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**Impacts and interaction of political and economic driving
forces in the international timber trade**

*Timber trade patterns in the light of the recent policies to contrast illegal logging and
of the increasing role of multi-functional forest management*

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Abbreviations and acronyms

AILPA	Australian Illegal Logging Prohibition Act
NAHB	Association of Home Builders
BRIC	Brasil, Russia, India, China
CA	Competent Authority
CETA	Comprehensive Economic and Trade Agreement
CFS	Corpo Forestale dello Stato
CHP	Combined Heat and Power
CITES	Convention on International Trade in Endangered Species on wild flora and fauna
CLT	Cross-laminated timber
CN	Combined Nomenclature
CoC	Chain of Custody
DDS	Due Diligence System
EC	European Commission
EIA	Environmental Investigation Agency
EU	European Union
EUTR	EU Timber Regulation
FAO	Food and Agriculture Organization
FSC	Forest Stewardship Council
GATT	General Agreement on Tariff and Trade
GDP	Gross Domestic Production
GHG	Greenhouse Gases (GHG)
GLULAM	Glued-Laminated Timber
GSE	Gestore dei Servizi Energetici
Ha	Hectare
IEA	International Energy Agency
IMM	Independent Market Monitoring
IPCC	Intergovernmentl Panel on Cliamte Change
ITTO	International Tropical Timber Organization
JWEE	Joint Wood Energy Enquiry
MIPAAF	Ministero delle Politiche alimentari agricole e forestali
MO	Monitoring Organization
NMRO	National Measurement and Regulation Office

PEFC	Programme for the Endorsement of Forest Certification
REN21	Renewable Energy Network
RO	Renewable Obligation
TLAS	Timber Legality Assurance System
TPP	Trans-Pacific Partnership
UN	United Nations
UNECE	United Nations Economic Commission for Europe
VPA	Voluntary Partnership Agreement
WTO	World Trade Organization
Ton	Tonnes

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SUMMARY

The direction of the development of the international forest market and the trade of timber products is largely determined by factors external to the traditional boundaries of the forestry sector. External factors can include international economic changes, environmental and energy policies implemented by international or national institutions, technological advancements and the response of civil society and public authorities to the most critical environmental changes, like deforestation, forest degradation and illegal behaviour of the actors in the supply chain (FAO, 1998)

More precisely, changes in international economic situations, such as the 2008 economic crisis, and the growth of emerging economies, are having diverging and sometimes opposite effects on the demand for timber products in specific countries and are modifying the composition of the types of timber products consumed (ITTO, 2013). At the same time, specific laws enforced by developed countries to fight the illegal timber trade, such as the implementation of the FLEGT Action Plan in Europe and the amendment of the Lacey Act in the USA, can favour changes in the trade behaviour of timber importers in Western countries (Pepke, 2015). Just like developed countries, which have traditionally been significant importers of roundwood, producing and exporting countries have also been implementing restrictions on exports in order to ensure the correct forest management over the past few years. These have included measures such as quantitative restrictions (quotas) and export taxes. Furthermore, the choice to assign economic incentives to wood used for energy has been an important driving factor in leading to a sharp growth in imports of woody biomass for energy purposes (Berndes *et al.*, 2003). In this period characterized by profound structural changes and increased competition with emerging economies, forest-based industries in traditional markets have begun to respond to these challenges by developing new and innovative products, such as new building materials, biodegradable plastics and bio-fuels (Hurmekoski and Hetemäki, 2013).

The main goal of the PhD thesis research is to connect these driving forces that have recently been affecting the international timber sector with the recent different trade patterns. We analyse this topic with a mixed, qualitative-quantitative, approach. In the first part, the research will describe and extensively analyse with mainly a qualitative approach the driving forces that have recently been characterizing the global timber market. In the second part, the thesis aims to assess the real level of enforcement of the main initiative implemented by the EU (the FLEGT Action Plan) to fight against the import of illegal timber. The third part will be based mainly on a quantitative approach, therefore we will present the methodology used to collect data on the timber trade and to improve their quality, while the following part of the thesis will be dedicated to the presentation of the results and the related discussion.

The research has demonstrated how the 2008 economic crisis hit log imports to Western countries accelerating the growth process of emerging countries like China and India on the international log market. The main reasons behind these trends were the collapse of log demand in the EU-28 and the USA during the crisis, as well as the introduction of tariff measures in important producing countries and the rising demand for timber products in emerging economies. These economic driving forces are doubtless factors that have tended to lessen the impact of measures

intended to fight against the trade of illegal timber. In fact, although some of the trade patterns that emerged in the period between 2005 and 2014 can be attributed to the enforcement of EU Regulation (EU) No. 995/2010, the present research has demonstrated how these trade patterns seem to have been mainly motivated by factors unrelated to the introduction of the EUTR.

