In his article, he claims *“Thailand has several policies in place that help promote the production and use of renewable energy, according to the International Energy Agency. In 2009, the government implemented the Renewable Energy Development Plan (2008-'22) and in June 2015 the country passed the Thailand Alternative Energy Development Plan (2015-'36). Agriculture is big in Thailand. According to Chinese pellet mill maker Zhengzhou Fanway Machinery Manufacturing Co. Ltd., which supplies biomass and wood pellet mills to Thailand, in one-year Thailand can produce 6 million tons of rice husk and more than 25 million tons of sugarcane bagasse. Oil palm and wood wastes are two more sources of abundant biomass in the country. The materials are primarily collected from rice, sugar and oil palm mills, and the wood processing industries, respectively. Sugarcane and rice are more concentrated in the northern and northeastern regions of the country, while the southern region has higher concentrations of oil palm processing”*

As the pelleting of non-wood biomass in Thailand gains popularity, the country's wood pellet manufacturing industry is rather established. *“The growing global demand of wood pellets, especially in the Asian Market, stimulates the wood pellet manufacturing industry in Thailand”*, ZFMM states. This would be confirmed that Thailand has opportunity to be one of successful suppliers for the wood pellet. The figure below also presents export and import from countries within Asian Wood Pellet Market:

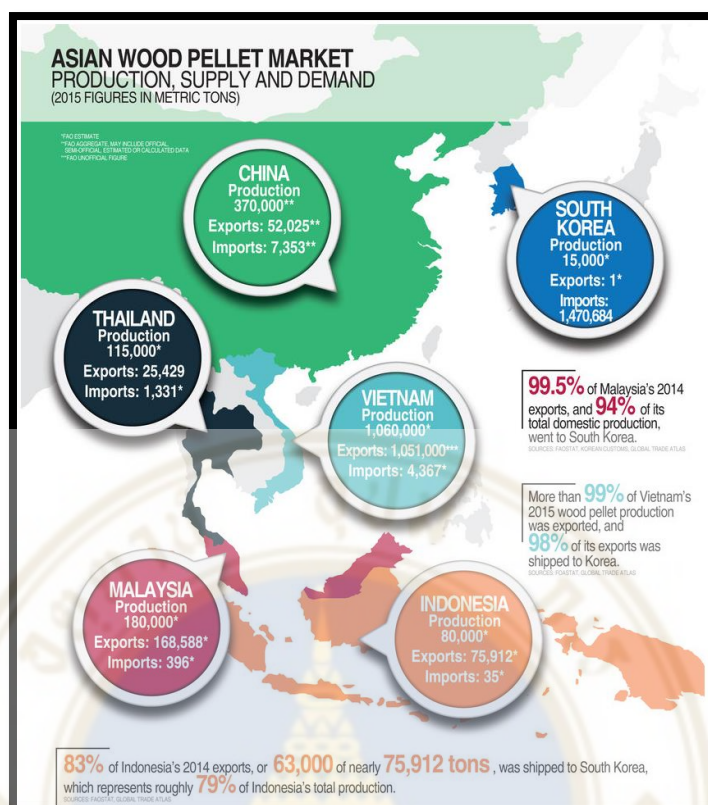


Figure 2.4 Asian Wood Pellet Market

As the year progresses, the trend of exporting for each country shall increase. However, the readiness of the technology and government policy should provide the advantages over neighboring countries and the distance travel to customer destination such as Japan and Korea could be shorter comparing to Indonesia which has a big supply source. Another advantage that Thailand would have over Indonesia is the political settlement. Thailand has steadier political situation so that the policy to support the pelletizing business could be developed more smoothly. The policy should be unchanged over the years even if the government parties changed.

Due to the evidences from article, Thailand has potential to become leading wood pellet supplier in Asia. However, there are issues that need to be addressed before Thailand could fulfill its potential in the world market.

CHAPTER III

RESEARCH METHODOLOGY

This research methodology was qualitative due to the nature of the topic. The research was based on the series of interview of the people who are involved in wood pellet business. The interview was conducted through face to face and via telephone. The reason for telephone interview is because the interviewees live in different parts of Bangkok. In addition, the author would like to receive first-hand information from various people who involve in the wood pellet business. The interview was conducted during the week of Jul 24th to Aug 4th, 2017. The note has been taken during the interview; however, the interviewees were not comfortable for the interview to be recorded. The interview time was range from 15 minutes to 40 minutes.

Series of questions have been asked to the interviewees. Below are the series of questions that have been used during the interview:

Investor/Developer

- In terms of overall market of the wood pellet, what do you think about its market perspective?
- What is the position or potential for Thailand to be in wood pellet market?
- What is/are the problem(s) that prevent(s) Thailand to become one of the main exporters for wood pellet?
- Where would you see the potential market and what is the sizing that Thailand is capable for?
- Who do you or who are the stakeholders for wood pellet business?

Farmer

- How much do you know about wood pellet?
- Do you think is there any problem for the supply side of the raw material?
- Is there enough support from local government on the plantation and information about current business trend that involved rubber wood?
- Do you have enough accessibility to the information for improving your plantation?

The interview guideline was developed in terms of the market overview in order to get the inside opinions from various business investors and farmers who directly involved in the process of making wood pellet. Furthermore, to understand what the problems could be that may hinder Thailand to export wood pellet oversea or what the problems would be that the investors or potentially farmers foreseen hindering the wood pellet business.

This research was conducted based on the interview questions to the involved parties, mostly the investors. Since the investors need to have the clear idea of what is at stake in order to do the business, they would need to look of what \ the problems would be that could cause their business ineffectively. As investors need to explore their options for their customers, sources for the raw materials, logistic for the business, technology and rules and regulation both domestically and internationally, the author believes that the investors are reliable and good source to look into the wood pellet market.

