รายงานการศึกษา ฝึกอบรม ดูงาน ประชุม/สัมมนา ปฏิบัติการวิจัยและการปฏิบัติงาน
ในองค์การระหว่างประเทศ

ส่วนที่ ๑ ข้อมูลทั่วไป

๑.๑ ชื่อ/นามสกุล(นาย/นาง/นางสาว) อ้อมจิตร เสนา

อายุ ๓๓ การศึกษา ปริญญาโท

ความเชี่ยวชาญเฉพาะด้าน การจัดการป่าไม้อย่างยั่งยืน

๑.๒ ตำแหน่ง นักวิชาการป่าไม้ปฏิบัติการ

หน้าที่ความรับผิดชอบ (โดยย่อ) ส่งเสริมด้านการปลูกไม้เศรษฐกิจ ประสานงานด้านการป่าไม้เกี่ยวกับมาตรฐานการจัดการสวนป่าและการรับรองด้านป่าไม้

๑.๓ ชื่อเรื่อง/หลักสูตร Sustainable Development

สาขา Forest and Environmental policy

เพื่อ ☑ ศึกษา ☐ ฝึกอบรม ☐ ดูงาน ☐ ประชุม/สัมมนา

☐ ปฏิบัติงานวิจัย ☐ ไปปฏิบัติงานในองค์การระหว่างประเทศ

ประเทศที่ไป สาธารณะรัฐเกาหลี

แหล่งผู้ให้ทุน Asian Forest Cooperation Organization (AFoCO)

งบประมาณ -

ระหว่างวันที่ ๒๖ กุมภาพันธ์ ๒๕๖๓ – ๓๑ สิงหาคม ๒๕๖๔

รวมระยะเวลาการรับทุน ๑ ปี ๖ เดือน

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ของหน่วยงาน Asian Forest Cooperation Organization (AFoCO)

คุณวุฒิ/วุฒิบัตรที่ได้รับ Master of Science

ส่วนที่ ๒ ข้อมูลที่ได้รับจากการศึกษา ฝึกอบรม ดูงาน ประชุม/สัมมนา ปฏิบัติงานวิจัย และไปปฏิบัติงาน ในองค์การระหว่างประเทศ (โปรดให้ข้อมูลในเชิงวิชาการที่สามารถนำไปใช้ประโยชน์ได้ หากมีรายงานแยกต่างหาก กรุณาแนบ File ซึ่งมีขนาดไม่เกิน ๒ Mb ส่งไปด้วย)

๒.๑ วัตถุประสงค์

๑. วิเคราะห์ห่วงโซ่คุณค่าของไม้พะยูงในประเทศไทย

๒. ศึกษาปัญหาและวิเคราะห์แนวทางการตลาดทั้งในและต่างประเทศ

๒.๒ เนื้อหา (สรุปโดยย่อประมาณ ๒-๕ หน้ากระดาษ A๔) ไม้พะยูงเป็นไม้เศรษฐกิจที่มีมูลค่าสูง ไม้พะยูงในประเทศไทย มีประมาณ ๒๖ สายพันธุ์ เนื่องจากความชอบด้านเนื้อไม้ของตลาดในจีน ราคาจึงเพิ่มขึ้นอย่างมากและนำไปสู่การตัดไม้อย่างผิดกฎหมายอย่างหนักในประเทศเป็นเวลานานกว่าสิบปี ห่วงโซ่คุณค่าไม้พะยูงในประเทศไทยอยู่ในช่วงเริ่มต้น จึงไม่มีข้อมูลด้านการค้ามากนัก ทั้งนี้กฎหมายและข้อบังคับที่ล้าสมัยทำให้เป็นอุปสรรคในการค้าขายอย่างถูกกฎหมายของไม้ชนิดนี้ ประเทศไทยได้มีการประกาศแก้ไขพระราชบัญญัติป่าไม้ พ.ศ. ๒๔๘๔ ในปี พ.ศ. ๒๕๖๒ โดยต้นไม้ทุกชนิดที่ขึ้นในที่ดินกรรมสิทธิ์สามารถตัดขายได้โดยไม่ต้องขออนุญาตจากพนักงานเจ้าหน้าที่ ทำให้ไม้พะยูงกลายเป็นไม้เศรษฐกิจที่มีประชาชนสนใจปลูกเป็นจำนวนมาก ในปี ๒๕๕๘ กรมป่าไม้แจกจ่ายกล้าไม้พะยูงจำนวน ๔.๖ ล้านต้น คิดเป็น ๒๐% ของกล้าไม้ทั้งหมดในประเทศ ในปี ๒๕๕๑ มติคณะรัฐมนตรีห้ามการส่งออกไม้พะยูง ผู้ค้าที่ต้องการนำเข้าและส่งออกภายในประเทศต้องมีใบอนุญาต CITES จนถึงปัจจุบันพบรายงานเพียงรายเดียวเท่านั้น ในความเป็นจริงประเทศไทยได้ค้าไม้พะยูงกับประเทศจีนมาเป็นเวลานานแล้ว ตั้งแต่ปี ๒๕๕๒-๒๕๖๔ ประเทศไทยส่งออกไม้พะยูงมูลค่า ๔.๓ พันล้านดอลลาร์สหรัฐไปยังประเทศจีน ราคาตลาดภายในประเทศประมาณ ๕๐๐,๐๐๐ บาท/ลบ.ม. แต่ราคาสุดท้ายที่ประเทศจีนพุ่งเป็น ๑๕๑,๓๘๔ หยวน/ตัน หรือ ๗๓๘,๐๐๐ บาท/ตัน ผู้ซื้อชาวจีนมีบทบาทสำคัญในการกำหนดราคาและจัดการกับห่วงโซ่อุปทานไม้พะยูง ในประเทศไทยสามารถพบหลักฐานการค้าได้ในการประมูลขององค์การอุตสาหกรรมป่าไม้ ไม้พะยูงในธรรมชาติในประเทศไทยที่พบในอุทยานแห่งชาติ จำนวน ๑,๓๗๒,๐๐๐ ต้น คิดเป็นพื้นที่ ๒๙๕,๑๔๐ ลบ.ม. ภายใต้การขึ้นทะเบียนสวนป่า ๗๕,๙๗๑ ต้น และภายใต้สวนป่าขององค์กรอุตสาหกรรมป่าไม้รวม ๑,๗๔๕ ไร่ กรมป่าไม้เป็นหน่วยงานหลักในการพัฒนาระบบการตรวจสอบไม้ โดยเฉพาะอย่างยิ่งการรับรองแหล่งกำเนิดไม้เพื่อการส่งออกไปยังต่างประเทศ อย่างไรก็ตาม การแก้ไขกฎหมายและข้อบังคับเพื่อสนับสนุนการเติบโตทางของไม้เศรษฐกิจเป็นวิธีการสำคัญในการเพิ่มขีดการแข่งขันในตลาดอุตสาหกรรมไม้ โดยเฉพาะอย่างยิ่งการค้าไม้ในต่างประเทศ จากการศึกษาพบว่า ๑. หน่วยงานที่รับผิดชอบต้องมีการแลกเปลี่ยนข้อมูลเพื่อให้มีระบบการตรวจสอบที่มีคุณภาพ โดยมีกรมป่าไม้เป็นหน่วยงานหลักในการประสานและจัดเก็บข้อมูล พร้อมทั้งวิเคราะห์ข้อมูลตลอดห่วงโซ่อุปทาน รวมถึงตรวจสอบปลายทางของไม้ที่ส่งออกไปยังตลาดหลักโดยเฉพาะจีนและเวียดนาม ๒. สำหรับข้อมูลพิกัดศุลกากรที่ใช้ยังไม่สามารถนำมาวิเคราะห์หาจำนวนที่แท้จริงของไม้พะยูงที่มีการซื้อขายได้เนื่องจากคำจำกัดความของผลิตภัณฑ์ไม้ค่อนข้างกว้าง ๓. ทุกภาคส่วนควรร่วมกันตรวจสอบการขนส่งทางตู้คอนเทนเนอร์ พัฒนาศักยภาพเจ้าหน้าที่รัฐให้มีการตรวจสอบที่รัดกุมและภาคเอกชนควรแสดงความโปร่งใสในทุกขั้นตอนเพื่อยืนยันความชัดเจนของสินค้าผ่านด่านพรมแดน ๔. สร้างระบบการตรวจสอบย้อนกลับที่เป็นมาตรฐาน ลดความความเสี่ยงในการขนส่งสินค้า ๕. ตลาดไม้พะยูงยังคงมีแนวโน้มการเติบโตอย่างต่อเนื่อง การแก้ไขกฎระเบียบและข้อบังคับจะช่วยเพิ่มประสิทธิภาพการเติบโตทางด้านเศรษฐกิจและการแข่งขันของตลาดอุตสาหกรรมไม้ในตลาดโลก

๒.๓ ประโยชน์ที่ได้รับ

☑ ต่อตนเอง ได้รับความรู้ในด้านการป่าไม้และการจัดการสิ่งแวดล้อม เพิ่มพูนทักษะด้านภาษาการต่างประเทศ ได้แก่ ภาษาอังกฤษและภาษาเกาหลี

☑ ต่อหน่วยงาน สามารถนำผลการศึกษา นำมาต่อยอดในการวิเคราะห์นโยบายด้านการส่งเสริมการปลูกไม้เศรษฐกิจ เพิ่มศักยภาพบุคลากรด้านการส่งเสริมการปลูกป่า

☐ อื่น ๆ (ระบุ) ____________________

ส่วนที่ ๓ ปัญหา/อุปสรรค -

ส่วนที่ ๔ ข้อคิดเห็นและข้อเสนอแนะ

กรมป่าไม้ควรพิจารณาจัดทำแผนความต้องการบุคลากรที่มีความรู้จำเป็นเฉพาะด้านเพื่อจัดหาแหล่งทุนสำหรับบุคลากรให้มีโอกาสการศึกษาและอบรมเพิ่มเติมในระดับนานาชาติ เพื่อพัฒนาศักยภาพและทักษะด้านการป่าไม้ พร้อมทั้งสนับสนุนงบประมาณในการดำเนินงานวิจัยที่เกี่ยวข้อง

(ลงชื่อ) ____________________

(**นางสาวอ้อมจิตร เสนา**)

ส่วนที่ ๕ ความคิดเห็นของผู้บังคับบัญชา (ระดับผู้อำนวยการกอง/คณบดี ขึ้นไป)

กรมป่าไม้ได้เคยหารือกับผู้แทนสถานทูตสาธารณรัฐเกาหลีในเรื่องการค้าไม้ที่ถูกต้องตามกฎหมาย โดยมีการหารือในการจัดทำ Country Specific Guideline (CSG) ซึ่งจะสามารถต่อยอดความร่วมมือต่อไปได้

(ลงชื่อ) ____________________

((นายทนงศักดิ์ นนทภา))

ตำแหน่ง ผู้อำนวยการสำนักเศรษฐกิจการป่าไม้

หมายเหตุ แบบฟอร์มนี้เป็น Electronic File หากเนื้อที่ไม่พอโปรดขยายหรือเพิ่มเติมให้ได้ข้อมูลที่สามารถนำไปใช้ประโยชน์ได้

Master of Science Thesis

Value Chain of Siamese Rosewood in Thailand

Park Chung Hee School of Policy and Saemaul of
Yeungnam University

Department of Sustainable Development

Forest and Environmental Policy Major

Sena Aomjitr

Advisor : Prof. LEE YoHan

August 2021

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August 2021

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Most of the data and information are in RFD. I am personally a contracting officer who directly works in the field. They always fully support me and find the data for me. I would like to thank my friends for their support, Miss Thanyathorn, head of Udon Thani nursery. Mrs. Penpinich Visitsartkul, Head of Planning and Budget, Bureau of Forest Protection and Forest Fire Control. Miss Buchanan Chuachoksung, admin of the Forest plantation and E-Tree system, and all friends at the Royal Forest Department support both information and motivation.

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Sena Aomjitr

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List of Acronyms

RFD	the Royal Forest Department
FIO	the Forest Industry Organization
CITES	the Convention on International Trade in Endangered Species of Wild Fauna and Flora
CoC	The Chain of Custody
CoO	Certificate of Origin
EFI	The European Forest Institute
EIA	Environmental Investigation Agency
EU	The European Union
FAO	The Food and Agriculture Organization of the United Nations
GDP	Gross domestic product
GVC	Global value chain
Hongmu	A range of richly hued durable tropical hardwoods used to produce high-end reproduction furniture, flooring, and handicrafts
HS	Harmonized System codes
HTS	Harmonized Tariff System codes
ITTO	International Tropical Timber Organization
LAS	legality assurance system
RMB	The official currency of the People's Republic of China
TLVS	Timber Legality Verification System
UNODC	The United Nations Office on Drugs and Crime
US	The United States of America
WISE	The World Wildlife Seizures (World WISE) database
WWF	The World Wide Fund for Nature

ABSTRACT

Siamese rosewood was listed in CITES Appendix II under trade restrictions by CITES regulation. There are around 26 species of Dalbergia in Thailand. Due to the Chinese market's wood texture preference, the price is enormously rising and leads to heavy illegal logging in the country for more than ten years. This study aimed to understand the rosewood value chain by overview's rosewood value chain in Thailand, identify core issues, and map the chain link to the international market. Rosewood value chain in Thailand is in the birth stage of value chain status. Thailand aims to promote timber industries in the country, but outdated laws and regulations make trading an obstacle. In 2018 Thailand amendment The Forest Plantation Act of 1992, and then in 2019 has an announced the Forest Act, 1941.

The main reason is that all tree species planting in private land have the right to cut them after changing the law in 2019, making rosewood become the most favorable planting tree. In 2015, Royal Forest Department had to contribute 4.6 million rosewood seedlings account for 20% of the total seeding contribution in the country. By the way, the policy and regulation have an obstacle for market flow. The National Forestry Policy committee is ongoing to revises forest management in Thailand. However, they seem more concerned with endangered species and environmental impact more than economic value.

In 2008, the Cabinet Resolution banned the export of rosewood logs. The traders who want to import and export within the country need to have a CITES Permit. So far, only one case found recorded on the CITES species trade report. In the realistic, Thailand has been trading rosewood to China for a long time. From 2009-2021 Thailand has been exported rosewood account for 4.3 billion USD to China. Now the price is relatively stable. In the domestic market, the price is around 500,000 baht/m3, but in the final market, the price has been rising to 151,384 Yuan/Ton or 738,000 baht/Ton. Chinese buyers play an essential role in facilitating and dealing with the complex rosewood supply chains.

The evidence of rosewood trading can find in Forest Industry Organization (FIO) auction. FIO is the only one has permitted to harvest and sell timber from forest conversion land permitted. Rosewood trees remain in the country found in National Park total of 1,372,000 trees account for 295,140 m3, under forest plantation registered 75,971 trees and under Forest industry organization’s plantation total 236 ha. Now, after revising the law obtained from Section 7 under the Forest Act 2484, found the case that the loggers use evidence declared rosewood from the natural forest as their possession. RFD is the primary response administrative ongoing to set a new system for control timber flows and data management, especially to certify timber origin. However, amend laws and regulations to support timber economic growth should be an excellent way to increase market competition. Otherwise, Thailand will lose opportunities in the timber industry.