Sommario

L'evoluzione del settore forestale internazionale e il commercio dei prodotti legnosi, sono da sempre profondamente condizionati da fattori esterni al settore. Tra questi, è possibile ricordare i mutamenti del contesto economico internazionale, le politiche energetiche a livello nazionale ed internazionale, l'innovazione tecnologica e la risposta della società civile e delle istituzioni pubbliche a fenomeni, quali la deforestazione e il degrado delle foreste, in particolare nei paesi tropicali (FAO, 1998).

I grossi cambiamenti del contesto economico, infatti, come la crisi del 2008 e la rapida crescita delle economie emergenti, hanno avuto grossi impatti sulla domanda internazionale di prodotti in legno e hanno portato ad un vero e proprio stravolgimento dei tradizionali schemi del commercio internazionale dei prodotti in legno (ITTO, 2013). Allo stesso tempo, le leggi volute ed attuate dai paesi sviluppati per contrastare il fenomeno del taglio illegale di legname, come il piano d'azione FLEGT in Europa e il "Lacey Act" negli Stati Uniti, hanno condizionato le tradizionali scelte commerciali degli importatori di legname nei paesi occidentali (Pepke, 2015). Tuttavia, proprio come i paesi sviluppati, che rappresentano tradizionalmente i principali importatori di legname, negli ultimi venti anni, anche importanti paesi produttori, a loro volta, hanno applicato restrizioni sulle esportazioni, al fine di garantire la corretta gestione delle proprie foreste. Inoltre, è necessario considerare che, negli ultimi venti anni, grazie alla spinta di specifiche politiche energetiche, la domanda di biomassa legnosa per fini energetici, nei paesi sviluppati è notevolmente cresciuta (Berndes et al., 2003). In questo contesto caratterizzato da profondi cambiamenti strutturali e da una maggiore concorrenza con le economie emergenti, le industrie del settore forestale dei paesi occidentali, negli ultimi anni, sono state costrette a sviluppare prodotti e processi innovativi per rispondere a queste sfide (Hurmekoski e Hetemäki, 2013).

Questa tesi mira principalmente a connettere le forze, di natura economica, politica e tecnologica, che recentemente hanno condizionato il mercato del legname internazionale con le recenti evoluzioni del commercio internazionale.

La ricerca è stata sviluppata con un approccio misto, tra qualitativo e quantitativo. Nella prima parte, la ricerca descriverà e analizza in modo approfondito i principali elementi che, negli ultimi, hanno influenzato il commercio mondiale di legname. Nella seconda parte, la tesi mira a valutare il reale livello di attuazione della principale iniziativa attuata dall'Unione Europea, il piano d'azione FLEGT, per combattere l'importazione di legname illegale. La terza parte della tesi, invece, sarà basata principalmente su un approccio quantitativo, pertanto verrà presentata, in primo luogo, la metodologia utilizzata per raccogliere e migliorare la qualità dei dati sul commercio del legname, mentre la parte successiva della tesi sarà dedicata alla presentazione dei risultati e alla relativa discussione.

La ricerca ha dimostrato come la crisi economica del 2008 ha colpito in maniera considerevole le importazioni nei paesi occidentali, andando ad accelerare il processo di crescita nel mercato internazionale di legname grezzo di paesi emergenti come Cina e India. Le ragioni principali di queste tendenze sono state il crollo, durante la crisi, della domanda di legname tondo negli Stati Uniti e in EU-28, l'introduzione di restrizioni alle esportazioni in importanti paesi

produttori, nonché la repentina crescita della domanda interna nelle economie emergenti. Le recenti evoluzioni del contesto economico internazionale sono, senza dubbio, importanti fattori che hanno ridotto gli impatti reali delle misure destinate a combattere il commercio di legname illegale. Infatti, anche se alcuni dei recenti trend del commercio, emersi nel periodo compreso tra il 2005 e il 2014 possono in maniera intuitiva essere attribuiti all'applicazione del regolamento EUTR, la presente ricerca ha dimostrato come questi sembrano essere stati principalmente motivati da fattori non correlati all'introduzione di tale regolamento.

1. INTRODUCTION

The present chapter aims to present the research background, the problems behind the research as well as research questions and objectives.