The author also interviewed the business owners who produce wood pellet and export to other countries in Asia. This group of people would be able to provide in-depth information about the problems they are facing, how they are looking into the opportunity for the wood pellet market and what capability they think Thailand has in the upcoming years. The other groups that author interviewed are the sawmill owners and farmers because this group will know the resource and supply capability of the wood pellet. They were also able to provide the information about the current market of raw materials for the wood pellet and what business segment that may disturb the wood pellet raw material supply.

The interview series confirmed the author's assumptions that could potentially hinder the wood pellet business in Thailand and possibly see what could be the problems that the author may have miss in the author's assumptions.



CHAPTER IV

FINDINGS DISCUSSION

This chapter is aiming to comprehensively capture the results from the qualitative data via series of interview questions with investors, business owners and other relevant persons who involve in wood pellet business in Thailand. The interview was conducted through face to face conversation and via telephone because some of the interviewees do not currently live in Bangkok. The interviewees are series of people who are currently directly involve in wood pellet market either from producers of wood pellet, developers of the business and from supply side of the raw materials for wood pellet.

The data was collected through the interview questions. The selection of the interviewees is based on their experience with the wood pellet market in Thailand and involvement in wood pellet business. The author interviewed 6 people who are investors, business owners and farmers. The interview guideline has been developed in order to seek the possible problems that hinder the capability of Thailand for exporting the wood pellet overseas. The interview guideline was for the author to start the interview and to understand the wood pellet market better. Some of the questions have been openly discussed and mentioned during the interview without the need of author to raise the questions. The concept of the interviews was to have the interviewees openly discussed their thoughts on the business. As such, there were room for deviation and unexpected results finding from the interviewees.

The interview has been transcribed from each of interviewees and the author decided to separate each of the interviewee into separate section so that it would be convenient to identify each individual opinion and information regarding the topic. Not all of the interviewees share the same concern and have the same perspective when looking at the wood pellet market. However, the author would try to arrange the topic in the same manner for each interviewee.

The data analysis will be separated by each interviewee because some people look at the problems a bit differently from other people. Depending on their roles in the value chain, each person would focus on different aspects. As a result, the author would like to separate information from each person individually and then conclude the finding at the end of this section.

4.1 First Interviewee

The first interviewee comes from one of the private companies located in Bangkok. The company is mainly doing business in power generation sector and looking to invest in the wood pellet oversea market. The author knows this person from the past working experience and he has involved in business set up and looked for potential buyers and investors.

The first thing that the interviewee mentioned during the interview is the potential markets which are Korea and especially Japan due to the incentive program that the Japanese government put in place in order to promote the use of wood pellet or biomass fuel for their conventional power plants. Korea is also one of the biggest market in Asia in terms of logistical distance because it is not too far to transport from Thailand. Interviewee thinks that Japan and Korea capture about 20% of the global wood pellet at the moment.

In terms of supply for raw materials, he thinks that Thailand has the capability to supply both for domestic and international market. However, there are some competitions for raw materials within the region. Raw material competition that the interviewee mentioned is about using the raw materials for something else rather than producing the wood pellet. Mostly the raw materials for wood pellet are waste products from sawmills such as wood chip, sawdust, bark and remaining of the wood slab. These remaining materials, instead of using to produce wood pellet, could be used for making the particle board or other compressed wooden goods.

In addition, the interviewee stated during the interview that the price at current Korea market is too low because Korean customers compare Thailand pellet price with Vietnam pellet price. In reality, Thailand pellet has better quality than Vietnam pellet so that the price is not feasible for current investors to go for Korea

market. In the contrary, due to incentive program from Japanese government, it would be more feasible and the buyers from Japan are willing to enter into contract with higher price. Another factor that influences the price is the volume. Thailand does not have the ability to commit a long-term supply with big volume of the pellet because Thailand has many small investors who are not able to make a commitment for big volume and long contract term.

Another factor that the interviewee mentioned during the interview is the scheme for selling. There are not various options for selling the wood pellet because the competitiveness to drive the market is very low. The scheme for selling the pellet is either long-term with fixed price or short-term with spot price which does not give many options for new investors to get into the market and to capture the supply size of the raw materials due to uncertainty which limits the ability to compete and negotiate with the buyers.

The interviewee also highlighted the standard that enforces the raw materials. Interviewee mentioned that for Japan market, they require the raw materials and factories to meet FSC standard and certify the source of raw materials. Therefore, this process hinders the ability to compete the market and it increases the production cost of the wood pellet. This creates entry barrier for new investors because they have to certify wood and it requires high investment. However, this information is based on the understanding of the interviewee.

The last question that interviewer asked interviewee during the interview is about the main stakeholders for the wood pellet market. He thinks that the investors play an important role to drive this market within Thailand because they drive the government and farmers to support the business and drive Thailand into the Asian market. Since investors would like to get into this business, government would need to adjust their rules and regulations for investors to be able to compete in the global market. The infrastructure such as deep sea ports, railway systems and other inland transportations will need to catch up with the market trend to lower the production cost of the pellet.

The key highlight factors for the first interviewee are the raw material supply, the price of the pellet and standard for the investors to meet the international wood pellet supply. Another thing that the interviewee was provided is the capability

of Thailand because Thailand in the future shall be competitive in the Asia market once the infrastructure and rules and regulations are improved to lower the cost of production of the wood pellet.

4.2 Second Interviewee

The second interviewee comes from one of the private companies located in Bangkok. The company is mainly doing business in power generation sector and now looking to invest in the wood pellet oversea market. The author knows this person from the past working experience. He involved in business set up and looked for technology and supply source for raw materials.

During the interview, the author raised question regarding the potential growth in the wood pellet market. The response of the interviewee is that the market will grow continuously in the upcoming years especially in Japan because of the COP 21 and Fukushima nuclear power plant incident. Japan would be a most likely destination in terms of importing the wood pellet due to lack of natural resource in terms of biomass material and government would like to move away from fossil fuel in order to reduce the greenhouse gas emission from the power plants.