Key words: rosewood value chain, Siam rosewood, Dalbergia *cochinchinensis*, rosewood market

CHAPTER I INTRODUCTION

1.1 Background

Siamese rosewood is the commercial name of native rosewood species (*Dalbergia cochinchinensis* Pierre.) in earthen and earthen north of Thailand with generally found in dry evergreen forest and mixed deciduous forests at elevations between 100 and 200 meters above mean sea level. This species is native to Thailand, Cambodia, Laos, and Vietnam, most Indo-Chinese countries. The tree size is medium-high, around 25 meters, with identity as a slow-growing tree. There are around 26 species of Dalbergia in Thailand. (Niyomdham, 2002) Siamese rosewood is a high-quality timber, good color, hardness, durability, and easy to processing and resistant to insects. The wood texture is fine and classified as a first-class wood. While Thai people consider rosewood as a high item, therefore often used rosewood to make an altar table no used for the floor. Siamese rosewood is one of the rosewood species supply to "Hung mu" wood industries in China. Rosewood wood species becomes the most expensive and smuggled in the world. The high demand for wooden furniture and decorative materials from Chinese millionaires made the trend continue with the high economic value from the Chinese market, led to a stream of illegal logging, and made the tree abandon in natural forest. In the past 100 years ago, this kind of tree we call "Mai Kra Ya Loei," meaning the tree that lord not interesting because at that time only teak (*Tectona grandis spp*) was favorable for commercial. Since 2014, rosewood prices extremely peaking up as the same ways of seizure accrued in Thailand. Illegal logging in Thailand peaked between 2012 -2015 and dropped down in 2017 as a scarce resource. Due to the international market between "2000 – 2013", China has been imported rosewood species that reach 3.5 million cubic meters, worth $2.4 billion, with no signs of slowing down. (EIA, 2014a) Hongmu industries are encompassing rosewood species and other related species. The expanding hongmu industry has expanded massively over the past decade, with supply for both manufactured and consumed China. Hongmu log imports into China have increased by 1,300% from 2009 to 2014 (accounting for 10% of average from Chinese log imports by value) (EIA, 2016) Driving from high market demand leads to massive harvesting and illegal logging. As a result, more than 300 rosewood species are listing in The Convention on Trade in Endangered Species (CITES). Siamese rosewood also was listed in CITES Appendix II under trade restrictions by CITES controls "logs, sawn wood, and veneer sheets and allowing any other semi-finished products and finished products to a maximum of 10 kg to sell without the need for export permits.". (CITES, 2019)

As a global driving trend, rosewood is becoming a favorable planting tree for Thai farmers. Rosewood seeding demand rising as the report from Forest Nursery sector in 2015, Royal Forest Department has to contribute 4.6 million rosewood seedlings, 20% of total seeding species that had to contribute to the farmer. This phenomenon helps Thailand's government increase the forest plantation in private land and also increases national forest area and timber consumption at the same time. In the ways to move forward, Thailand establishes National Forestry Policy to monitoring forest management in-country. The Purpose of the National Forestry Policy is to have forest areas exceed 40%, which divides into 25% of the Conservation Forest area and 15% of forest economy within 20 years. Make the government challenge to encourage farmers or private sectors to have planting forest plantations in their land. Royal forest department (RFD), a response institution of the government sector to effort commercial forests reach to targeted as 15% of the country area. RFD decided the Private Reforestation Division to follow up policy and organize the project to planting trees for the wood industries, developed forest industry, promoted planting valuable trees in private lands, provide policy support for the private sector to investing forest industries in Thailand. RFD has many projects according to the expanding forest area. One of the most successful projects is the forest plantation subsidy project to promote an individual farmer planting slow-growing trees and fast-growing trees in their land. A project like this started in 1994 -1998, called the "Forest Plantation Promotion Project," initially from high wood demand. Unfortunately, this project stopped due to inefficient management projects. In 2016, RFD developed a "Promotion of Forest plantation for economic, Social and Environmental Project" again (RFD, 2017). The project gave an incentive for farmers who have high intension but limited finances by subsidizing a total of 5,000 baht/rai within five years. The payment will provide an installment basis in 1,000, 700, 800, 900, and 1,600 Baht/Rai/year in the 1st, 2nd, 3rd, 4th, and 5th year. Included seedlings support with 200 seedlings per Rai. The project also provides technical support such as selecting suitable tree species and forest plantation management. RFD had to set up many research sites to conserve tree species and developed silviculture practices to improve rosewood tree planting on a plantation scale.

Since 2015 government move forward to push up forest economics more productive by renewing law and enforcement. According to Forest Plantation Act B.E. 2535 (1992) and subsequent amendments B.E. 2558 (2015), the word “forest plantation” means land registered under a title deed or certificate of utilization under the Land Code, or on the lands in the land reform area under the Agricultural Land Reform Act, with proof of license, rent, lease, transfer, or inheritance for plantation and maintenance of the tree. Fifty-eight tree species need to register and submit documents to the officer to clarify the tree before cutting, including rosewood. Forest Plantation Act B.E. 2558 (2015) proposed promoting forest economics and preventing illegal pressure logging in a natural forest. Unfortunately, Forest Act B.E. 2484 (1941) is still a barrier for cutting preserve tree-like teak, rosewood, and *Dipterocarpus* spp. So, it is opposite with the purpose to promote forest economics within those tree species are high demand in the market. RFD is getting much pressure from private sectors that want to renew law and enforcement to be correlative with the market aspect.

Consequently, recently Thailand has announced Forest Act B.E. 2484 (1941) and subsequent amendments B.E. 2562 (2019). The main reason is to allow all tree species that planting on private land can cut their tree without permitting the officer. It is the new chapter for Thailand to unlock the law for promoting tree planting and forest economics. The system in a country is available, but, on the other hand, Thailand needs to develop a due diligent system to follow up global trade and criteria for the international market. Today, rosewood raw material still cannot export as following commitment with CITES, so this is another step for Thailand to working out.

According to perform on this mission to promote forest business and economic forests, we need to research and develop valuable timber species, both silviculture marketing. It is a new change of RFD from preserved to promoted institution. The question is, do we ready for it? When we encourage people to plant trees in their lands, we need to find a good answer for how much value they will get in the next 20-40 years. Rosewood takes around 30-40 years to harvest, and the most valuable part is a hardwood.

On the other hand, hardwood is still researching because some rosewood even mature tree still has small hardwood. When become to promote planting rosewood, we have to challenge both silviculture technology and market volatility. We still do not clearly understand the rosewood market because most of the supply products in these industries are from black market transactions to Hongmu industries in China, and the rosewood domestically trades, or wood processing industry in Thailand did not exist yet. Thence what information we should get to better understand and avoid the risks in the future. RFD should play an essential role in promoting tree planting and providing market information, regulation, and policy support in the economic forest sector.

When looking at the market perspective, value chain analysis is the selecting tool for identifying the rosewood market in Thailand. The study aimed to i) Overview's rosewood value chain in Thailand. ii) Identify core issues in the value chain and iii) Analyze value chain mapping link to the international market. This study will help policymakers with decision-making and critical issues for the rosewood market. Conduct planting information from the RFD data system. Identify core issues were taking information from published and unpublished articles and analyzing all information for the final report. The primary purpose of this work is to identify critical issues for chains targeting a specific development stage.

1.2 Research Objectives

1. To overviews rosewood value chain in Thailand.
2. To analyze value chain mapping link to international market.
3. To identify the core issues of the rosewood value chain in Thailand.

CHAPTER II LITERER REVIEW

2.1 Definition of Value Chain

The term "Value Chain" consists of the wide range of economic activities distributed from producer buyers to waste products at the end-users. Therefore, the industry structure can explain a better understanding of the profitability of the firm. Porter (1985) describes a firm's activities in the competitive advantage with five forces: (1) the new enter competitors, (2) the substitutes, (3) the power of buyers (4) the power of suppliers, and (5) the competition between exist competitors. Shank and Govindarajan (1989) describe the value chain as a process of firm activity that creating value from raw material and components arrange to end-use product and delivered into the final consumer hands. Hila & Olivier (2003) suggest that a value chain is an economic system that starts with all suppliers that consist of all distribution and supply itineraries producers that sell similar goods and competing on the same consumer market. Thus, value chain analysis can provide critical insight into (1) the inter-relationship between formal and informal work, (2) macroeconomic issues (capital flows and their volatility), (3) political issues, and (4) the social capital factor. (Mike & Raphael , 2001)

2.2 Global value chain framework

The global economy has an increasing international share, worldwide trading, and diverse global value chain structure, providing economic and GDP growth on a global scale. Moreover, worldwide competition also increases improved quality and increasing differentiated products. As the complexity of GVC, The GVC framework can help structure and analyze dynamics of different actors involved in a focus industry. The tools to be used to track global production, link geographic actors and determine their roles. Mainly focus on value-adding along with industry, start from concept into a product and final used. It examines the nature of works, technologies, standards, regulations, products, processes, and markets in specific industries and places, in the holistic view of global industries both from the top-down and the bottom-up. (Gereffi & Karina, 2016) The best way for making globalization is how governments, firms, and other institutions take advantage of the gains and reduce global barriers and pressure from multilateral agencies (such as the CITES, the ITTO, and the FAO) GVC includes six dimensions, (1) an input-output structure, describes raw materials into final products; (2) the geographic scope, explains the industry intersperse and activities (3) a governance structure, explains firms controlled. (4) Upgrading describes the dynamic movement of each stage within the value chain. (5) An institutional context embedded with local economic and social elements and (6) industry stakeholders describe the interaction between different actors to achieve industrial upgrading.

GVC approach consists of two components, (1) value chain mapping and analysis to identify the geography and stakeholder's activities from raw material to end-product. (Input-output). (2) Value chain context and determine the role of dynamic factors (governance, institutions, and inter-firm relationships) that influence the location, the development process, and the product or service competitiveness. It including identifies potential interventions and critical points to making change. (globalvaluechains.org, 2016) To make sure the analysis covers all the production cycle, including governance relations to the final markets, the factors that determine the participation of certain producers, and total earnings gain by different parties in the chain. This mapping should consider all aspects because it is an excellent form to overview and synoptic global earnings linked to all activities. (Kaplinsky & Morris, 2000) Identifies the value chain method, can classify as Hila & Olivier (2003) explain each tool to get an outcome.

TOOLS		OUTCOM
1. Chain Mapping	⇒	1. Chain Structure, Context, Orientation/Exposure of the chain
2. Interviews of Chain Actors	⇒	Chain Actor’s Data
3. Screening at Chain Actors Level	⇒	Critical Issues at Chain Actor Level
4. Screening at Chain Level	⇒	Critical Issues at Chain Level
5. Identification of Performance Indicators	⇒	Strategic Needs for improving Chain Performance.

(Hila & Olivier, 2003)

The research agenda on the Asia timber value chain suggests a relationship analysis of more detail between a forest-based value chain and the ecosystems, especially about their capability to provide raw materials and ecosystem services in the future. Research find out the stakeholders involved in the value chain have varied influence; depend on their capacity over other chain actors. The power will increase when they can get more information and access to the market information and stakeholders. The GVC framework using in different sectors, including the forest industry, but understanding the timber products influenced by the active international enterprises in timber value chains' performance is still limited. Most of the interest of the published paper is in Southeast Asia, particularly in Indonesia, but other wood-based products suppliers, such as China, Malaysia, and Vietnam, have less research and information. Unfortunately, they do not found publications in Thailand or Myanmar. (Tham, Pretzsc, & Darr, 2020)

2.3 HS codes for import export analysis

Harmonized Tariff System codes (HTS) use for specific goods and services present. The code at 10-digit lengths is referred to as HTS codes, while shorter using as HS codes. The first two digits of the code refer to vast product categories. As digits increase, the products covered become more granular, and the 10-digit level is the most specific but is not available through most trade databases. Most sources will allow for the retrieved data reported in either volume or value terms. To make reports more reliable, one should critically review both figures to identify potential reporting issues. (Freedonia, 2021) The HS code using specific classified products, but the commonly labeled “Other” in wood products disrupts and undermines practical information. Usually, the units in trade statistics records are “unit” rather than “kg,” so some small products such as musical instruments, wooden toys, and handicrafts may have lost any wood volume or weight records. Thus, estimated Thailand’s wooden products trade should determine the price from individual products and specific markets. For example, Thailand rosewood has a precisely Harmonized System (HS) customs codes are 44039990, 44079990, 44083990. (AVA, 2021) As a result of the 16th Meeting of the Conference of the Parties to CITES (COP16), Mar 2013, Bangkok (Thailand) Regarding the national reports of CITES Parties species' data trade found out that it has some gaps, inconsistencies, and limitations on the data recorded and reported. Beyond the limited species, information such as common name, species similarity, and comprehensive trade databases. (CITES, The CITES Tree Species Programme, 2019)

2.4 Rosewood global value chain

Starting in the ten centuries during the late Ming and early Qing dynasties, rosewood has been in furniture manufacturing because emperors’ families famously use it. It has risen these woods become more special cultural meaningful for Chinese people. As high demand, the new species that have similar textures also begun to be used for manufacturers in China and becoming an increasing international trade. (Huang & Sun , 2013) The conclusion from industry experts and observations on various rosewood marketplaces in China found that around 16 species that commonly used in the market. From the Chinese trader's perspective, the rosewood species can be used as the collectible, refer as high value or ordinary based on the value of each species. Among collectible rosewoods, D. *odorifera* and D. *tonkinensis praion* draw highly high market prices. However, strong demand from the market makes a similar species relatively rare, like P. *macarocarpus* become as mid-end ordinary species. (Table 1).

Table 1 Market Classifications of Common Rosewood Species and their Origins

Market Classification by Value		**Scientific Name**	**Main Origin**
Collectable class	Class I	D. odorifera	Hainan province, China
	Class II	D. tonkinensis praion	Vietnam
		P. santalinus	India
Ordinary class	High-end class	D. louvelii	Madagascar
		D. cochinchinensis	Mekong Region
		D. retusa	South America
	Mid-end class	P. cambodianus	Mekong Region
		D. cearensis	Mekong Region
		D. oliveri	Mekong Region
		P. macarocarpus	Mekong Region
		P. pedatus	Mekong Region
	Low-end class	D. stevensonii	South America
		M. laurentii	Africa
		M. leucantha	Mekong Region
		D. melanoxylon	Africa
		P. erinaceus	Africa

Source: from Wenbin and Xiufang, 2013

The high-end rosewood species, such as D. *louvelii*, D. *cochinchinensis*, and D. *retusa*, are well used for making furniture. The high and mid-end species are mainly imported from Southeast Asia. (Table 2).

Table 2 Common rosewoods trading in China.