1.1 Background

The global forest sector, which includes forest management, timber harvesting and processing, contributes to 1% of the global GDP, officially employs around 13.2 million people across the world and informally employs at least another 41 million people (Agrawal *et al.*, 2013). In some developing countries, particularly in Africa, the forest sector makes a fundamental contribution to the national economy, covering more than 15% of the national GDP (FAO, 2014a). Historically, there has been a strong correlation between the societies and economies that have undergone the largest changes and how forests have been used to supply their products. For example, the agricultural expansion and industrial development of the 17th and 19th centuries have favoured rapid deforestation in Europe and the USA. During the 20th century, when coal and other fossil fuels began to replace wood as the main energy source, the global forest area deforestation rates began to decline and today forest area increasing in most European countries, as well as in North America (Agrawal *et al.*, 2013).

In the last 35 years, the global economic structure has been subjected to rapid reconfiguration due to the increasing role of emerging countries and to the 2008 economic crisis. This transfer of economic power from the traditional developed world has sped up dramatically over the last 20 years (Dicken, 2011). In 2013, China, due an average annual GDP growth rate of 10%, became the world's largest trading economy for goods and services, surpassing the US (WTO, 2014). In an international context, emerging economies contributed to more than 80% of global growth after the 2008 financial crisis (IMF, 2016).

Just like the international economy, the global market for forest products has undergone a drastic evolution in the last 30 years. In fact, the core of the international timber market, has been moving from the West to the East over the past 20 years, as well as from the North to the South. This is due to lower manufacturing costs, and/or more favourable natural conditions for rapid wood growth (Hurmekoski and Hetemäki, 2013). This movement was especially relevant during and just after the economic crisis, i.e., over the period from 2007 to 2013. In this period, for example, the role of Asian countries like China and India in the international timber market, for example in panel and sawn wood production, more than doubled. Consequently, the timber sector in developed countries underwent a process of renovation to respond to these challenges, increasing the attention paid to high value-added forest products and services (Hetemäki *et al.*, 2014).

In this context, despite the fact that developed countries have enforced specific laws to fight the illegal timber trade, such as Regulation (EU) No 995/2010 in Europe and the amendment of the Lacey Act in the USA, new concerns over the problem of illegal logging are emerging around the world. In fact, China and India, which are by far the world's leading timber processors, have increased their presence Africa and in South-East Asia, sparking concerns among civil society

regarding the legality of their behaviour. Until now, the actions carried out by developed countries have not appeared to be highly effective in fighting against the illegal timber trade on a global level. Furthermore, the important and innovative role now believed to be played by forests in combating climate change has affected the forest timber production (UNECE-FAO, 2014), offering new opportunities, but, at same time, favouring large speculative investments (Hetemäki *et al.*, 2014).

1.2 Problem statement

It is certain that the main driving forces that have recently been affecting the international timber market have had, are currently having and will continue to have an impact on the timber trade. However, this impact is frequently difficult to interpret and analyse and it is very hard to connect different trade patterns to a single driving force affecting the international timber sector. In particular, effects connected with political driving forces could be hidden by the consequences of economic ones. For instance, it is possible to suppose that policies created to combat the illegal timber trade could lead importers in the developed world to modify their supply chain, switching from supply chains with a high risk of illegal logging to those with a negligible risk (Giurca *et al.*, 2013; Pepke *et al.*, 2015). Nevertheless, most authors (Masiero *et al.*, 2014; Oliver, 2015) who have recently attempted to identify the direct impact on trade of policies created to combat illegal logging recognize that the effects of such policies are still uncertain and unclear, due to the rapid evolution of the international timber market. To clarify, the rapid growth of emerging economies is probably the driving force currently exerting the biggest impact on the international timber market; this force is also potentially having the strongest impact in terms of hiding the effects of political drivers. Another factor that should be considered when analysing the effects of political drivers in the international timber market is the real level and enforcement of these policies. For example, policies created to combat the illegal timber trade are enforced slowly and not in a uniform manner across Member States (Sotirov *et al.*, 2015), while policies implemented to support the energy produced from woody biomass appear to be inadequate to ensure the sustainability of the supply chain (ClientEarth, 2011). Furthermore, an international upsurge of protectionist sentiment has been in evidence across the world; in 2016, it led to Trump's election as US president and to the UK's decision to leave the EU following a referendum. These decisions will probably have consequences for international trade. First of all, some important trade agreements, such as the Comprehensive Economic and Trade Agreement (CETA), are under threat. In the timber sector, protectionist policies in the international have actually been present since the 1970s, when producing countries started to implement tariff and non-tariff policies to support domestic industrialization and to favour the sustainable management of forests. An escalation of tariff measures has recently been observed and this trend will certainly have an effect on the international timber trade.