In terms of the supply of raw materials, according to the interviewee, Thailand has great reserve supply in terms of rubber wood because there are more than 22 million rai of rubber wood at the moment. Due to supply of raw materials, there would be no shortage in the upcoming years. However, the plantation plan would need to be put in place in order to sustain the growth in the wooden market, not only wood pellet market. There is also one thing that government would need to support is the registration of the rubber wood into the database to get more accurate data about the actual plantation area of the rubber wood. This would require the participation of the farmers as well.

The interviewee discussed about problems that hinder Thailand for exporting wood pellet to Asia market. There are many factors at the moment that hinder Thailand to fulfill its capability. First of all, he talked about big and small investors because the investment cost for the business is quite high and the process to obtain wood certification takes long time. In consequence, smaller investors would not

have enough ability to enter into the market and promote themselves to the global market.

Secondly, there are big competitors from Vietnam who drive the price down for Thailand and the travelling distance is much shorter from Vietnam to Japan and Korea so that it creates some disadvantages to Thai investors. Another aspect regarding the price is the long-term commitment. In Thailand there are not many investors who could get long-term contract with buyers and the price of the wood pellet could fluctuate as the nature of spot price and there are many competitors for this scheme.

Moreover, the logistic in Thailand especially down south where most of the raw materials are is still a problem due to lack of deep sea ports and inland transportation for the investors to receive raw materials and transfer the wood pellet to sea ports. Thus, it creates huge additional cost for logistic and more cost of production of the wood pellet. The capability to get the market size and capture huge amount of raw materials might be able to break out from this barrier.

Furthermore, it is about technology. The supplier of reliable and efficient technology for producing wood pellet still comes from oversea. It creates huge investment cost for the investors and affects cost of production to be higher comparing to other countries.

Lastly, the interviewee raises some concerns about the government rules and regulations that do not entirely support the wood pellet production. As the rules and regulations still do not fully support the investors in terms of certification of wood, export and import of relevant machine and technology for wood pellet production, also cutting down wood, there are still some rules and regulations that prevent the investors to use machine to cut down trees.

As per the interviewee's statement, the logistic issue seems to be highlighted because the logistic is essential factor in terms of operating cost and it would need to be accounted for cost of production. Another thing that logistic comes to play is the inland and sea transportation because it is a big burden to the investors for inland transportation in terms of receiving raw materials and transporting final products to ports. Once the product reach to the ports for sea freight but there is no deep-sea port in down south, it would be implied that it is not possible at the moment

to export the pellet via big vessel. It creates higher transportation cost when investors have to ship wood pellet in smaller quantity.

The interviewee was asked about the key stakeholders and he mentioned during the interview that first of all, it is customers that play the big role and investors are the driving force to drive the business with support from government. Farmers and sawmill owners play their part in terms of supply of the raw materials. All of them come to gather it and generate both demand and supply for the business.

4.3 Third Interviewee

The third person comes from the KU. He is a professor at KU with many years of experiences for wood pellet. He is one of the certification body committees for Thailand. He also owns a wood pellet business and one of the suppliers who exports wood pellet to oversea. He is also doing research for black pellet technology and acts as the lawyer for forestry for the government agency.

The author started the interview with potential growth for wood pellet market. Interviewee said that the market now is growing and there are many potential buyers from oversea such as Japan and Korea due to government policy to reduce the greenhouse gas emission and other environmental concerns over the conventional type power plants. The demand will continue to grow due to imminence of new biomass power plants in Japan or the one that plan to convert from fossil-fired power plant to biomass power plant.

Once the author asked about what the problems could be that hinder Thailand from exporting the wood pellet, the first answer is the price of the wood pellet because Vietnam market offers lower price but with lower quality as well. Korea market accepts the wood that is not required to be certified by FSC or other creditable organizations but it does offer the lower buying price and that is not feasible to Thailand to get in to the market. The price that seem to be at least over USD 100 per ton, which could cover logistic cost and investment cost for the long run. However, it would take into consideration in the volume of order accordingly.

During the interview, the interviewee provided some information that within the next 5-7 years, Thailand may need to rethink about plantation of rubber

wood because farmers will cut down the rubber wood which would be longer to plant comparing to other types of tree such as eucalyptus or arcadia. If the continuity of raw material supply does not meet the demand, the investors may face problem about contractual volume or it is harder to find the buyers due to volume fluctuation of supply. It would create a side effect in terms of wood pellet price as well.

The author also received some information from the interviewee that currently the rubber wood in Thailand has been certified for over 300,000 rai at the moment and other 700,000 rai for another type of wood. Though comparing to current size of the rubber wood plantation it seems to be very low. As the time progresses, more forestry would be certified. The author has been informed that process of certifying the wood is not very difficult but it would require the participation from the farmers because they need to adjust their life to certain standards for plantation.

The interviewee did not provide the information about specific stakeholders for wood pellet market because he thinks that everyone equally involves in the market and becomes the driving factor to drive Thailand wood pellet market forward.

4.4 Fourth Interviewee

The fourth interviewee is the owner of sawmills down in southern of Thailand and owns many other businesses that relate to wood. He has been in the sawmill business over 20 years and has many years of experiences involving in exporting wooden material to oversea. He has been dealing with many changes in policies and government.

To start the interview, the interviewer asked the interviewee about the prospective of the wood pellet market. He highlighted the growth in Japan market due to new government policy and Fukushima incident. Japanese government needs to turn away from nuclear power plant. Also Japan highly concerns about the environmental issue due to strict environmental regulations. Therefore, Japanese government is turning to biomass power plant in the belief that it would reduce the greenhouse gas emission to the environment. In addition, people more concern about the environment which stimulates a cleaner energy and drives the expanding of the wood pellet market.