Hongmu 'Class'		Scientific Name	Common Name(s)	Chinese classification	Source	CITES Appendix	Price per cubic metre[3]
Collectable	Class I	Dalbergia odorifera	Chinese Rosewood / Huanghuali	Xiangzhi	China		$1,500,000
	Class II	Dalbergia tonkinensis	Sua		Vietnam		$2,000,000
		Pterocarpus santalinus	Red sandalwood, Red sanders	Zitan	India	II (2007)	$358,000
Ordinary Class	High End	Dalbergia louvelii	Bois de rose / Malagasy rosewood	Hei suanzhi	Madagascar	II (2013)	$45,000
		Dalbergia cochinchinensis	Siamese rosewood / Thai rosewood	Hong suanzhi	Mekong Basin	II (2013)	$93,000
		Dalbergia retusa	Black rosewood / Cocobolo	Hong suanzhi	Central America	II (2013)	$32,000
	Mid-end	Pterocarpus macarocarpus / cambodianus	Burmese padauk	Huali	Mekong Basin		$6,300
		Dalbergia cearensis	Kingwood	Hong suanzhi	Brazil		
		Dalbergia oliveri/ bariensis	Burmese rosewood / Tamalan	Hong suanzhi	Mekong Basin		$9,200
	Low-end	Dalbergia stevensonii	Honduran rosewood	Hei suanzhi	Central America	II (2013)	
		Millettia laurentii	Wenge	Jichi	Congo Basin		$850
		Millettia leucantha	Sathon	Jichi	Mekong Basin		
		Dalbergia melanoxylon	African blackwood	Hei suanzhi	East Africa		$2,400
		Pterocarpus erinaceus	Kosso / Vene / African rosewood	Huali	West Africa		$1,100

Source: Rosewood Case Study: Draft report for World Wildlife Crime Report 2016 (UNODC, 2016)

Chinese rosewood industries have relied on Southeast Asia as a scarce resource, African countries' demand has become increasing. Half of China's imports of rosewood logs are harvesting in Southeast Asia. Meanwhile, the value accounts for 70 percent in total. By the way, as import data registered information African rosewood logs and sawnwood increasingly 700 percent since 2010 (Naomi , 2015) Especially Siamese rosewood is slow-growing trees and increasing decades of over-harvesting across Southeast Asia’s forests. Chinese traders are finding another additional source in Africa and Latin America to meet the excessive rosewood demand even the wood quality is lower and smaller-sized, or different species also take it as rosewood. The increasing scarcity of high-quality rosewood materials has led to a capitalism of the logs stocking up by Chinese traders or each household. This event created highly speculative markets that have more safe or profitable than the saving bank accounts or the stock markets. (Huang & Sun , 2013)

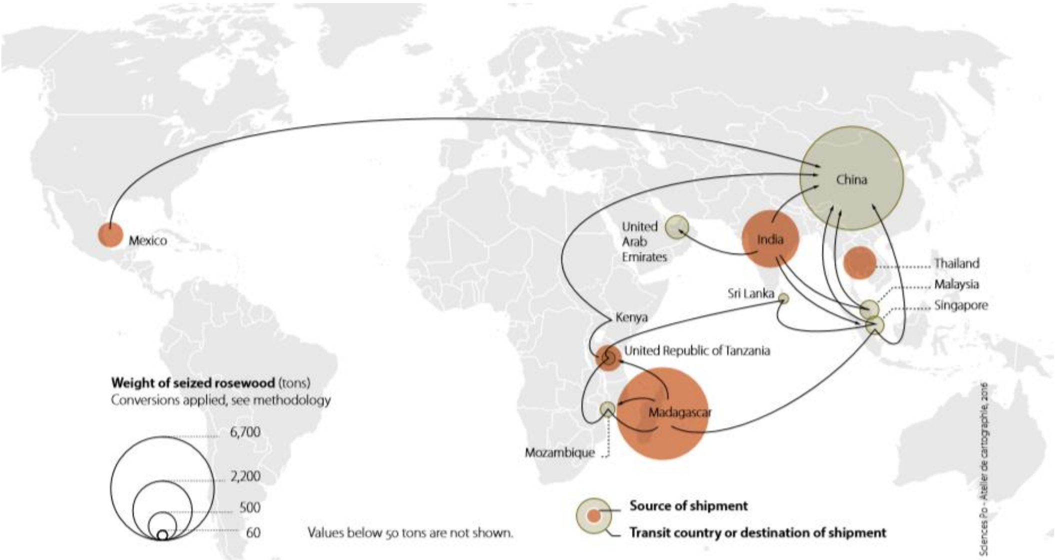

Figure 1 The main rosewood logs flow and timber seizures (tons), 2005-2015

Source from UNODC (2016)

2.4.1 Supply of rosewood

China is now playing a significant driver in tropical wood products and is the world’s largest consumer in the timber market, expecting to maintain this role in the future. The world-facing financial crisis in 2008 makes US and EU demand for wood products from China slow-growing drown, but Chinese domestic demand is still firm on growth. One of the reasons is the government an incentive package to investigated infrastructure and housing that make many producers move from export markets to meeting a target in domestic demand. (ITTO I. , 2012) The rosewood timber trading trend is also the same most purchased import to supply domestic demand. However, rosewood product also remains popular in other developed countries like Japan, Taiwan, and Singapore. The most high-end rosewood species using to produce furniture, priced up to 10 million RMB (US$1.6 million), while the lower-end species settle productions up to 60 to 90 percent in the market. (EFI, 2014) Ninety percent of the rosewood material in China is used to make wooden furniture, and others used handicrafts such as wooden carvings, bracelets, necklaces, etc. Follow with the cultural preference, can be classified into three major manufacturers in China that have to be their traditional style with is Guang (Guangdong) style, Su (Jiangsu) style, and Jing (Beijing) Style. The style was characterized by a distinct rosewood furniture design. The Chinese "exotic taste" of rosewood or another endangered species still increasing in contrast with the scarcity of resources. Zhu (2019) Found that the consumer behavior is still more interested in traditional cultural objects supporting rosewood furniture manufacturing rapidly. By the way, in 2015, rosewood log imports have declined from the previous year. The main reason is the accumulation after investment speculation peaked in 2013 and 2014, the anti-corruption campaign from the president Xi Jinping government, and Environmentalism consideration for using furniture from the new customers. (Naomi, 2015) It may make some change when new customers have become more preferring western design products. However, the conclusion from rosewood preference consumption seems like young Chinese people prefer less extravagant styles, and some producers said, "Only old people like this kind of furniture and Young people prefer simpler designs, like IKEA." (Sandy & Edward, 2019). Nowadays, rarely products like rosewood, rhinoceroses, and other endangered resources are used to interest more than cultural praise. China’s rosewood boom is to be revealing the imbrication of culture and capitalism in twenty centuries. (Zhu, 2019)

2.4.2 Product Flows in China manufacories

Rosewood logs are imported into China in regular trade across-border with neighboring countries or shifting through the port in Hong Kong. The imported wood has a low certify of control wood documented, and challenging to control the trade of high-risk timber species. The source around 92 percent was from Laos, Vietnam, Thailand, or Cambodia, and almost 50 percent came from Laos alone. In 2010 the investigation on Hong Kong’s timber imports found out that around 30 percent could be illegal. (WWF, 2011) The shipments through Hong Kong routes have frequently been using. The shipments onward are sent from Hong Kong to the Shenzhen Special Economic Zone (SEZ) to avoid paying taxes and customs inspections before entering Shenzhen or port cities in the Pearl River Delta. (EIA, 2014b) To quantify the total amount of China’s rosewood imports through Hong Kong, only using customs data is not enough, due to the lack of customs code (HS code) mandatory, and they are using various rosewood under other codes. The enforcement increased after promising with CITES in 2015, but the high-risk timber shipments are still being routed through Hong Kong port. The World WISE report that China and Vietnam are the leading destinations for trafficked rosewood account for three-quarters of all illegal logging worldwide. The species similar to rosewoods event not on the official hongmu list has to attain market demand due to its lookalike characteristics. Therefore, they were mixed with rosewood species and sold onto Chinese manufacturing. According to housing investment in China has been a decline in consumer spending on new furniture. Also, the government has conspicuous the high-end goods, and against anti-corruption make critically at spending on luxury goods. (WISE, 2020)

Seventy-five percent of rosewood logs and 90 percent of rosewood sawnwood imports to the China mainland registered in either Huangpu or Shanghai, with Kunming, Nanjing, and Nanning, respectively. In addition, although Rosewood from southeast Asia, particularly Myanmar, Laos, and Vietnam, enters China crosses the border in Yunnan province, semi-furnished rosewood furniture from Vietnam also entered Guangxi Province. (EFI, 2014) The final product after supply in China will export to another country that has the same cultural preference like Japan and the ethnically Chinese regions of Singapore, Taiwan, Hong Kong, and Macao. Thus, the final market sharing 50/50 consume in the Chinese market and overseas market (Huang & Sun, 2013). For example, in Thailand, illegal rosewood was smuggling to neighboring Laos and Cambodia and then passed off as Lao or Cambodian species and "exported" back to Thailand organize by middlemen or third-country traders and officials.

2.4.3 Existing Mechanisms for rosewood trade (mainly in China)

In the traditional Chinese trade, intermediaries are Chinese (by ethnicity or nationality) play an essential role to facilitate and dealing with their complex supply chains. Particularly in Southeast Asia, the middleman often has a contract with higher-level or law enforcement government officials. (EIA, 2015) The pressure from both internal and international combat to illegal logging makes China developed tools to clarify the timber import, including CITES enforcement, national standards for rosewood classification, bilateral agreements against illegal wood between producer and consumer, voluntary guidelines on overseas forest enterprises, and a draft Timber Legality Verification System (TLVS). The Chinese government has not mandatory enforcement but focused on establishing voluntary mechanisms instead (CITES enforcement is an exception). The Chinese government has monitoring measures for CITES-listed rosewood species. Importers need to provide contracts, invoices, Certificates of Origin, and phytosanitary certificates for customs clearance. In 2012, CITES principles have been applied to 16 provinces and established nationwide networks (European Forestry Institute 2014). In the CITES regulation, the illegal rosewood trader is likely to use the "Annotation 5 loophole," which restricts the trade of logs, sawnwood, timber, and veneer. All other forms it is not included. The trader can modify their products as "semi-finished" to prevent crime. (Naomi, 2015)

2.5 Economic Forest plantation in Thailand

2.5.1 Trade of wood products in Thailand

In 2019 Thailand had been imports wood products, accounted for 36 billion baht (1.15 billion USD), around a 31 percent decrease from the previous year, but the number of exports remains, the total number of wood products export account to 2.79 billion USD, its two times higher than imports. (RFD, 2020) By the way, this number does not include the value of forest products or services within domestic consumption. Most of the wood manufactories are located in the southern part where rubberwood has been surplus, while machine-powered woodworking factories are primarily located in the north with a lot of teak and hardwood supplied.

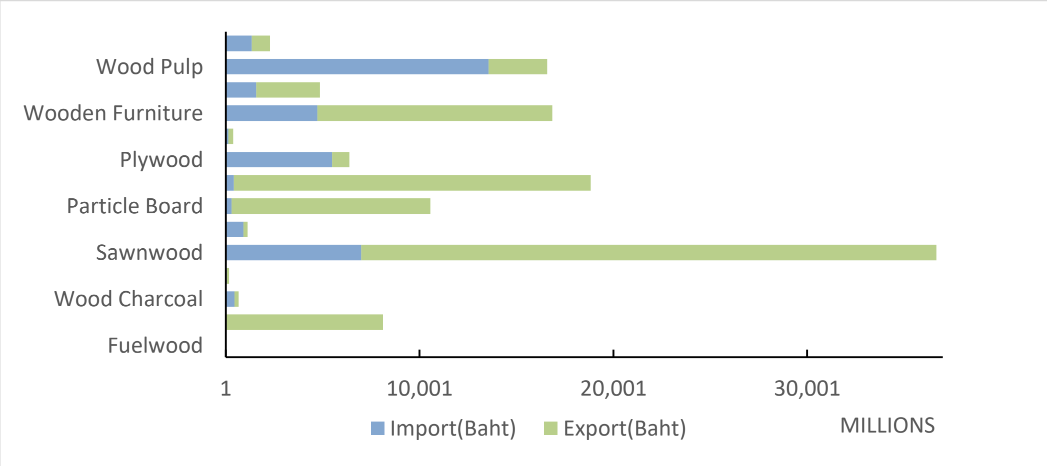

Figure 2 Thailand imports and exports of wood products.

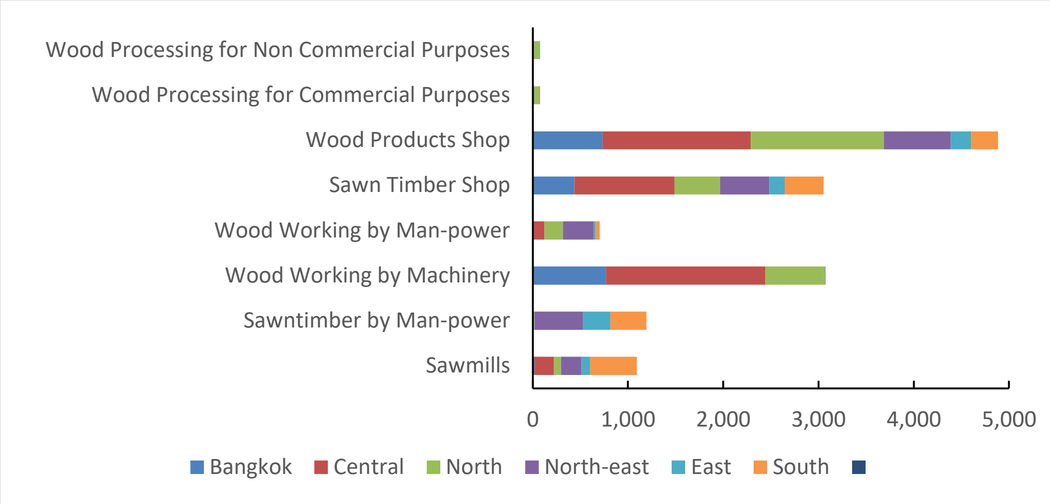

Figure 3 Sawmills and Wood Products Factories in Thailand, 2019

Forest industry organization is a semi-private enterprise agency with operator logging, plantations, and the wood industry in Thailand. The products of timber report in 2018 showed that Teak plantation timber 71,954.53 m3, Wood Eucalyptus plantations 55,399.88 m3, Rubber Timber 133,784.43 m3, other plantation timber 11,889.94 m3 and outside the forest 11,956.98 m^3. (FIO, 2020) Thailand is a Southeast Asia wood products hub, especially furniture and paper products. In statistics information between 2012 - 2016, Thailand was the nineteenth most significant global exporter of timber products and a particular position as an export-focused manufacturer. (Jade & Marigold , 2019)

2.5.2 Trade of rosewood in Thailand

<u>The legality and right</u>

Land tenure in Thailand has different kinds of ownership and proposed use. The ownership can divide into state land and private land, and if any person does not legally own the lands under the Land Code so the land will classify as "forest" (even if not covered by trees). Thailand has a total forest area of 323 million Rai (51 million ha) account for 31.68% of country areas. (RFD, 2020) In 2018, Thailand amendment The Forest Plantation Act of 1992 (amended in 2015, 2018) to unlock some miserable laws and regulations and promote economic forest in private and public lands. The 58 tree-listed species have been under the Act. The growing owners of this species can register their plantations with Royal Forest Department or Natural Resource and Environment Province Office. The registration provides benefits such as harvesting and processing on-site, exempt fees, and secure land ownership. The tree on private land is not mandatory under forestry laws. The owners did not need a permit to plant, harvest, transport, and sell.