1.3 Objectives and research questions

Once described the driving forces that have recently been characterizing the international timber market, the present research aims to understand how each driving force have affected the main trade patterns that have recently been reshaping the international timber trade. In detail, the

research aims to identify which driving forces had the most significant impacts in the international timber market and covered the effects of other driving forces.

The study is driven by the following research questions:

- What are the main effects on trade of the major economic driving forces, such as the 2008 crisis and the recent emergence of developing countries on the international timber market?
- What are the consequences of the implementation of policies supporting the use of woody biomass for energy?
- What are the recent trends in illegal timber flows around the world?
- What are the impacts of the tools to support the legal origin of the wood resources implemented by public organizations and the civil society?
- More specifically, have there been any direct or indirect effects on trade that could partially be connected to the FLEGT Action Plan and at what level is the FLEGT Action Plan being enforced in Europe?

The above-presented research questions determine one general and five specific research objectives, which are presented below

General objective

To analyse the international timber trade in order to identify any major recent trade patterns and to connect these with the various driving forces which have been dominating the international timber market over the past few years.

Specific objectives

1. To identify, in terms of their impact on the timber trade, of the major economic driving forces which have recently been affecting the timber trade;
2. To identify the consequences, in terms of its impact on the timber trade, of the growing European demand for woody biomass for energy;
3. To define an updated picture of the trade flows of illegal timber around the world;
4. To describe the tools to support the legal origin of the wood resources implemented by public organizations and the civil society;
5. To provide a detailed description of the extent of EUTR enforcement across Member States; to identify the consequences, in terms its impact on the timber trade, of the enforcement of Regulation (EU) No 995/2010.