The interviewee was asked about the problems for exporting the wood pellet and he raised some concerns over certain factors. The first one is the government support but his statement is different from other interviewees. He pointed out that the government should promote the consumption of the wood pellet within the country instead of adjusting the rules and regulations for exporting. He found the potential within the country that would be more viable to generate the demand within the country by having new biomass power plants close to wood pellet factories or close to the plantation areas. At the moment, while most people are building new power plants which government provides the higher incentive, there would create the lack of supply source for biomass fuel in the near future and the available source would be too far to make it feasible to transport to existing power plants.

Another factor that the interviewee highlighted is the price of the wood pellet because the competition from Vietnam is high and it hinders the ability Thailand to compete in the global market. Vietnam is able to offer the lower price due to lower cost of logistic and lower quality of the wood pellet. In some countries, the quality is not the main factor to consider to buy. Certification of wood also hinders Thailand because the cost to certify wood will hugely be placed on the investors to meet that standard and the price from buyers would be very important.

The policy in neighboring countries also make it harder for Thailand to compete in the global market, for example, Vietnam where they have concession policy to help out with the plantation of raw materials. Consequently, it helps securing the supply size of the equation and it is able to commit in the long-term contract and commit for the price. Once the investors get into longer contract term, they are able to lower their selling price and secure loan easier from the financial institution.

Another thing would be the oil price that drops at the moment. Since the oil price drops, many people turn back to conventional type of power plant due to lower operating cost. However, this could be a temporary trend because the oil price shall increase when the time progresses. Although the environmentalist could raise this issue to the global state as the countries signed the Paris Agreement to lower their carbon emission, wood pellet shall be one of the main sources to help each country to fulfill their commitment.

4.5 Fifth Interviewee

The fifth interviewee comes from one of the private companies located in Bangkok. He is one of the co-founders of the wood pellet company in Thailand. At the moment, the company owns couple factories and already exports over 20,000 tons of wood pellets per month. He is currently exploring global wood pellet market.

The interviewee started with prospective of the wood pellet market. He found that the Asia market will continue to grow over the years and countries keen on cleaner energy and the government in those countries has helped promoting the use of biomass fuel by offering incentive for using biomass fuel. The main buyers would come from Japan due to government policy and very high incentive from importing the wood pellet for power generation. There is already plan to construct about 4-5 GW of generating capacity that would use biomass as a primary fuel and it will be operated by 2020. Korea may not be attractive market in terms of price but it is a still growing market.

The interviewee provided interesting information regarding the certification of the wood. He mentioned during the interview that if the farmers plant their new rubber tree or cut down the rubber tree, the government would provide the incentive for cutting and planting of the rubber tree and it would consider to be registered plantation. It would be able to substitute the certification from FSC because the government could ensure the sustainability of the plantation.

During the interview, the problem for exporting wood pellet was raised by the author. The interviewee discussed with some factors that hinder exporting of the wood pellet. One of the factor is the logistic. Both inland and sea transportation become one of the main problems at the moment. If the investors could not secure the port and inland transportation that fit their needs and costs, it would be impossible to stay in this business because this could be the main operating cost for the company and it would drive the price up. Another issue would be securing the long-term contract with buyers. If the price is fixed, it would be easier for investors to secure the loan and forecast their capacity to look for source of the raw materials as well as technology. Due to many small investors, it is difficult to secure long-term contract with buyers because investors could not secure the raw material sources which are big enough to commit the volume with the buyers.

Interviewer asked opinion from the interviewee about the domestic demand and interviewee said that for domestic use of wood pellet, the demand is not there because the government does not provide any tangible benefits for using of wood pellet and the buying price is not attractive for the sellers at the moment. Once there is not demand, the supply could not increase the price because it comes back to basic demand and supply.

4.6 Sixth Interviewee

The sixth person is farmer from southern part of Thailand. He owns the rubber wood plantation for many years and supplies raw materials for one of the investors for wood pellet, though a sawmill.

The interview started with the question regarding the wood pellet and how much he knows about wood pellet. He does not know about the business and does not really know what wood pellet is. He only concerns that there would be an off-taker who is willing to take his wood once it reaches its time for cutting down. That is main source of his income, not what the off-taker is doing once they take his wood.

The government still enforces the policy for cutting down rubber tree and planting a new one. However, it needs to be registered with RAT. He feels he has received enough support from the government agency but he has not been informed about what wood pellet is from the local agency and what the potential market for the wood could be in the upcoming years. There are only investors who talk to him because the investors would require securing the raw materials for their supply to investors' customers.

4.7 Summary of Findings

From the interview, there are couple of things in commons between each interviewee who highlighted such as logistic, price, rules and regulations and technology. There are some other factors that author did not account for such as domestic demand and different opinions regarding the certification of the raw material and contract term. Some of the investors are giving more attention to logistic problem

rather than technological problem. As there is no right or wrong answer for the response due to the readiness and awareness of each investors. However from the interview, it provides the ideas of where the potential problems are that hinder Thailand for becoming one of the main exporters for wood pellet.

One thing that is stand out for the author is the domestic demand of wood pellet. It is interesting that there is not much support for promoting the use of wood pellet within the country. The potential problem that causes a low demand for wood pellet within the country is no benefit for using wood pellet for the power plant. In addition, the wood pellet would increase the operating cost for power plant due to higher price in wood pellet. One of the benefits from using wood pellet is that requires smaller space to store and less consumption due to the density. Energy from pellet is higher, humidity in the material is also lower from wood pellet so that it provides better combustion for the biomass power plant boiler.