Timber's trade legality

The timber legality assurance is on the land processing right, including requesting for legally logging permit, transportation from a source of timber before entering industrial timber processing for exportation.

1. Timber from Public Land a permitted operator on public land must own documents of land processing right or land use the written permit.

2. Timber from Private Land Unrestricted Species on Private Land (under Forest Act B.E. 2484), the harvesting of available species will mainly consider the evidence of land as un-restricted species on public land. The land has the certificate of permission for activities within the forest area; the harvesting can proceed freely without requesting permission or any permit.

3. Imported timber to the Kingdom of Thailand an importer must declare the documents to ensure the legality of wood as 'Certificate of Origin' or trade export permit to Customs Department

4. Exporting need the documents, which attaching during importing materials to processing facilities, and documents of product transportation, which depart from processing facilities, including the legality of business and guidelines that demonstrate the legality and transparency of the establishments.

2.5.3 The trades of rosewood (*Dalbergia cochinchinensis*)

Thailand has a long history of timber concession because in the past country have rich natural resources. However, facing the heavy environmental damages in 1988 had made the country stop logging from natural forests and become conservative. (RFD, 2020)

1. 1989 Logging ban, no harvesting in natural forest

2. 11 November 2008, The Cabinet resolution to ban import logs and artifacts from the Kingdom of Cambodia and Lao People's Democratic Republic also ban export in any case.

3. March 2013 Thailand by committee agreed to list Siamese rosewood under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)'s Appendix II. At the 16th Meeting of the Conference of the Parties in Bangkok. Following the agreement, all Siamese rosewood, before export to other countries, must have a permit license to ensure legality.

4. 18 November 2014 The Ministry of Agriculture and Cooperatives for conservative plants list Siamese rosewood enter into force for import and export. Need to have CITES permit, failure to do so may result in a fine of 3,000 baht and may result in imprisonment for a term of up to three months, or both.

5. The 17th meeting of the Conference of the Parties to CITES (CoP17), the committee agrees to list Dalbergia species as 304 species worldwide restrict to the trade under CITES. Notification of the Ministry of Agriculture and Cooperatives for conservative plants 2019, order 36th in Dalbergia group result in Dalbergia ordorifera, Dalbergia tonkinensis, Dalbergia errans, and Dalbergia sissoo under control by CITES.

6. Followed the regulation by CITES. There are many forms of trade control as:

6.1 Siam rosewood control from seedling logs, sawn wood, and lumber until all finished products except seeds, flower, fruits, and tissue culture (obtained in vitro, in solid or liquid media).

6.2 Wood in a Dalbergia group from Mexico only control for logs, sawn wood, veneer sheets, and plywood does not cover finished products and furniture (Mexico rosewood 13 species)

6.3 Other Dalbergia from 5.1, 5.2 well known as D. oliveri, D. cultrate, D.bariensis, D. parviflora, control by seedling logs, sawn wood, lumber, and all products in the Dalbergia group include furniture from this species except the handicraft products containing less than 10kg

6.4 Finished musical instruments, finished musical instrument parts, and finished musical instruments accessories need the CITES permits to import or export the following items.

7. Followed the cabinet resolution to ban export rosewood by assigning the Ministry of Commerce examination to announce ban import-export rosewood as import and export product within the country in 1979. For export, rosewood needs to refer to cabinet resolution on 11 November 2018, it is the policy designation no result in the law and no regulation or enforcement, but the relevant organization needs to take followed and implement. As no change in the law and regulation right now, the Department of Agriculture can issue the CITES permit document for entrepreneurs who wants to export by not against the country's law.

<u>The control trade for rosewood under restrict by CITES.</u>

In terms of the CITES regulation, exports rosewood have a specific method on timber trade species appendix II. To issue the permit document must not be against the country's law. The export species must not threaten with extinction. Usually, most of the conservative plants can bring to the Plant Varieties Protection office to prove that an artificial propagation, but tree species like Dalbergia still have illegal logging. Thus, to issue the permit document must need to clarify in the logging site. Document and principal to issue the CITES permit for tree planting in the country. (Before announcing the forest plantation Act.)

7.1 Timber’s Source of Origin document such as land title deed, forest plantation certificate.

7.2 In case selling wood from land title deed need to have evidence from owner or delegate person.

7.3 The CITES Management Authority requires checking.

7.4 All logs must have a mark with a document list before transportation to the sawmill or factory.

7.5 When in the processing process, need to report CITES authority for checking the process and showing all lists when finished.

7.6 In case logs from forest plantation must follow forest plantation Act. Include transportation process. CITES authority may require to check.

7.7 Documents need to get CITES permit:

- Land title
- Picture of a tree at the site with latitude and longitude geographic
- Picture of the tree after falling with stump with latitude and longitude geographic.
- Picture of all felling tree
- The timber list with a marker in each log.
- Picture of transportation
- Picture of a storage site
- Picture of wood processing
- Picture of all finished lumber
- List of finished lumber

8. When the officer issued the document, the interpreters followed all the processes then The CITES authority will come to check before transport to another area.

2.6 Market route

Thailand has been banned the trading of rosewood species. However, the smuggling continues across the Cambodian and Lao borders into Thailand. The traders avoided it by smuggling rosewood into Laos and declared it as Lao rosewood. The EIA reported found that about 60 percent of rosewood trade in Laos was harvested in Thailand. (EIA, 2014a) Thailand is the hub of high-risk tropical sawn timber from neighboring countries such as Laos, Malaysia, Myanmar, and Cambodia. However, the case of the import is controlled by China, with more than 18% from illegally sourced. All the wood imports to Thailand are consuming within-country while the number of exports is lower, and expected that the timber use the source from plantations and assume to use in the country. (Lawson, 2014)

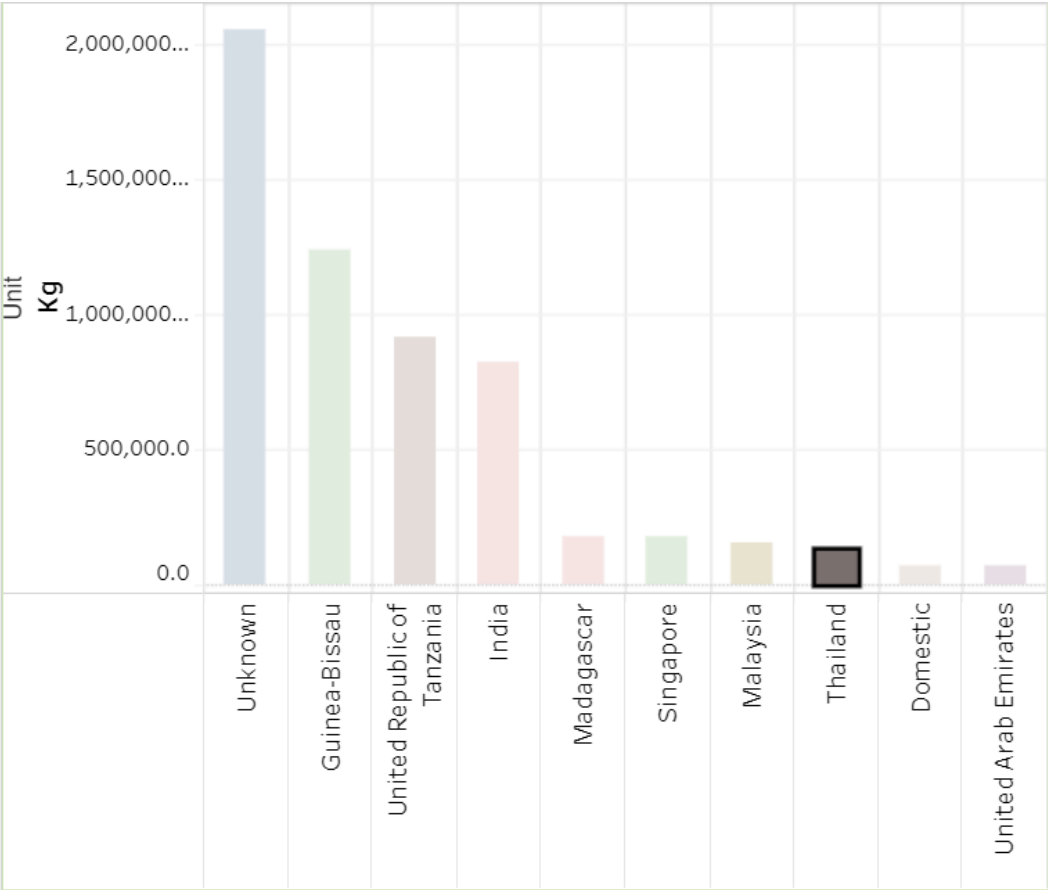

Figure 4 Thailand is top ten countries origin rosewood export by quantities report.

Source from World WISE

CHAPTER III METHODOLOGY

Since no database of value chain agents was available, respondents were selected based on existing information by

1. Conduct rosewood tree planting from Thailand forest plantation register, Forest Economics Bureau, Royal Forest Department. The total number of rosewood supplies in the country estimate base on previous studies and reports within the country.

2. A policy analysis was conducted to assess the influence of regulation on trade and the up-to-date rosewood situation by assessing national and country reports.

3. A raw customs data categorized by the Harmonized System (HS), the global international statistic trade between Thailand and China was conducted on the UN Comtrade database (www.comtrade.un.org), and Thai customs data is available from the website of the Royal Thai Customs Department (www.customs.or.th). The data trade available for individual years or parts of years needs to have manual aggregate data to establish the trade trends.

4. Rosewood seizure data conducted from the Royal Forest Department and Department of National Parks, Wildlife, and Plant Conservation reports.

CHAPTER IV RESULTS AND DISCUSSION

4.1 Results

4.1.1 Thailand rosewood supply

The number of rosewood trees in Thailand found that the total remains in National park around 1,372,000 trees accounts for 295,140 m^3, under forest plantation registered 75,971 trees and under the Forest industry organization's plantation total of 236 ha (around 80 percent have 40-49 years ready for harvesting) (Tangkit, 2021) Thailand promoted tree plantings for almost 30 years but no certainly in marketing and long-term policy support. The oldest rosewood plantation implemented by the Forest Industry Organization (FIO) since 1980 and one's plantation own by Famer in Nong Bua Lam Phu province since 1994, with a total of 19,600 trees. FIO is a government-owned enterprise that has 244 plantations located around Thailand. RFD start the private plantation program in 1994 -1998. Until now, many trees have been cut and sold at the domestic market. Rosewood supply from plantations has not been finding to export yet. Most of the rosewood export from Thailand to China is an import from neighboring countries. The information for CITES Trade Database in Siam rosewood spices (2013-2020) found one case report rosewood product original export from Thailand to the United States in 2019 and one case no record country original and importer to China in 2019 (CITES, 2020) Currently, Forest Industry Organization is ongoing to auction the rosewood logs and sawnwood from trees outside forests (Timber outside plantation) by following Plantation Act.1992. However, the trading consumes to be used in the country since no policies support exporting yet.

Figure 5 Rosewood plantation

(a)* Mr. Songdej Boonaum rosewood plantation in Nong Bua Lam Phu province. (b)** FIO rosewood plantation in Thagum plantation, Trad Province.

FIO is the main lead to dealing with timber industries. There was also a resolution to allow the Royal Forest Department, Department of National Parks, Wildlife and Plant Conservation, and the Thai Customs Department to send rosewood over 1,206 cubic meters and other precious woods. At the end of the case, it will give to FIO to privatize it for use in the construction of the museum building. (RFD, 2016) There is also a lot of rosewood dispute preserved at the Royal Forest Department.

* Picture from https://www.technologychaoban.com/agricultural-technology/article_70221
** Picture from Mr. Jong Mongkonsakullit

Table 3 The timber table for making a bid at FIO central region.

lot	Type of Wood	Amount	Volume	Production Cost (Baht)
1	rosewood sawnwood	2,479 sheets	80.24 cf^3	131,112.16
2	rosewood sawnwood	300 sheets	19.89cf^3	32,500.26
3	rosewood sawnwood	495 sheets	50.29cf^3	82,173.86
4	rosewood sawnwood	1,007 sheets	37.58cf^3	61,405.72
5	Iron sawnwood	211 sheets	40.57cf^3	66,291.38
	Total	4,492 sheets	228.57cf^3	373,483.38
6	rosewood logs	114 logs	13.9cm^3	47,442.79
	total	114 logs	13.9cm^3	47,442.79
				420,926.17

Source: The Forest Industry Organization auction announcement

Figure 6 Logs and sawnwood waiting to have auction at FIO office.*

(*picture by Mr. Jong Mongkonsakullit)

Mr. Jong Mongkonsakullit, head director of the FIO central region office, said, "The traders are more preferring logs than sawnwood" all wood products from FIO are available both online and offline. It is an open auction so that the traders can get information through the FIO website http://www.fio.co.th/web/index.php/sell. They will announce that the information is up to date whom interested can submit the bid price at FIO central region office. All Applicants are Thai "The traders are Thai, but they do not want to share information, where timber goes next." since no logging concessions are allowed in the country, they still allow the clearing of forests for infrastructure. This auction needs to follow the timber clearance convention in The Forest Act B.E. 2484 (1941) and the Forest Plantation Act B.E. 2535 (1992). Only the Forest Industry Organization (FIO) has permitted to harvest and sell timber from forest land permitted for conversion by the RFD regulations.