1.4 Structure of the thesis

Figure 1 provides an overview of the thesis contents and structure

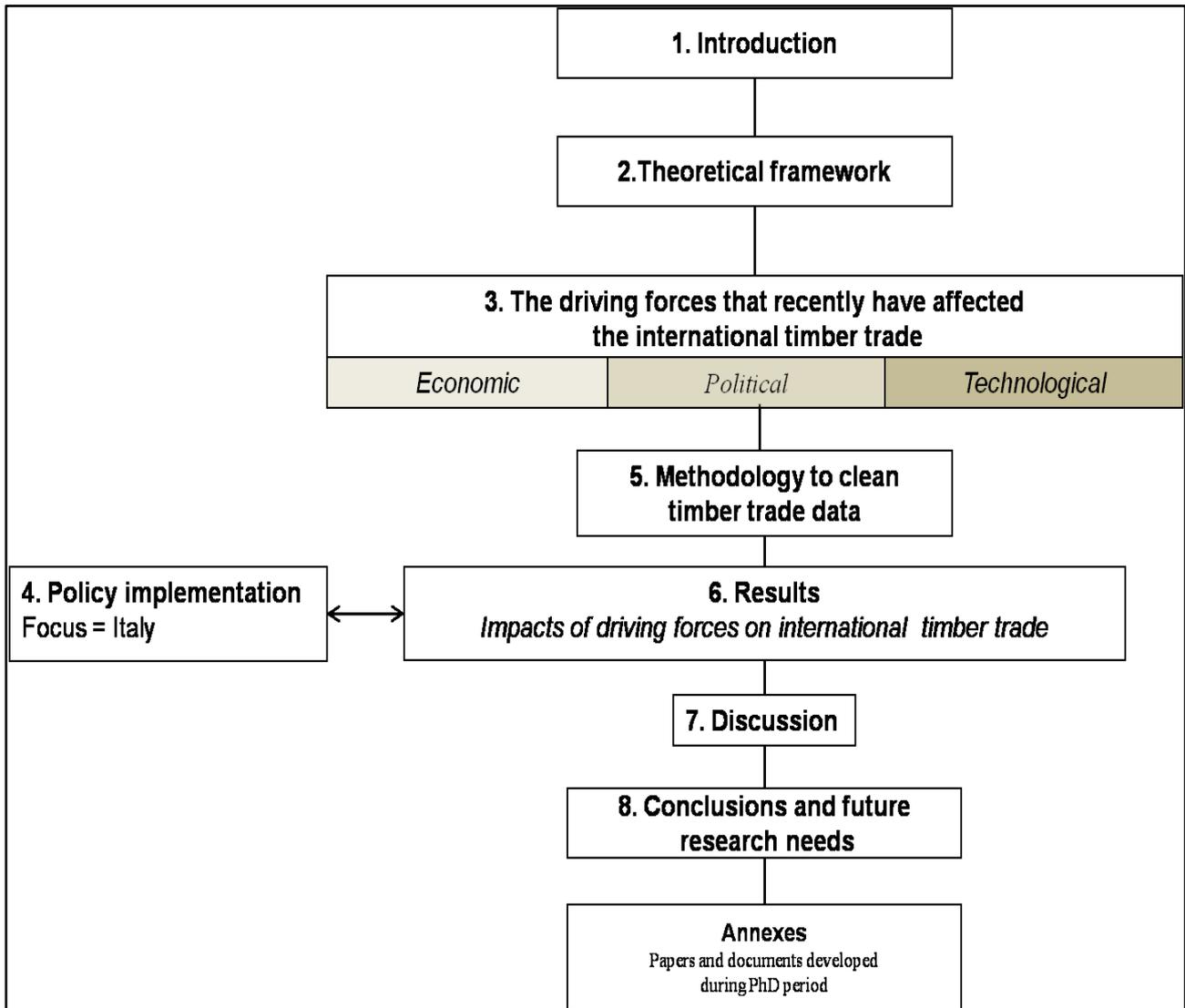


Figure 1. Thesis structure

Chapter 1 provides background information and presents the problems, thesis questions and objectives. Chapter 2 introduces the theoretical framework, summarizing the major theories that will constitute the main reference points for the research. Chapter 3 presents the driving forces that have recently been characterizing the international economy and the global timber sector. It will present in detail: (i) economic driving forces, such as the 2008 economic crisis and the development of emerging economies, (ii) policies with the potential to affect trends in the timber trade, such as those developed to combat illegal logging, the FLEGT Action Plan and policies to incentivize the diffusion of renewable energies and (iii) the technological forces that have recently been affecting the international timber sector. Chapter 4 describes and analyses the implementation of the FLEGT Action Plan, both in Europe and in Italy (which will provide the basis of a case study). Chapter 5 includes the research methodology utilized to collect and improve trade data quality, whereas chapter 6 aims to present main results of research. In detail, it presents the impacts on international timber trade of each driving force. Chapter 7 aims to discuss and analyse the results presented in

Chapter 6, whereas Chapter 8 presents conclusions drawn from the results and discussions presented in Chapters 6 and 7, as well as indications and suggestions for future research needs. The Annexes contribute to the thesis development by presenting a selection of papers developed during the PhD. period.

However, as presented in Table 1, many of the outputs included in this thesis are partially included in scientific papers, conference proceedings, presentations and project reports developed and published during the PhD period. In any case, even if some of it has already been presented in other scientific elaborations, the content has been updated and adjusted to lend the PhD thesis the greatest possible coherence.

Table 1. Chapters and reports, papers and presentation already published

Chapters	Reports, papers and presentation already published that include the contents of chapters
4.1.1 An analysis of scientific literature concerning EUTR enforcement	PROJECT REPORT: Indufor Oy, Tesaf, Efeca (2016). <i>Review of the European Union's Timber Regulation</i> . Report commissioned by European Commission, Directorate-General for the Environment in the context of project "Support to the implementation of the EU Timber Regulation" - ANNEX 8
4.1.2 An analysis of the legislative frameworks across EU Member States to enforce EUTR	PROJECT REPORT: Indufor Oy, Tesaf, Efeca (2016). <i>Review of the European Union's Timber Regulation¹</i> . Report commissioned by European Commission, Directorate-General for the Environment in the context of project "Support to the implementation of the EU Timber Regulation" - ANNEX 2
4.1.3 EUTR enforcement in Italy	CONFERENCE PROCEEDING: Andrighetto N., Pettenella D., Masiero M., (2015). Illegal Activities in the Italian Wood-Energy Sector and Potential Impacts on Regulation (EU) 995/2010 (EU Timber Regulation) . Proceedings of the 16th International Symposium, May 2015, Braşov, Romania, IUFRO division 9, Forest policy and economics (<i>research group 9.06.00: forest law and environmental legislation</i>); p. 94-106
3.2.2 The increasing role of woody biomass for energy in Italy	PAPER: Andrighetto N., Pettenella D., Favero M. (2015). Nuove stime sulle biomasse legnose a fini energetici. Un quadro informativo ricco ma disomogeneo . <i>Sherwood, Foreste ed Alberi Oggi</i> , 209, pp. 37-40
6.2 The impacts on timber trade of the increasing role of emerging economies	Andrighetto N., Pettenella D., Masiero M. (2017). Changing patterns in wood trade: the emerging EU regional market . Oral presentation in IUFRO 125 th Anniversary Congress in the session 7:D9, Freiburg 18-22.11.2017.
7. Discussion (figures)	BOOK CHAPTER: Jianbang G., Cerutti P., Masiero M., Pettenella D., Andrighetto N., Dawson T. (2016). Quantifying illegal logging and related timber trade