The market trend has been confirmed from the interview that Thailand has the capability to supply the wood pellet to oversea and has the ability to be one of the major exporter to other countries. The current market is Japan and Korea but Japan is more attractive to the investors due to higher buying price and growing demand. Japan is expanding their demand of the wood pellet or biomass fuel due to Fukushima nuclear power plant incident and the COP 21 which Japan has signed back in the years to commit to lower their greenhouse gas emission. Japanese government is also stimulating the demand of biomass fuel by giving out the incentive to those who are importing and using biomass fuel in the power plant.

Another thing that the author found during the interview is that there is not clear understating regarding the certification. As one of the interviewee states that if the farmers registered their plantation with RAT, there is no requirement for those plantations to obtain certification from FSC. While other interviewees did not mention this during the interview. It seems that they are not aware of this. The author does not have enough information regarding this issue to make the conclusion. If the farmers registered their plantation area with RAT, it could be used as a substitution for FSC certification. To extend of the author's knowledge, FSC requires farmers to follow certain protocols during their plantation process.

However, one thing that has not been highlighted during the interview or emphasized during the interview is the sustainability of the raw material sources. One investor mentioned that the RAT will register new plantation into database to create a sustainable plant and know exactly how much the rubber wood has been cut down or the new one has been planted each year. The cycle of the plantation progress would be entered into the system and RAT would have a better picture of exact number of plantation area. Another factor that helps the sustainable growth of the rubber wood is the certification from FSC because the farmers or investors need to plant for sustainability of the rubber wood.



CHAPTER V

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

For the conclusion of this research, author believes that the assumptions that the author made has been confirmed by the interviewees. There are some aspects that the author did not cover and the author found it to be good additional information and aspects of the findings. At the beginning, author made assumptions that would hinder Thailand to become major exporter of the wood pellet with four main factors: rules and regulations, the sustainable growth for the rubber wood, logistic problem and technology for producing the wood pellet. Each of the interviewee provided their opinions regarding the issues and problems. All of the above assumptions has been confirmed and discussed during the interview session.

The interviewees reflected some common concerns with the author such as rules and regulations. At the moment, government is still behind in terms of supporting investors to get into the business, export the wood pellet to Japan and other countries need certified wood. There are many plantation areas that have not been certified by certification body or have not been recorded into the RAT database. Therefore, it prevents the exportation to some countries.

The sustainable growth and plan for rubber wood have been discussed during the interview but it is only brief discussion regarding this issues. It seems that there are some plans for the sustainable plantation but it is not concrete plans. It is only for registering data into RAT database for recording the plantation areas and knowing the volume of the available sources of rubber wood. The FSC would provide more detailed plan but that has only been enforced at minimal aread of plantation.

The logistic seems to be one of the priority problems and it is direct factor into operating cost and the production cost. This issue has been mentioned by all of interviewees. The inland and sea transportation play a big role of this business and it has a big impact on the company. At the moment, the logistic has not fully been

accommodated to the business owners because the deep sea ports for exporting are far away from the area of factories.

The technology has been discussed by some of the interviewees because some do not concern about the technology and it depends on foreign technology suppliers. The investors who have plan do not concern more about this aspect while ones who will invest in the business and look at it in another way around seem to have more concern on this matter because it has big impact on the investment cost. It depends on experience in the business.

5.2 Recommendations

5.2.1 Rules and Regulations

The author would like to suggest the stakeholders especially the investors to have clear understanding what is the requirement is from imported customers such as certified wood. Once the understanding of the requirement is clear, investors and government agency would need to work together in order to develop plan and adjust current rules and regulations. One example from the interview is that if the RAT database for plantation areas could be used as substitution of FSC certification. Government agencies should also host a seminar to educate investors on current rules and regulations that involve in the wood pellet.

Another thing that may encourage more investors to develop wood pellet is to generate demand within the country. This would involve the government agency such as ministry of energy in thing about more biomass power plant located close to supply source. At this moment, most of the new biomass power plants are located in the 3 provinces and 4 districts in southern part of Thailand due to higher incentive program. As the ministry of energy has approved power development plan 2015 (“PDP 2015”), the alternative energy increases from PDP 2010 version and creates room to increase the renewable energy from biomass. At the current status, this renewable energy has been dedicated to solar and wind power.

5.2.2 Sustainable Growth

Government agency should come in and take FSC as an example for plantation plan. Once the wood pellet industry becomes bigger, supply size would need to be increased and the cutting of plantation would grow at a faster rate. The RAT database is a good start instead using the local network and people to connect to the one that has not register their plantation area with RAT but to go a step further, RAT might not need to wait until current farmers planting their new crops. Once RAT has the information, then the policy for cutting and planting new crops need to be put in place. The plan need to be incorporated with the whole wooden product market and limit the sizing of each segment to identify the balance between each product and plantation each year, to prevent farmers to switch around between each type of wood and create an unbalance in supply side. One plan has already happened with latex price when there is too much supply.

5.2.3 Logistic

For this aspect of the problem, author would seek first to develop deep sea ports in the South of Thailand such as Nakorn Sri Thammarat or Surat Thani because these provinces are the main supply for raw materials. The inland system would need to be developed and location to develop the industrial land would need to be sought. The location that would provide benefit for both receiving raw materials and transporting the final products has to be identify. However, in order to implement this logistic plan, the understanding to the community needs to be communicated clearly as well. The environmental regulations need to be enforced strictly. Similar idea of the Eastern Economic Corridor (“EEC”) needs to be developed in southern Thailand. It may focus on wooden products and latex as main focus instead of heavy industry and aviation industry. It also creates a gateway for more investors and alternative routes for importing and exporting goods, though southern Thailand.

5.2.4 Technology

In terms of technology, Thailand is still dependent on foreign technology. Thailand does not have currently the process to improve technology that could be commercially operated with high production capacity. Thailand has smaller capacity

for production machine but it prevents Thailand to compete with the global market because the production rate cannot meet the demand size. Therefore, private and public sectors should provide funding into technology development that suits Thailand rubber and other kinds of wood. The funding could go to university students to develop the capability and know-how could be technically learned to improve machine that already exists or it could be developed with technology owners.