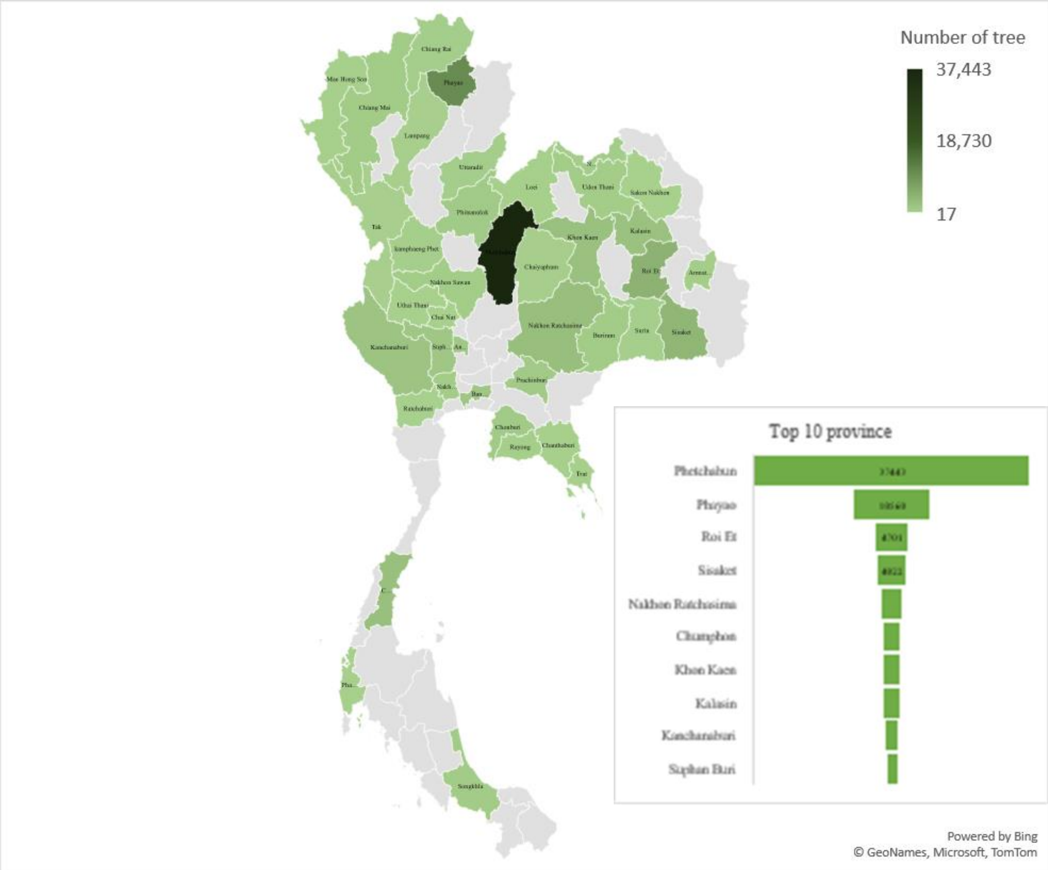

Figure 7 Showing geographic the number of rosewood tree have been registered with forest plantation system.
(Source from RFD plantation register system, Data on 1 May 2021)

Domestic timber in Thailand is from two sources provided by planted timber and natural forest, and the majority source is from plantations. The Forest Plantation Act B.E. 2535 (1992), the Forest Plantation Act (No. 2) B.E. 2558 (2015) allowed registering to grow 58 commercial timber species by using official land documentation to prove the right of their land ownership or concession. The registered will need RFD approval to allow legal felling under the Forest Plantation Act 1992 (B.E. 2535). On the other hand, trees planting in the home garden also can register with the RFD system call “e-tree” by taking a photo with descript location, age, diameter and high, etc. but not related to law and regulation. Thailand is already sitting a new system for controlling timber flows and data management, replacing the existing paper-based system that burdens track. However, develop a legality assurance system (LAS) is gradual due to compliance with legality and related standard. The RFD has had a project to survey wood stuck since 2018. Regarding the concern about the actual rosewoods stock supply in the country would solve soon within not more than two years. By analyze information in the RFD register system and correct more data to cover around the country.

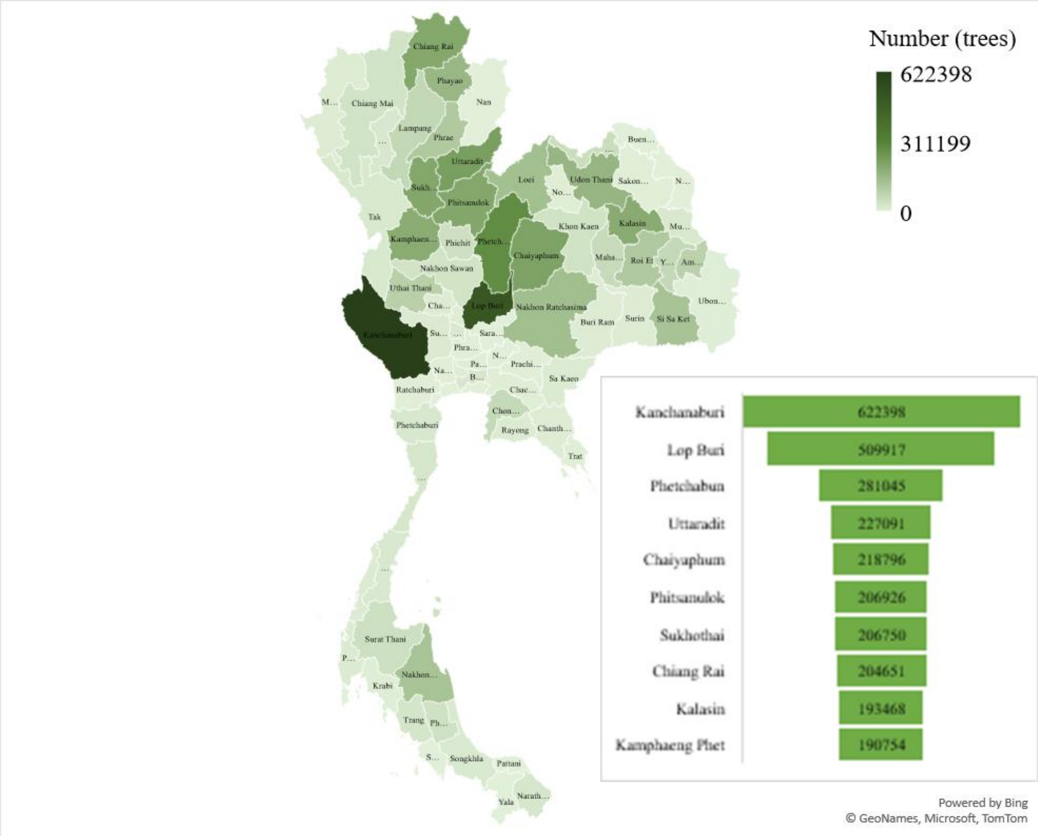

Figure 8 Showing geographic the number of high value tree have been registered with e-Tree system.

(Source from RFD e-Tree register system, Data on 1 May 2021)

4.1.2 Policy and regulation for rosewood trade in Thailand

In 2008, The Cabinet resolution banned export logs. The traders who want to import and export within the country need to have a CITES Permit. The processing and regulation will classify timber's source of origin into three types.

1. Timber from Public Land must have a forest plantation certificate,
2. Timber from Private Land no needs a permit for the harvesting but must show evidence of land certificate and harvesting process for transport and trading,
3. Imported and export timber within Thailand need a certificate of origin to declare the legality of wood products.

However, the low governance system may also increase the risk of illegal import into the country. As the customs record, rosewood still has been importing and exporting through the neighboring countries. Thailand commits with Myanmar and Cambodia to request a Certificate of Origin (CoO) for imports of timber products but does not apply with timber from Laos. However, it is not a clear regulatory basis for which countries need CoO requirements. (Jade & Marigold , 2019) The main problem factor for enforcement authorities to comply correctly with the CITES listings is clarifying differentiating between Dalbergia species, including CITES-listed or non-listed Dalbergia. The use of common trade names "rosewood" is interrupted to tracking/reporting of Dalbergia species in trade because many non-listed Dalbergia species are subject to not-endangered species. At the checking point, only suspicious products by using scientific analysis to identify species or harvesting site, and origin. By the way, the suspect process affected the cost and time of companies rather than government agencies. For example, the big seizer case in 2006 found 11 containers of rosewood (account for 160 million baht) waiting to re-export to China at Lamchabung port. The suspension process takes too long. Finally, the court considered that the timber was legally importing, should return to the owner. However, until now, the products are still stuck in Thai Customs.

It is becoming a critical issue of both misdeclaration and corruption for examining shipments. The number of seizures is often finding along the river or forests between Thailand, Laos, and Cambodia. The border between Thailand and Laos is well known as a red area for rosewood seizures. The main shipping ports are 87% crossed the Mekong River, 10% shipping through the ports or container terminals, 3% shipping through the Gulf of Thailand. However, only five findings are to be used in the country. (Penthai & Vincent , 2018)

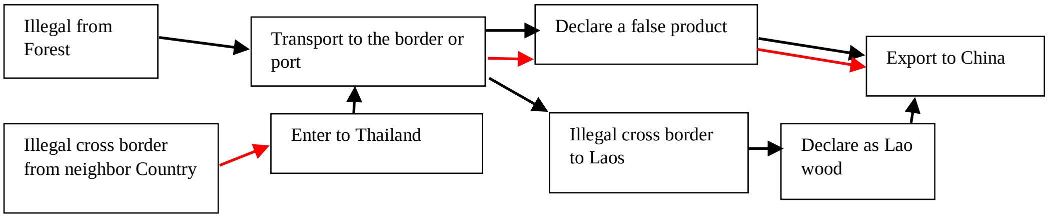

Figure 9 The illegal rosewood flow in Thailand

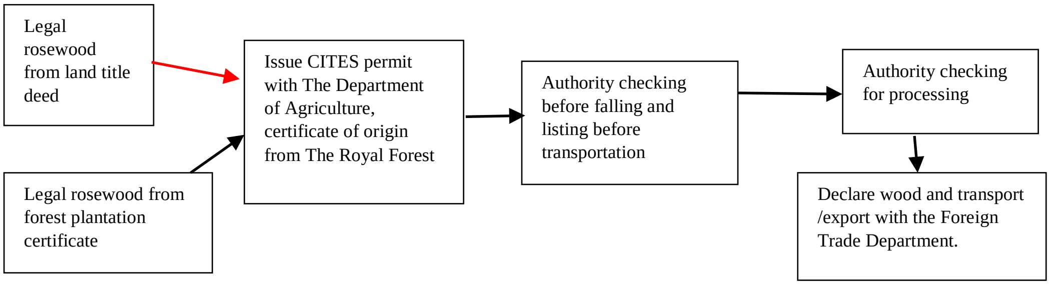

Figure 10 The legal rosewood flow in Thailand

The Forest Act B.E. 2562 (2019) describes in "section 7" According to the Land Code, all types of wood grown in private land that has title document showing ownership or possessory right are not prohibited wood. According to the type of title document, the minister proclaimed the approval of the cabinet resolution that the wood grew by the human in public land with have allowed utilizing shall deem "not prohibited wood." Therefore, it is an opportunity for rosewood to be trade, but the export rosewood needs to follow the regulation from the cabinet resolution on 11 November 2018. The prohibition export of all kinds of rosewood timber from the state of the kingdom. By the way, re-export must have a certificate of origin from The Royal Forest Department and the CITES permit document from the Department of Agriculture before submitting all documents to the Foreign Trade Department.

The National Forestry Policy committee has the last meeting on 29 January 2021 to conclude from case study details and impacts on the export of plantation teak and Siamese rosewood report, the suggestion to cancel the cabinet order in 2008 to allowing rosewood harvesting from plantations export to other counties. By the way, in this meeting still cannot have finally decided yet. There are two different opinions between conservatism and liberalism. Most of the conservative organization's concern about illegal logging because they still do not believe in the governance systems as a risk assessment report from NEPCon (2017a) As some evident in Panama, The government policies allowed harvesting under a management plan but seemed like activate illegal logging and facilitated laundering illegal to become legal logs. (Vardeman & Runk, 2020) Thailand's timber risk score is 28 out of 100. The main key concern is harvesting activities link to transportation and trade. The high-value species such as teak, rosewood, merbau Certificates of origin have a higher risk of being unreliable. Even CITES certificates seem to be veritable. (Jade & Marigold , 2019)

Table 4 The National Forestry Policy committee debate meeting on 29 January 2021

Conservatism	Liberalism
Low wood supply in the country (only around 224 ha at FIO plantation)	A total of 560 ha of private plantations have been reported in the forest plantation register system.
No exact data from the privets plantation and rosewood have a long rotation, not urgent for exporting.	In recent years, RFD has contributed 30 million rosewood seedlings to people, and farmers have been planting trees for more than 25 years. So now there is some supply to the market.
Risky for mis-declaring as wood from plantation	RFD improve declaration system more efficient preventing illegal harvesting
May increase illegal logging in the forest as ivory and pangolin as rare items	Rosewood can plant and regeneration better than ivory and pangolin.

The National Forestry Policy committee also needs to find a solution for the wood trade because the trader faces a problem about tariffs for exporting that obstacle with wood industries. In export logs and sawn timber, finished wood products, and other wood products, the tariff rate is 40%, 10 %, and 20% of cost value, respectively. It is not supported the industry's growth; many traders and entrepreneurs require to amend this regulation. Most of the laws and regulations are preventing illegal logging and are outdated. However, Lawson (2014) found that economic demand is the most driving competition in the worldwide timber industry more than legality demands and more critical than manufacturing costs, levels of taxes, subsidies, tariffs, or demands for sustainability. It seems correct as of the picture. 11 the number of export rosewood outside country steady increase. Since 2009 when with high demand from the Chinese market, the timber flow increased opposite the law and regulation. Rosewood illegal logging becomes the most critical issue in Thailand. According to the report on China's global rosewood industry, the number of timber imports from the Mekong region between 2000-2009 accounted for 70 percent, which puts huge pressure on timber resources, particularly for Siamese rosewood species. (EIA, 2014a) In the National Park, the crime between loggers and forest rangers being a severe issue. Sadly, a Thai forest ranger who protects the national forest has been killed by armed loggers. Thus, we are lost not only national resources but also human resources.

The value of illegal rosewoods has seizer still far lower than the value that has been trading at the same time. As a result, most of the rosewood import into the country will be re-export directly to the primary market in China. In 2011, an EIA reported a rosewood bed in Shanghai retailing at US$1 million. The EIA (2016b) as the report, from 2009 to 2014, the number of rosewood logs imported to China increased to 1,300%, making the number of businesses and traders more than 30,000 companies. Not surprisingly, rosewood has been progressively recording trading within the country, reaching historically high levels. We cannot compare the value of illegal trade with the regular trade record because all the timber is from natural forests. However, if all kinds of timber from plantations can export like another commercial product, it would increase the country's GDP from the wood industries and decrease pressure from illegal logging.