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APPENDIX A: Transcription of Interviewees

1st Interviewee

- In term of overall market of the wood pellet, what do you think about its market perspective?
 - He thinks is really viable to go for Japan and Korea. Especially in Japan market due to the incentive program that the Japanese government put in place, in order to promote the use of wood pellet or biomass type fuel for their conventional power plants. As Japanese government looking to move away from conventional power plant to renewable power plant, the market grown seems to be high in Japan.
 - Korea is also one of the biggest market in Asia and in term of logistical distance, it is not too far to transport from Thailand. Interviewee thinks that Japan and Korea are capture about 20% of the global wood pellet market. However the Korea market provides more competitiveness in term of entering the market, due to the fact that Korea market is easier to enter and big competition from Vietnam.
- What position or potential for Thailand to be in wood pellet market?
 - In term of supply for raw material, he thinks that Thailand has the capability to supply both for domestic and international market. However, there are some competitions for raw material within the region. Each of the competitor is well known within the region and usually has a very good relationship with sawmills or farmers. With the competitor in securing the raw material, it hinders Thailand opportunity to go into global market.
 - Raw material competition is about using the raw material for something else rather than producing the wood pellet, mostly the

raw material for wood pellet is a waste product from sawmill such as wood chip, sawdust, bark and remaining of the wood slab. These remaining materials, instead of using to produce wood pellet it could be used for marking the particle board or other compressed wooden goods. The competition could be very competitive or not very competitive, the driving force behind this is the price of each product and the other thing would be the process of making such product. Right now Thailand is more familiar with process of making particle board and other wooden goods comparing to producing wood pellet.

- What is/are the problem that preventing Thailand to become one of the main exporters for wood pellet?
 - o Price at current market for Korea is too low, this was due to the fact that Korean customers comparing Thailand pellet price with Vietnam pellet price. In reality, Thailand pellet has a better quality comparing to Vietnam pellet. As such the price is not feasible for current investor to go into Korea market, however with incentive program from Japanese government it would be more feasible and more attractive for the investor. The buyers from Japan are willing to enter into contract with higher price. The other factor that influence the price is the volume as now, Thailand does not have the ability to commit to a long-term supply with big volume of the pellet. This was not the matter of not enough supply, but it is due to Thailand has many small investor, but not many as a big one. As such they are not able to make a commitment for big volume and long term contract.
 - o The other factor is scheme for selling, as now there are not many options for selling the wood pellet as such the competitiveness to drive the market is very low. Entry barrier for wood pellet market is still very high, due to high investment cost and ability to secure the raw material, as the current selling scheme. New investor with lack of financial support could find it hard to enter into the

market. The scheme for selling the pellet are either long-term with fixed price or short-term with spot price, which does not give many options for new investors to get into the market and in order to capture the supply size of the raw material as there are many uncertainties, such thing limit the ability to compete and negotiate with the buyers.

- The standard that enforcing the raw material. For Japan market, they require for the raw material and factory to meet FSC standard and certified the source of raw material. As such this process hinders the ability to compete for the market and it is increase the production cost of the wood pellet. This create an entry barrier for new investors as well, as to certify the wood, it required investment to be put in. FSC standard is not quite an easy to obtain as there are not many qualified certification body within the country. Hence it require some period to able to certify rubber wood plantation area in Thailand.
- Where would you see the potential market and what is the sizing that Thailand is capable for?
 - Thailand has the potential to be one of the main exporting of wood pellet, as the resource for the raw material is there. However it needs to be supported by the local government as Thailand has capability to supply over hundred thousand tons of wood pellet per year. These numbers are from what is the current plantation area within Thailand at the moment. This information is obtained from talking with farmers and local sawmills as those people know more about the actual plantation area comparing to the government information. As there are some areas that are illegal plantation.
- Who do you or who are the stakeholders for wood pellet business?
 - The main stakeholder for the wood pellet market, he thinks that the investor play an important role to drive this market within Thailand as it is a key driver to drive the government and farmer

to support the business and to drive Thailand into the Asian market.

- As more investors would like to get into this business, government would need to adjust their rules and regulations for investors to be able to compete in the global market, the infrastructure will need to catch up with the market trend to lower the production cost of the pellet. For infrastructure (support from government), it will require logistic needs such as deep sea port, railway system and other inland transportation.

2nd Interviewee

- In term of overall market of the wood pellet, what do you think about its market perspective?
 - The market will be continue to grow in the upcoming years, he highlighting that the market would continue to grow in Japan because of the COP 21 and Fukushima nuclear power plant incident. Japan would be a most likely destination in term of the importing of the wood pellet, since Japan is lack the natural resource in term of biomass material and due to government would like to move away from fossil fuel in order to reduce the greenhouse gas emission from the power plants.
 - The global trend is also supporting the use of wood pellet due to increase of environmental concern. The Paris Agreement will continue to be enforced and it seems that next COP will still consider the greenhouse reduction policy.
 - There is another push for wood pellet and that is the consideration of renewable energy. Biomass is also considered to be a renewable energy source as well, due to its ability to regrown the plantation and replenish of energy source within couple of years.
- What position or potential for Thailand to be in wood pellet market?
 - Thailand has a great reserve supply in term of rubber wood, as there are more than 22 million rai of rubber wood at the moment.

As such in term of the supply of raw material, there would be no shortage in the upcoming years. However, the plantation plan would need to be put in place in order to sustain the grown in the wooden market not only wood pellet market. There is also one thing that government would need to help out is the registering of the rubber wood into the database to get more accurate data about the actual plantation area of the rubber wood. This would require the participation of the farmers as well. The sizing of the plantation of rubber wood from difference sources provide different information ranging from 19 – 22 million ha of plantation.