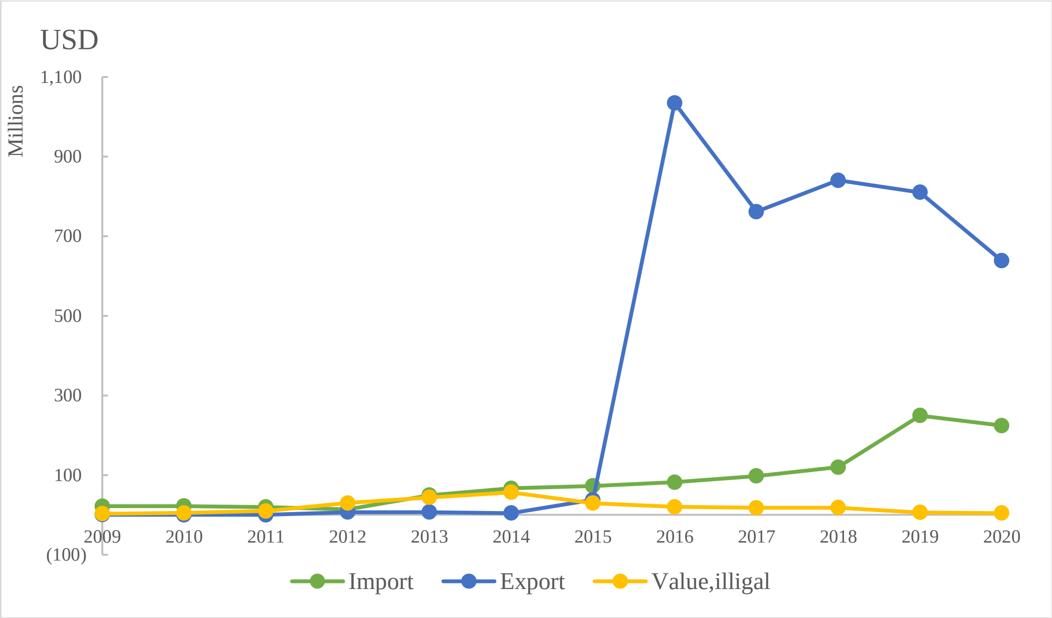

Figure 11 The value from timber product in Thailand.

(Data source from Thai custom and Royal Forest Department and Department of National Parks, Wildlife and Plant Conservation reports, 2021)

4.1.3 Rosewood trade trend in Thailand

Rosewood is only little use in the country because cultural preference and utility are not suitable for construction. By the way, sawnwood demand-supply have a positive increase as Benjawan and Patitta (2019) Report that Thai people will have increase sawnwood demanding depend on the prices so if the prices increase people will die wiliness to buy more. The forecast wood demand during 2560-2569 showed a downward trend as the same trend with timber supply that depends on imports from neighboring countries with a scarcity of resources and bans export logging. Correspond trend with Intongkaew & Junchang. (2017) The forecast trend of Thailand's round wood and raw materials demands from 2016 to 2036 is increasing every year. To fulfill the demand for round wood and raw material consumption in timber industries, the government has to develop policies to enhance wood supply from forest plantations and increase forest economy and conservation to utilization in the long run with sustainable management. Thailand has a large and varies wood product import. The top10 import countries are Malaysia, Laos, the United States, Myanmar, New Zealand, Cameroon, Congo, Mozambique, China, and Indonesia. The Harmonized System classification of products manages customs data. The data provide volumes/weight, value, sources of import and destinations of export, period over time. Using Harmonized System (HS) to track data trade within the country found that the value from wood product trading increased as an industry grows, but due to the coronavirus pandemic in 2020, the trend drop drowns significantly. The wood industry also faces many difficulties, like other sectors but more serious with legal and wood certification barriers. By the way, the HS code cannot explain in detail as many counties still do not use specific HS code only China has a specific customs code for "rosewood species" the imports logs correspond to HS code 44039930 and 44079910 for sawn timber. (CITES, 2016) in Thailand, using HS 8 digitals code refers to the related wood product within import and export in the country but is not specified in detail. (Table 5) The chain of custody documentation can prove evidence of custody, transfer, biological and physical in detail. However, Thailand has a low implementation of Chain of Custody systems, making it hard to analyze the Thai wood industry in detail to get information on timber sources to purchasers. (Heuch, Sandom, & Sunthornhao, 2012) The information from Thai Customs takes it from two main checking points at the RFD checkpoint near the port in Bangkok (Khlong Toei) and the entry point from Laos at Nong Khai province. In addition, the Thai Customs will correspond with RFD officials to clarify and prove timber illegality and arrangement import certification.

Table 5 The HS code to be use in difference source.

HS code	Description	Source
4403499010	Endangered tropical rough wood, specified in Subheading Note 1 to this Chapter (other than that treated with paint, stains, creosote or other preservatives)	China CITES HS code at China Costum
4403999019	Other endangered non-coniferous wood in the rough (other than wood treated with paint, stans, creosote or other preservatives)	
4407999015	Wood sawn or chipped lengthwise, sliced or peeled, end-jointed, of other endangered wood, of a thickness exceeding 6mm.	
4407999095	Wood sawn or chipped lengthwise, sliced or peeled, non end-jointed, of other endangered wood, of a thickness exceeding 6mm.	
44039990	Wood in the rough, whether or not stripped of bark or sapwood, or roughly squared. (Other)	Thai Costum Using HS 8 digitals code
44079990	Wood sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, of a thickness exceeding 6 mm. (Other)	
44083990	Sheets for veneering (including those obtained by slicing laminated wood), for plywood or for similar laminated wood and other wood, sawn lengthwise, sliced or peeled, whether or not planed, sanded, spliced or end-jointed, of a thickness not exceeding 6 mm. (Other)	
44034910	Wood in the rough, whether or not stripped of bark or sapwood, or roughly squared. Baulks, sawlogs and veneer logs, Rosewood	Thai Costum Using HS 8 digitals code, Changing in 2017
44034990	Wood in the rough, whether or not stripped of bark or sapwood, or roughly squared. Other, Rosewood	
440399	Wood; in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated, n.e.c. in heading no. 4403	UN COMTRADE Using HS 6

440799	Wood; sawn or chipped lengthwise, sliced or peeled, of a thickness exceeding 6mm, whether or not planed, sanded or finger-jointed, n.e.c. in heading no. 4407	digitals code
440839	Wood, of tropical wood; as in Subheading note 2 to this Chapter, n.e.c. in heading no. 4408.31, sheets for veneer or plywood, other wood sawn length wise, sliced or peeled, whether or not planed, sanded or end-jointed, not thicker than 6mm	

In terms of amendment law and regulation for rosewood, trade needs to agree with many related administrative include representatives of the Prime Minister's Office (Secretariat of the Cabinet), the Ministry of Agriculture and Cooperatives (Department of Agriculture), the Ministry of Natural Resources and Environment (The Royal Forestry Department and the Department of National Park, Wildlife and Plant Conservation) and the Ministry of Commerce (Department of Foreign Trade).

In the Opinion Office of the Council of State Number 157/2019 clarify the facts and agreement to confirm that the Ministry of Agriculture and Cooperatives have authority according to in 29 bis of Plant Variety Act B.E 1975 additionally amended by Vision 5 of Plant Variety Act (No. 22) 1992 and the announcement of the Ministry of Agriculture and Cooperatives on the conservative plant on Thursday, April 15, 2016. The result was said "all logs, lumber, and veneer of rosewood species, import-export or passing through the country are prohibiting. Exception from the timber that got allowed from the Director-General of the Department of Agriculture or the assigned person."

The exporter must submit an application form and attach a copy of the CITES certification and source of origin showing the official to issue a letter of authorization export and signing in the permit form. Then, the verification process to check the correct evidence as shown in the permit or not. If correct, the exporter will proceed to re-sign the authorization letter. Therefore, it will result that the license is complete. The Authorization letter to import-export validates not more than six months from the date of issuance license. (Facility, 2020.) The procedure to process import-export log permission following:

1. Proof of timber origin. All timber should have ownership or attendant evidence related to the certificate of land or forest plantation certification.

2. Proof of the legality of timber processing. In the wood processing process, need to have permission from RFD and The Department of Industrial. All timber lists should be showing in the report for RFD Authority checking.

3. Proof of the legality of transportation. To transport timber through each checking point should have a stamp from authority for passing the areas. Forest officers or police officers can be asking if any suspect.

4. Proof of the product's identity. The final checking should show the evidence of ownership, species obtain, harvesting, processing, and transportation documents.

In case timber source from the plantation in the Kingdom of Thailand. When moves the timber through Forest Checking Point needs to inform the competent officer to written permission to be moved further. Timber took outside under the forest plantation act. Need to stamp, imprint, or seal to show ownership. Each Checking Point needs to show the documentary to show the physical evidence and proof of product legality. In the manufacturing need to have permission from RFD to convert timber for trade, the record data report is up to date. In the realistic, no case found apply the CITES permit to export rosewood from Thailand (Tangkit, 2021) Due to the prices and demand continue must no longer prohibit. The administrative have a permit to do so. By the way, it should have a case study. Otherwise, it will have an obstacle to trading in the future.

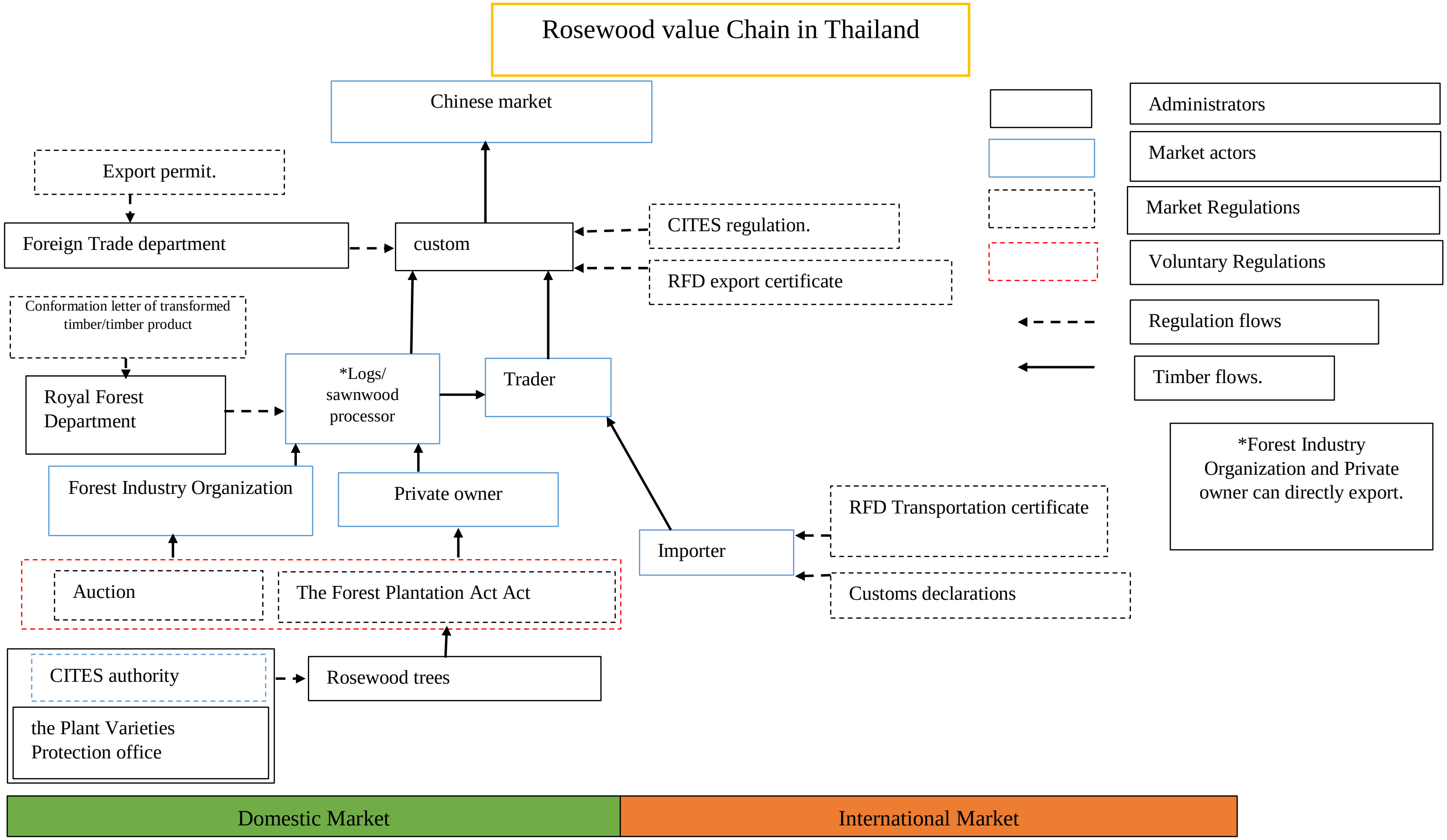

Figure 12 Shown the Rosewood value chain in Thailand.

Table 6 Name of organization and responsibility on rosewood trade.

Process/ Organization	Seedlings	Planting	Harvesting	Transportation	Processing	Exporting
Royal Forest Department	Main contributing seedling	Voluntary register forest Plantation Act (No. 2) B.E. 2558 (2015) with private and public land to prove occupancy, leasehold, concession, or use rights.	Control the Electric Chainsaw Act B.E. 2545 (2002) approve a permit to operate a chainsaw	The Forest Act (1941) (B.E. 2484) control logging operations, including transportation of timber and non-timber products and sawn wood production. logs and sawn timber that transport within Thailand need a travel permit.	Monitors and examine wood processing and timber utilization. Checking timber in-outputs records from timber-using factory.	Prove for a Certificate of Origin (CoO) and CoC (if a customer requests proof of origin)
Plant Varieties Protection office	Proving an artificial propagation		Issue the permit document to clarify the logging site for CITES species			Phytosanitary certificates for customs clearance
Thai Costum						Import - Export Document declaration, checking a sales invoice. Required to issue tax invoices and collecting VAT
The Department of Industrial					Responsible for approving factory license by the Factory Act B.E. 2535.	

The Foreign trade department						Making export permit
The Ministry of Commerce						Make a regulation requires the licensing of imports-exports in wood.

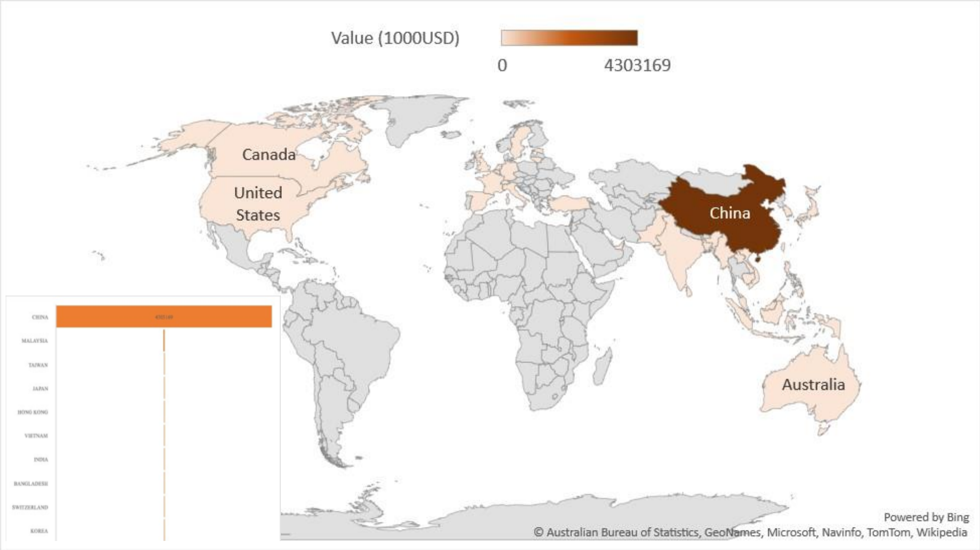

Figure 13 Shown the top country Thailand export of rosewood.

(Data source from Thai custom from 2009-2021)

Thailand is also the top country wood processing and top10 export countries wood products. Picture 13 shows the explicit leading export country is China, followed by Malaysia, Taiwan, Japan, Hong Kong, and Vietnam, respectively. From 2009-2021 Thailand has been exporting rosewood account to 4.3 billion USD to China. The target for export timber product change to un risk market because most of the risk market such as Europe and the United States have their timber certify requirement that difficult to access into the market. Rosewood demand in China has grown exponentially over the past 15 years. In 2016, approximately 80% of overall hongmu imports into China averaged the equivalent of 350 hongmu logs per hour. (EIA, 2016) Thailand was implemented rosewood trade under CITES regulation. However, the report on the timber flow found that the main source countries China's imports of CITES regulated tree species were Argentina, Paraguay, Vietnam, and Singapore, followed by Japan, Malaysia, Indonesia, Germany, and Thailand. (ITTO, 2017) The China Timber Price Index report indicates that rosewood in the Chinese market is mainly importing from Myanmar and Thailand. Due to the corona epidemic, political, and market considerations. So far, no new wood products have come to the Chinese market for more than a year, and according to the current chaotic situation in Myanmar, it is expecting that It will be more difficult for new products to enter the market in 2021. At the same trend with data from Thai Custom that the number of rosewood export have been decreased significantly since 2016 and continue to decrease until last 2020 after the corona epidemic.

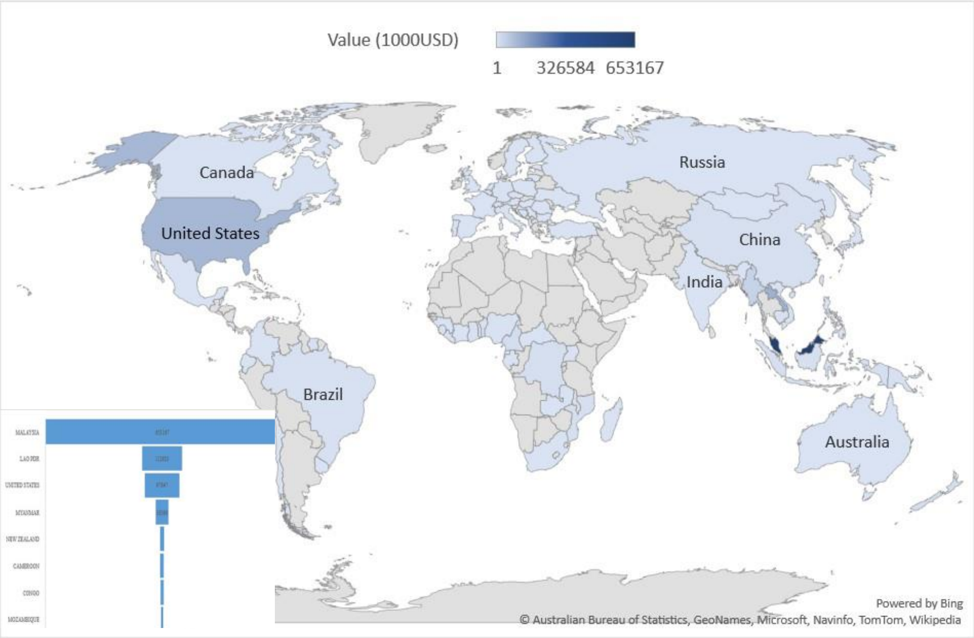

Figure 14 Shown the top country Thailand import of rosewood.

(Data source from Thai custom from 2009-2021)

* Using HS code 440399 to tracking Wood; in the rough, whether or not stripped of bark or sapwood, or roughly squared, untreated, n.e.s. in heading no. 4403

Thailand is also a wood processing country. Although the high-risk tropical sawn timber from neighboring countries such as Laos, Malaysia, Myanmar, and Cambodia have been importing into the country, most of the rosewood import to Thailand will be re-export to the third country, mainly in China. EIA (2014) reports that the illegal rosewood logged from Thailand was smuggled into Cambodia and re-exported into Thailand again to obtain the reported origin from Cambodia. The process of obscure its origin can be seen in Laos and Myanmar as well. Now Myanmar also directly import timber through the China-Burmese border, making the number of imports to Thailand decrease.

The strong market in 2020 has given strong confidence support for rosewood industries businesses. The traders believe that the mid-to-high-end hardwood raw material market will continue going in 2021. Market experts predict that the cost will rise and expected all types of hardwood raw materials prices would increase up to 5%-10%.(CTI, 2021b) Now the rosewood from Thailand price at 151,384 Yuan/Ton (Shanghai Furen Timber Market) (CTI, Product Price, 2021) In the same main markets, Okoume's prices remained stable overall. The price in the Guangdong market for the sawn wood is around 3900-4200 yuan/cubic meter. The price has risen sharply recently, same at red sandalwood from the Gambia the price has climbed to 7500-8000 yuan/ton, which is also a massive pressure for domestic businesses. It can see that rosewood industries cannot be downward.

Thailand and China have been partners traders for a long time. However, after 2017 (picture 15), scarcity of resources made the trading value drop down during the wood industries competition in the Mekong Region. Thailand was one of the main rosewood supplies in the Chinese market but currently, due to the legal suspension process and unclear ownership. There are more than 1,500 tons of rosewood (sawnwood) in Thailand still waiting to trade. By the way, China always finds new resources to fulfill the market demand. According to the information from China Timber Price Index, starting from June 2020, Burmese rosewood price has been increased account to 20%. The Guangdong market prices with a diameter of 50-60 cm and a length of 2m were reported at 30-33,000 yuan/ton, while the price of common materials has varied between 15-20,000 yuan/ton for a long time. (CTI, 2021a) In 2021, which rising new middle-class more than 400 million people will consume less luxury, high-end, and diversified, China will become the world's largest consumer market change. The traditional Chinese rosewood furniture materials and the market of high-end private customized materials will establish. The raw material supply to the market can take advantage and seem to have a good trend in future.

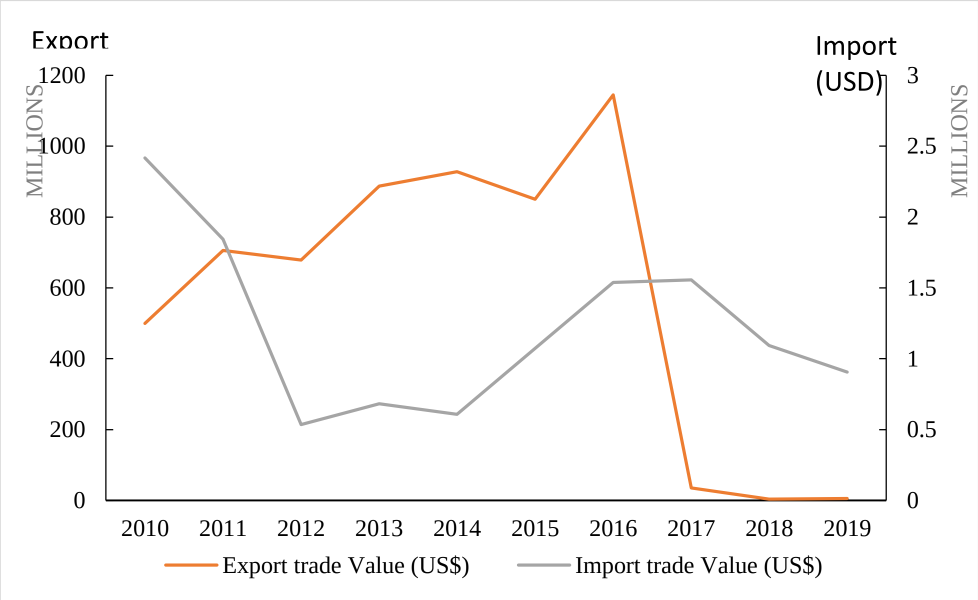

Figure 15 The rosewood trade between Thailand and China.

(Data source from UN Comtrade)

4.1.4 Rosewood illegal logging and opportunities for the trade.

Thailand rosewood illegal logging is the most critical issue in the country. In 2000-09, China's global rosewood industry imports timber from the Mekong region accounted for 70 percent, which makes enormous pressure on standing stocks, particularly of Siamese rosewood. (EIA, 2014a) In the national park, the crime between loggers and forest rangers being severe. Sadly, a Thai forest ranger who protects the national forest has been killing by armed loggers. Thus, we are lost not only national resources but also human resources.

High-value rosewood (old trees) has been exploiting from natural forests for many years since 2009. Figure. 16 shows the trend of illegal logging has been seizure by Thai forest rangers. In 2013-2015 is the high peak of number and volume of illegal rosewood logging. It is the same period that the rosewood global market price has excessively risen. Zhu (2019) Found that China’s rosewood imports (Roundwood equivalents in millions of meters cubed) are higher in 2014 by the main source from Asia. Meanwhile, after 2014 number of rosewoods imported from Asia has declined but surge in Africa instead.

After heavily illegal logging from natural forests in Thailand, the number of trees has been scarce, and now only small trees have remained. Most countries with the exact similarity of rosewood species finding challenging to deal with illegal logging and species lost from natural forests. High-end rosewoods came with high quality that most of the age of the tree over 50 years. Nowadays is rarely found a big and old rosewood tree in natural forests in Thailand. At the point of cabinet resolution, all kinds of rosewood species (D. cochinchinensis) cannot be import-export and cannot re-export rounded and sawn timber. Only finished semi-products can be export.

One of the reasons for the number of seizures decreases because cooperation between international organizations and the Department of National Parks, Wildlife, and Plant Conservation being using smart patrol to combat crime in the National Park.

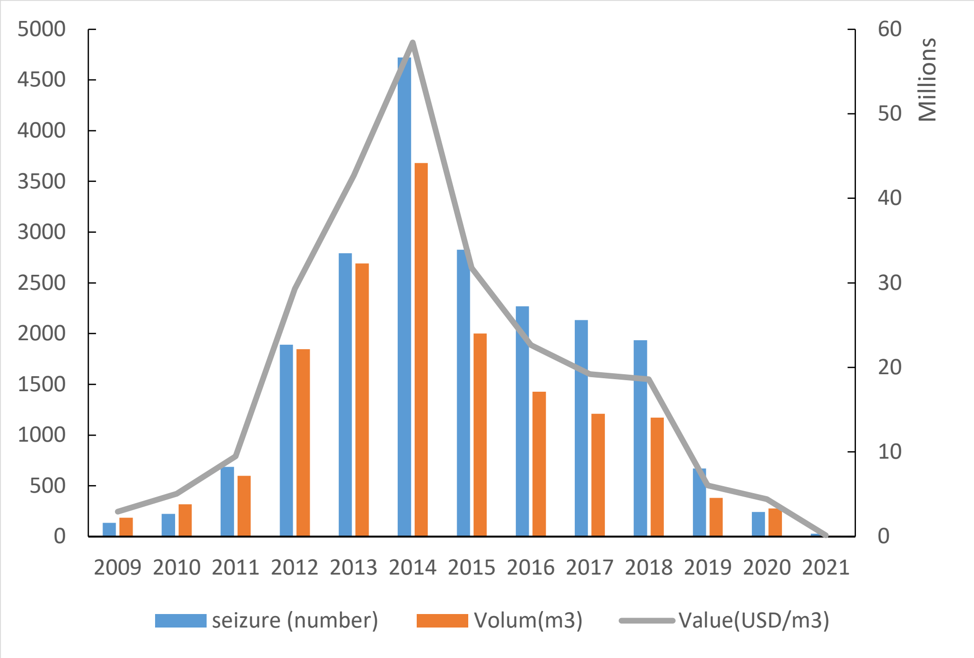

Figure 16 Rosewood seizure in Thailand from 2009 – 2021

(Data from the Royal Forest Department and Department of National Parks, Wildlife and Plant Conservation reports, 2021)

Rosewood has been planting as a home garden or plantation. The economics plantation mainly uses spacing distances 4 x 2 meters, 1 ha using 1,250 seedlings. The researcher recommends using spacing at 4x4 meters to make rosewood trees more have been grown at diameter better. Royal Forest Department has mother trees and seedling seed orchards to collect quality seed for tree planting. A small amount can get free from the forest research and development office, but if who needs more for the commercial, they will be selling at 2,700 Baht/kg (The price in the general market is 1300 -1500 Baht/kg.) Usually, people also can get seed and seedlings from the market but cannot quarantine the quality. Every year, all RFD nurseries will contribute seedling to farmers, schools, and other organizations at the end of May. Therefore, demand for rosewood seedlings has been an increase every year. In 2020 RFD reported that they produce rosewood seedlings with more than

10,000,000 seedlings (account only rosewood seedling cultivation activity) contributing to the country.

By the way, Royal Forest Department has been creating a “Promotion of Forest plantation for economic, Social and Environmental Project” providing both financial and technical support. The members need to agree on intensive five years management plan. At the end of the project must have at least 70% of standing trees remain. The standard cost for subsidy is 5,000 baht/rai (1 ha = 6.25 rai), but the actual cost must be more than that. Mr. Pracha Pnyo, head of Aung Pra plantation, said the average cost for cultivating a plantation at Forestry Industries Organization is a total of 48,000 baht/rai. The cost is getting high in the first year, such as for seedlings (available price in the market is 5-10 baht), preparing the soil, and planting. The tree planting needs to weeding and fertilizing at 2-5 years after that not need too much treatment. Nuthep (2018) found that heartwood rosewood has average tends to increase according to the diameter at breast height at 21-25 centimeters has an average heartwood of 38.39 kilograms per tree. The best age for logging was between 18 and 25 years at the price of around 530 to 1,000 USD /ha. By the way, hardwood quality is most important for the valuation of rosewood. (Kliangpibool , 2012) Thus, the planter needs to use silviculture technology to improve hardwood quality at 4-5 years. The well-growing rosewood trees at the age of 30 will have a diameter at breast height (DBH) of 25-30 cm, which is a good color hardwood. The very red hardwood will gain more benefit from the commercial.

The price of rosewood trade estimates from the black market for the sawnwood diameter 23-28 cm. the price around 500,000 baht/m^3 (DNP, 2021) Due to high-value species, rosewood has been planting rapidly, and some areas changing from rice fields to rosewood plantations. That is good for increase forest areas in the country. The Royal Forest Department has to promote tree planting, especially high-value trees, with uncertain policies and regulations, it will be difficult to support farmers in the future. Estimation of the income obtained from the trading of rosewood using the dry weight of rosewood with a DBH of 25 cm, planted with a 4 × 4 m spacing in the Royal Forest Department's plantation. Using the age of 29 years as a represent multiplied by the selling price of rosewood from natural forests 300-800 baht per kilogram (Reference price from the Bureau of Forest Prevention and Control and Forest Fire Control, RFD), It was found that if the rosewood could be planted and maintained similarly with the survival rate of 90 percent will lead to income per rai 2,865,000-7,640,000 baht, average 98,793-263,448 baht per year. (Visaratana, Pinthong, & Hutasangchai, 2016)

In the value chain, the high demand for rosewoods also increases the demand for the seedling in the local market. Usually, D. cochinchinensis, or we are generally known as the Siamese rosewood species not much popular compare with teak in the past. Mainly because it is heavily illegal logging from the natural forest, the cabinet resolution on Forest Act of 1941 section 7 that D. cochinchinensis grown everywhere in the country is defining as restricted timber. People need to ask permission to fell or sell precious in any case. This enact in the law obstacle to encouraging people planting valuable trees. Many people want to plant rosewood, but they are afraid that they will not cut their trees in the future.