- More reliable information could be considered from the local farmers or local sawmills. As both parties are closer to actual information and their network seem to be more in depth.
- What is/are the problem that preventing Thailand to become one of the main exporters for wood pellet?
 - First thing is about the big and small investors, as the investment cost for the business is quite high and the ability to obtain certify wood is a long steps, smaller investor would not have enough ability to enter into the market and promoting themselves to the global market. If the new investor would like to enter into this market, there are at least two factors that would play a big role in. First is the buyers, investors need to be able to tired down some contract and fixed price for wood pellet and second thing is the supply of the raw material.
 - Secondly there is big competitor from Vietnam, which drive the price down for Thailand and with the travelling distance is much shorter from Vietnam to Japan and Korea, such it's create some disadvantages to Thai investors, another aspect regarding the price is the long-term commitment. In Thailand there are not many investors who could get long-term contract with buyers and

as such the price of the wood pellet could fluctuating as the nature of spot price and there more competitors for this scheme.

- Thirdly, the logistic as Thailand specially down south where most of the raw materials are, the logistically is still a problem due to lack of deep sea port and inland transportation is not easily access for the investors to received raw material and transport the wood pellet out to sea port. Thus, it creates huge additional cost for logistical and as such more cost of production of the wood pellet. Only that one that capable to get the market size and capture huge amount of raw material might be able to break out from this barrier.
- Fourthly, the technology, as the supplier of the technology (reliable and efficient) for producing wood pellet still comes from oversea. It crates huge investment cost for the investors, making the investors has a bigger cost of production when comparing with other countries. There is not much support from government in term of developing the technology itself. Now, if investor would like to get something cheap. It would be something like reverse engineer from the existing machine, however the quality and reliability of the machine are still not on par with imported machine.
- Lastly, the interviewee raises some concert about the government rules and regulations that are still not entirely support the wood pellet production. As the rules and regulations still not fully support the investors in term of certification of wood, exporting and importing of relevant machine and technology for wood pellet production, also to cut down wood, there are still some rules and regulations that preventing the investors to use machine to cut down trees. It is not possible to use mobile chainsaw to go into the wood and process the wood within the plantation area, the wood need to be transported to sawmill in order to cut and process it into other size.

- Where would you see the potential market and what is the sizing that Thailand is capable for?
 - Thailand does have enough capacity to supply wood pellet to Japan and Korea, as the plantation area is approximately 22 million rai and 30% of that could be used as raw material for wood pellet, in term of the calculation Thailand should be able to provide wood pellet to Japan and Korea for over hundred thousand ton a year.
 - As such Thailand has capability to be one of the major suppliers to Japan and Korea if the price is right.
- Who do you or who are the stakeholders for wood pellet business?
 - First of all it's the customers that pay the big role, investors are the driving force to drive the business with support from government, farmers and sawmills owners play their part in term of supply of the raw material. As all of them come to gather it generate both demand and supply for the business.
 - There are some minor stakeholders as well such as transportation company for logistic. As transportation will play a part in term of accessibility to raw material and to port. Such thing would affect the financial model for the project.

3rd Interviewee

- In term of overall market of the wood pellet, what do you think about its market perspective?
 - The market now is growing and there are many potential buyers from oversea such as Japan and Korea. As the fact that this is due to government policy to reduce the greenhouse gas emission and other environmental concern over the conventional type power plants. The demand will continue to grow due to imminent of new biomass power plants in Japan or the one that plan to convert from fossil-fired power plant to biomass power plant. He

currently already have some contracts to supply wood pellet, there is no risk of the market is going down at the moment.

- This is due to the fact that Japanese government is really put in place the policy to promote importing of biomass fuel in order to meet the commitment in COP 21.
- What position or potential for Thailand to be in wood pellet market?
 - Thailand could be one of the major suppliers for the wood pellet to Japan and Korea due to quite a lot of supply source. Thailand has quite a large plantation area for rubber wood and other type of wood as well. Most of the rubber wood, which is accessible, is located in the southern provinces in Thailand.
- What is/are the problem that preventing Thailand to become one of the main exporters for wood pellet?
 - The price of the wood pellet as the Vietnam market offer lower price, however with lower quality as well. Korea market accept the wood that is not require to be certified by FSC or other creditable organization, however it does offer the lower buying price and that is not feasible to Thailand to get in to the market.
 - The price needs to be at less over USD 100 per ton, which could cover logistical cost and investment cost for the long run. However, that needs to factor in the volume of the order as well. Some other minor problem for exporting wood pellet is getting to know the buyers as most of the buyers are oversea, thus it would require some connection to open the wood pellet market. At the moment support from government in term of promoting the wood pellet is very limited. There is not really a match program where government is helping out to get sellers and buyers together.
- Where would you see the potential market and what is the sizing that Thailand is capable for?
 - The interviewee has not been response about this question.

- Who do you or who are the stakeholders for wood pellet business?
 - o For me there is not really specific stakeholders for wood pellet market as I think that everyone are equally involve in the market and are the driving factor to drive Thailand wood pellet market forward. So everyone is playing a role in driving wood pellet forward. If one is missing from the supply chain, then the business could not function.

4th Interviewee

- In term of overall market of the wood pellet, what do you think about its market perspective?
 - o The grown in Japan market due to new government policy and it was due to Fukushima incident. Japanese government needs to turn away from nuclear power plant. Also due to Japan is highly concern about the environmental issue, as it one of the strictest country for environmental regulations. Thus, Japanese government is turning to biomass power plant in the belief that it would reduce the greenhouse gas emission to the environment. Also as people grown more concern about the environment, it stimulate a cleaner energy as well, such thing is one of the mechanism to drive the expanding of the wood pellet market.
 - o The remaining wood from sawmill is also one of the small driving force for the market because sawmill does not have space to keep the remaining sawdust or wood slab from the cutting process, as such sawmills would need to seek alternative option to off load their “waste” from the sawmill area.
- What position or potential for Thailand to be in wood pellet market?
 - o My opinion is in another perspective, I would think that instead of going for oversea market. Thailand should be focusing for domestic demand and the demand should be generate by the government, the demand for wood pellet would come from the biomass power plant. Most of the new power plants right now are

located in 3 provinces and 4 districts with higher incentive for electricity tariff. However, the supply sources are mostly located in upper provinces such as Nakorn Sri Thammarat or Surat Thani. In those provinces there is so much available resource for biomass power plant. Biomass fuel should be enough to supply at least 300-400 MW. It would also generate more work within the area and also help out with the power stabilization within the region as well.