In order to alleviate the pressure on planters and the Thailand Wood Association, the cabinet amended Section 7 of the Forest Act of 1941 to state that all types of trees growing in private land with ownership title documents are not prohibited wood. The wood of trees produced by humans on public property with authorization to use it is not considered banned and can utilize legally. However, since the new regulation passed on April 15, 2019, the demand for rosewood seedlings has risen. As a result, RFD was unable to deliver the supplies required to meet the public's demands. As a result, there were many orders, and the seedling price has increased by up to three times since 2010. It brought in money for local markets and private nurseries.

Rosewood seedling preparation takes around 3-5 months to be ready for planting. The difficulty happens if having too much rain or humidity so that seedlings may get fungi or attacked insects or diseases quickly. The planter or forester need to have skills and experience. For the seedlings with small sizes of less than 10 centimeters in the market, the price varies between 5-10 baht. The prices for a good size are high between 10-30 centimeters, around 15-30 baht. The gardener can get more benefits because the cost is low and the demand is high. This business can continue growing in the future. Miss Thanyathorn, head of Udon Thani nursery station, said, "Obviously seen that it directly affects seedling demand and price because of change in the law and regulation."

Table 7 The goods market for Siam rosewood in Thailand.

Product	Dimension	Use	Source	Price
Seed		Plantation	Royal Forest Department Selected tree, roadside	Free 2,700 Baht/kg
Seedling	tall >10 cm tall >10 cm tall 10-30 cm	Plantation	Royal Forest Department Garden shop Garden shop	Free 5- 10 Baht 15-30 Baht
Planting	1st year 2-10 years 30 rotations	Plantation	private land	5,000 Baht/rai 1,500 Bath/rai 48,000 baht/rai
Whole tree for trade	50 cm 23-28 cm	roundwood sawnwood	length 2 m	1,000,000 baht 500,000 baht/m3

In the rosewood industries, Vietnam is the main supplier to China and has become second-processing rosewood products. The processing operations shift the location from the east to the less developed western parts of China, and some move to Vietnam. (Huang & Sun , 2013) Thailand and Vietnam are the main actors for wood industries in Southeast Asia. Meanwhile, Vietnam's wood industry has been developing so fast compare with Thailand.

Table 8 Comparison rosewood status between Vietnam and Thailand.

Comparison	**Vietnam**	**Thailand**
Species	Dalbergia tonkinensis	Dalbergia cochinchinensis
IUCN threatened species	II	II
rotation	15-20 years	25-30 years
prices (m3) USD	2,000,000	93,000
policy support (promote)	home gardens	home gardens
legality	prohibit from nature forest but farmer can plant and cut	prohibit from nature forest but farmer can plant and cut
Factory	have	Do not have (small product from FIO)
trader	have	Finding (maybe on black market)
domestic market	have	Do not have
Final market	China	China
Demand	only depend on China	only depend on China

Dalbergia tonkinensis in Vietnam is one of the most expensive species in rosewood industries, and it already having traded in both international and local markets. The trade has contributed local economic value from selling seed, seedlings, timber, handicrafts, and furniture. Vietnam is one of the main wood processing in the world and the second-largest timber product exporter in Asia. Vietnam also has to implement EU FLEGT VPA and CITES regulations to maintain its position in this industry. (To & Sango , 2019) Compare to wood industries between Thailand and Vietnam, Vietnam's wood-processing industry has expanded rapidly. Vietnam has developed policies to increase investment and build large-scale wood enterprises since the first 2000s. The wood industry in Vietnam is going well even with some enterprise disruptions by Covid-19. Moreover, the market is expecting to grown-up further in 2021 (Nguyen, 2021) In Vietnam, D. tonkinensis also restricted by CITES APPENDIX II. Harvesting from natural forests was prohibited. The trees have been planting in private land. The owner can cut their trees after the procedure permit from the forest authority. (Nhung, Chi, Thu, Thuongc, & Ban, 2020) Thailand has not been installing a local wood enterprise for rosewood timber yet. The trading has been importing and re-export for logs and sawnwood without any processing.

The number of rosewoods from planting expects to be supplied into the domestic market soon. Tangkit (2021) Conclude that in the next 30 years, Thailand will have enough rosewood supply in the market. China is the main market now, but Thailand needs to be prepared for small-large wood processing enterprises to increase the competitiveness and strength of high-value wood products. The challenge for the rosewood market is that the products are scope to supply chain and rely on market demand in China.

4.2 Discussion

Wildlife crime and illegal logging are critical issues in developing countries. The issue becomes severe and complicated because of the driving market and growing demand from developed countries especially driving demand for tropical timber from China. (Zhang, al. 2016) China buyers prefer a big volume with a lower price and low concern of environment when compare with the EU or US market. Most of the developed countries create a standard to verify wood timber, especially the legality verification. By the way, if China's responses to the international legality verification well will impact timber industries a lot.

Without Chinese support for this regulation, the wood flow will turn away from the US, EU, and Australian markets to the lower legality requirements markets such as the domestic Chinese market. (Iben , Jie , Christian , Bin , & Yan , 2018) In global value chains, governance played the key to driving standards, specifically in buyer-driven value chains. Another factor is to develop industries that will face declining business, as the value-added/price of the exports may fall. It is the one challenge in comparative advantage for developing countries. (Kaplinsky, Terheggen , & Tijaja, 2010) Particularly, the rosewood, the driving from the Chinese market leading to unsustainable forest management.

The high demand with higher prices forces the rosewood market difficult to reach the international forest management standard. Chinese demand for commodities seems to force the business partner into low-technology, low-skill niches in their chains. They are followed by requiring low standards in the value chains. By the way, eliminating illegal timber production is more economical than eliminating consumption. It will pass the cost to developing countries more than developed countries who are the main driving market at the global level. Developing countries will face many adverse effects on timber economics. (Zhang, Xu, Wang, Yang, & Yang, 2016)

It is challenging for Thailand to build up opportunities for timber industries. After revising the law, the loggers often use vulnerability evidence obtained from Section 7 under the Forest Act 2484 to claim their timber possession. Many seizure cases found that the suspect always claims that old wooden pieces had been possessed for a long time and denied any intention to resell. The response organization should have a solid systematic to do due diligence on all wood products before setting the rosewood market.

The essential things that need to be improved are building the capacity of the authorities and good governance. Specifically, reduce corruption, which could activate economic growth and the ability to be capable of sustainable trade. (Tieguhong, Ingram, Mala , Ndoye, & Grouwels, 2015) The collaboration between international organizations such as CITES, the European Union's Forest Law Enforcement, Governance and Trade (FLEGT), the International Timber Trade Organization (ITTO) will help to facilitate the timber trade verification. Penthai & Vincent (2018) Mention that to make a successful implementation on endangered species trade should perform with 1) clearly identification species, 2) forceful legal to prevent corruption, and 3) the authority can work with transparency and confidence.

If Thailand wants to continue to build up rosewood timber trade competition, it should be considered value-adding and technology are improving through the processing products. However, creating a steady policy to support the rosewood market while the demand from the final market is still going up should make a more positive impact on economic growth. The cabinet resolution on 11 November B.E. 2551 is not laws, rules, or regulations. It is only the order of administering related administration for the following. It still has a chance for trading if traders can show evidence of legal wood. By this, the rosewood timber from growing trees can increase timber stock. The plantation has become significant to improve the domestic timber supply capacity. Even now, China also planting massive economies plantations support domestic demand. (Zhang, et al., 2020) The worldwide rosewood demand is likely to persist. Timber harvesting has increased along with a nation's economic growth. The absence of strict forest management policies cannot effectively stop illegal logging for economic benefits. Thailand's timber industries still have opportunities to growing up. Even now, the number of rosewood sources planted in the country is still low, but in the next 20 years, for sure, that will be enough supply from the private plantation. The source of rosewood trade in Thailand most comes from the international market. The pressure from international regulation forces neighboring countries such as Laos, Myanmar, and Cambodia to following the regulation. The trading between these countries becomes difficult since most of the wood supply in the market cannot clarify the source of origin.

Meanwhile, the logging ban cannot stop illegal logging if the number of imports from neighboring countries. The strong law and regulation cannot prevent timber crime if enforcement is still weak. However, RFD and the Department of National Parks, Wildlife and Plant Conservation, with Border Patrol Police, also cooperate in combating illegal logging. The smart patrol to survey through conservative areas was good effective. Thailand needs to improve technology and system that will increase capacity to combat illegal logging. Without concern on illegal logging, rosewood trade must have more beneficial sharing to local people and economic growth.

CHEPTER V CONCLUSION AND RECOMANDATION

5.1 Conclusion

1. Rosewood supply within-country found that the number of rosewood trees has been recording, remaining in National Park as a total of 1,372,000 trees account for 295,140 m3, under forest plantation registered 75,971 trees and under Forest industry organization's plantation total 236 ha. It is not including un-record data that is ongoing to survey.

2. The value chain of Siam rosewood in Thailand is in the birth stage of value chain status. Most of the rosewood has been exporting to the Chinese market, import from neighboring countries, and re-export without processing. As a result, there are fewer opportunities for value-adding. The domestic market just starting after the Forest Act (1989) amend 2019 by allowed all kinds of trees that planting on private land can cut without permission. The FIO is one of the organizations' ongoing trading rosewood in the domestic market. By the way, the rosewood trade within Thailand was less data information.

3. The value of rosewood export was higher same at the time of the illegal logging crisis. China is the main market that import rosewood product from Thailand. From 2009-2021 Thailand has been exported rosewood account to 4.3 billion USD to China. Now the price is relatively stable. In the domestic market, the price is around 500,000 baht/m3, but in the final market, the price has been rising to 151,384 Yuan/Ton or 738,000 baht/Ton.

4. The core issues related to the rosewood value chain found that the policy and regulation obstacle for market flow. The concern of endangered species and environmental impact must be more explicit than economic value.

5.2 Recommendation

Thailand needs to check the current statement of the relative administration. Primarily, RFD should collect and analyze all available data with is the permission harvesting documented and export data also cross-check destinations on imports exports into major markets particularly, China and Vietnam. Only the HS code cannot confirm the actual number of rosewoods that have been trading due to the unclear definition of the product. The Thai Custom cannot afford to combat crime through containerized shipping alone. Public-Private Partnerships are essential to clarify products across borders. To be straight strategic to combat illegal trade in the rosewood supply chain needs information sharing, cargo risk assessment, shipper due diligence, and a solid legislation system.

Rosewood market is still growing up with intense demand driving from the Chinese market. Amend laws and regulations to support timber economic growth should be a better way to increase market competition. Otherwise, Thailand will lose opportunities in the timber industry.

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태국 시암 로즈우드의 가치사슬분석

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요약

샴 로즈 우드는 CITES 규정의 무역 제한에 따라 CITES 부록 II 에 리스트되었습니다. 태국에는 약 26 종의 달 베르 지아가 있습니다. 중국 시장에서 이 목재의 질감 선호로 인해 가격이 극도로 상승하여, 10 년 이상 국가에서 불법 벌목이 이뤄졌습니다. 이 연구는 개요의 로즈 우드 가치 사슬을 통해 태국에서의 로즈 우드 가치 사슬을 이해하고, 핵심 문제를 확인하고, 체인 링크를 국제 시장에 매핑하는 것을 목표로했습니다. 태국의 로즈 우드 가치 사슬은 가치 사슬 상태의 초기 단계에 있습니다. 태국은 국가에서 목재 산업을 촉진하는 것을 목표로하지만, 오래된 법률과 규정이 무역에 걸림돌이되고 있습니다. 2018 년에 태국은 1992 년에 재정된 산림 조림 법을 개정하고 2019 년에 1941 년의 산림법이 개정되었음을 알렸습니다. 주된 이유는 사유지에 심는 모든 수종에 대한 나무를 자를 권리가 있기 때문입니다. 2019 년 법을 변경 한 후 로즈 우드를 심는 것은 가장 선호되는 파종심기가 되었습니다. 2015 년에 왕립 산림부는 460 만 개의 자단 묘목을 기부했고 이는 전국 전체 파종 기여도의 20 %를 차지했습니다. 하지만, 정책과 규제는 시장 흐름에 장애물이 되고 있습니다. 태국의 산림 관리를 수정하기 위해 논의를 진행중인 국가 산림 정책위원회는 경제적 가치보다 멸종 위기에 처한 종과 환경 영향에 더 관심이있는 것 같습니다. 2008 년 내각 결의안은

로즈 우드 통나무의 수출을 금지했습니다. 태국 국내에서 수출입을 원하는 상인은 CITES 허가증이 필요합니다. 지금까지 CITES 종 무역 보고서에 기록 된 사례는 단 하나뿐입니다. 현실적으로 태국은 오랫동안 로즈 우드를 중국에 거래 해 왔습니다. 2009-2021 년 사이 태국은 중국에 43 억 달러에 달하는 로즈 우드를 수출했습니다. 현재 가격은 상당히 안정적이며, 국내 시장에서는 약 500,000 바트 / m3 의 가격이 최종 시장에서는 151,384 위안 / 톤 또는 738,000 바트 / 톤으로 상승했습니다. 중국 구매자는 복잡한 로즈 우드 공급망을 촉진하고 처리하는 데 중요한 역할을 합니다.
로즈 우드 거래의 증거는 산림 산업기구 (FIO) 경매에서 찾을 수 있습니다. FIO 는 허가된 산림 개조 토지에서 목재를 수확하고 판매하는 것을 허용한 유일한 회사입니다. 로즈 우드는 국립 공원에 남아있는 총 1,372,000 그루의 나무가 295,140m3 를 차지하고 산림 조림 아래에 75,971 그루의 나무가 등록되었으며 산림 산업 조직의 조림 아래에 총 236ha 가 있습니다. 산림법 2484 에 따라 섹션 7 에서 얻은 법을 개정 한 후, 벌목꾼이 자연림에서 온 로즈 우드를 그들이 소유 한 것으로 선언한 케이스를 찾았습니다. RFD 는 목재 원산지를 인증하기 위해서 특별히 목재 흐름 제어 및 데이터 관리를 위한 새로운 시스템을 설정하기 위해서 진행중인 주요 대응 행정입니다. 그러나 목재 시장의 성장을 지원하기 위해 법률 및 규정을 수정하는 것은 시장 경쟁을 증가시키는 좋은 방법이어야합니다. 그렇지 않으면 태국은 목재 산업에서 기회를 잃을 것입니다.

카워드: 로즈우드의, 가치사슬분석, 태국 로즈우드의