- What is/are the problem that preventing Thailand to become one of the main exporters for wood pellet?
 - The first one is the government support, the government should promote the consumption of the wood pellet within the country instead of adjusting the rules and regulations for exporting. I see the potential within the country that it would be more viable to generate the demand within the country by having new biomass power plants close to wood pellet factory or close to the plantation area. At the moment, most people are building new power plants where government provide the higher incentive, which in the near future there would create the lack of supply source for biomass fuel and the available source would be too far too make it feasible to transport to existing power plants in further down in the country such as Yala or Pattani.
 - The other factor that I want to highlight is the price of the wood pellet, as the competition from Vietnam is high, it hinder the ability Thailand to compete in the global market. Vietnam is able to offer the lower price due to lower cost of logistic and lower in quality of the wood pellet, which in some countries the quality is not their main factor for consideration to buy. Certify of wood also hinder Thailand, as the cost to certify wood will hugely be placed on the investors and to meet that standard the price from buyer would be very important.

- The policy in neighboring countries also make it harder for Thailand to compete in the global market, some example could be from Vietnam where they have concession policy to help out with the plantation of raw material. Thus, it help secure the supply size of the equation and able to commit in the long-term contract and able to commit for the price, once the investors get into longer contract term, they are able to lower their selling price and secure loan easier from the financial institute.
- Another thing would the oil price that is dropped at the moment, as the oil price dropped, many people turn back to conventional type of power plant due to lower in operating cost. However, this could be a temporary trend, as the oil price shall increase as the time progress. Though the environmentalist could raise this issue to the global state as the countries signed the Paris Agreement to lower their carbon emission, wood pellet shall be one of the main source in helping each counties fulfill their commitment.
- Where would you see the potential market and what is the sizing that Thailand is capable for?
 - Thailand at the moment should have enough supply sources for 300-400 MW of the biomass power plant. As I mentions this before, the current status for biomass fuel within the southern region should be more than enough to supply nation plan, if the government decided to promote the use of wood pellet within the country.
- Who do you or who are the stakeholders for wood pellet business?
 - This question has not been raised during the interview.

5th Interviewee

- In term of overall market of the wood pellet, what do you think about its market perspective?
 - o The Asia market will continue to grow over the years and countries keen on cleaner energy and the government in those countries has help in promoting the use of biomass fuel, by offering incentive for using biomass fuel. The main buyers would come from Japan, as it has been highlight in the government policy and very high incentive from importing the wood pellet for power generation. There is already plan to construction about 4-5 GW of generating capacity that would use biomass as a primary fuel and it schedule to start and be commercial operation by 2020. Korea may not be attractive market in term of price, however it is a still growing market. The other countries around the region do not provide an attractive market. As the government policy does not provide any incentive for people who would like to import wood pellet for industrial or household use.
- What position or potential for Thailand to be in wood pellet market?
 - o This question has not been raised during the interview.
- What is/are the problem that preventing Thailand to become one of the main exporters for wood pellet?
 - o Factors that hinder exporting of the wood pellet. One of the factor is the logistic, both inland and sea transportation is one of the main problem at the moment. If the investors could not secure the port and inland transportation that fit their needs and costs, it would be impossible to stay in this business. As this could be the main operating cost for the company and it would drive the price up. The other issue would be securing the long-term contract with buyers. If the price is fixed, it would be easier for investors to secure the loan and forecast their capacity and looking for sourcing of the raw material and technology. Due to many small investors, it is very difficult to secure long-term contract with

buyer because investors could not secure the raw material source, big enough to commit the volume with the buyers.

- Where would you see the potential market and what is the sizing that Thailand is capable for?
 - Thailand has quite a good supply source, it is due to the plantation of rubber wood policy in the previous years, thus it create the foundation of supply for wood. The supply will be sufficient for another 5-7 years if there is new plantation. However, if the plantation has been planned and sustainable there would continue to be enough supply for roughly over hundred thousand tons of wood pellet per year.
- Who do you or who are the stakeholders for wood pellet business?
 - This question has not been raised during the interview.

6th Interviewee

- How much do you know about wood pellet?
 - I don't really know much about wood pellet, I saw couple of them from the factory. But I don't have the knowledge for what it will be using for. As for me it is not really my concern after I sell my wood to sawmill or investors. I only care that I would make enough money for my family and if the price of wood is going up, then there is a plus for me. For me it would be too much to seeking more information what the sawmill or investors would do to my wood after I sell it to them.
- Do you think is there any problem for the supply side of the raw material?
 - I don't think there is any problem, since I re-plant the rubber wood after I cut it down or someone cut it down for me. So for me, I think the supply would still be there and it would stay relatively the same since government pay me to cut down and plan a new one and that is true for other rubber wood farmers as well. The government also helping out on improving method of

plantation and how to maintain my rubber wood. I think that is sufficient help from the government as I'm not looking to expand my plantation beyond my own resources.

- Is there enough support from local government on the plantation and information about current business trend that involved rubber wood?
 - o For me, the support in term of plantation is quite sufficient already, however I do not get information about what my wood could be used for. I have some knowledge about the latex, but I do not really have any idea about the product from wood beside furniture and particle board.