¹ Since this report contains more than 70 pages, in this thesis it will not be included as appendix. However, it is available at following link: http://ec.europa.eu/environment/forests/eutr_report.htm

	(chapter 3) . In: D.Kleinschmit, S.Mansourian, C. Wildburger, A. Purrel (eds.), <i>Illegal Logging and Related Timber Trade – Dimensions, Drivers, Impacts and Responses</i> . A Global Scientific Rapid Response Assessment Report. IUFRO World Series Volume 35. 2016 Vienna, p. 37-59.
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Furthermore, part of the contents of the present work and publications was developed in the context of the following project:

- *Support to the EC on the implementation of the EU Timber Regulation* (January 2014 - December 2015). Partners of the project consortium were Indufor (lead partner), Tesaf (Padua University) and Efeca. The project aimed to support the European Commission in reviewing the EU Timber Regulation (EUTR) over the first two years of its implementation. The main activities carried on by myself included assessing the applications of entities aiming to become monitoring organizations and analysing the Biennial Reports made by Competent Authorities (CA) to report on the implementation of the EUTR in their own countries.
- *The Joint Wood Energy Enquiry (JWEE)*, launched in 2006 by the UNECE/FAO Forestry and Timber Section, with the encouragement of the Joint ECE/FAO Working Party on Forest Statistics and in collaboration with the International Energy Agency (IEA), the Food and Agriculture Organization (FAO) and the European Commission (EC). Its purpose is to collect data and improve knowledge related to wood energy consumption in each country. As the project's Italian correspondent, in early 2017 I supplied an overview of the Italian data on Italy's consumption of woody biomass for energy, in collaboration with "*Gestore dei Servizi Energetici*".
- *FLEGT Independent Market Monitoring (IMM)*, funded by the European Commission and implemented by the International Tropical Timber Organization (ITTO), aims to independently scrutinize and assess concrete changes in the EU timber market and monitors the extent to which the market recognizes and appreciates FLEGT licensed timber. As the project's Italian correspondent, in 2017 I interviewed the main stakeholders in the Italian timber sector in order to understand their first impressions of the introduction of FLEGT licenses for Indonesian timber.

2. THEORETICAL FRAMEWORK

The theoretical framework of our research approach is based on two bunches of theories: those related to the analysis of the role of trade in economic development and those connected to the new subjects of natural resources governance systems.

According to numerous studies (Sun and Heshmati, 2010; Jarreau and Poncet, 2012), international trade is recognized one of main elements supporting the development and economic growth of a country. Feder (1983) has demonstrated how a country should invest resources in the export sector instead of the non-export sector. This assumption strengthens the idea behind the theory of comparative advantage, developed by Ricardo in the early 1800s. In fact, Ricardo's theory demonstrated that, if two countries capable of producing two commodities engage in a free market, then they will increase their overall consumption by exporting the good for which they have a comparative advantage while importing the other good. Simply put, when focusing on natural resources, countries with plentiful natural resources will generally have a comparative advantage in products based on those resources. Building on this, two Swedish economists, Heckscher and Ohlin (1991), improved Ricardo's theory by theorizing that even if two countries had the same production technology, trade could still be beneficial because they would have a different factor endowment. However, the constantly growing trade in natural resources, which currently accounts for 20% of the global trade of goods, presents particular challenges for policy-makers, because they are essential to the production process for most finished products but are also potentially exhaustible. Furthermore, the unequal distribution of natural resources across countries and the volatility of their prices can be the cause of international tensions. Therefore, their extraction and the use of natural resources should be carefully managed in order to balance the competing needs of current and future generations (WTO, 2010). Furthermore, for this reason, the Heckscher-Ohlin theory has been modified over time through the introduction of other factors besides resource endowment which also have the potential to affect comparative advantages, such as transportation costs, economies of scale and government policies. In particular, policies can influence international trade patterns and the prices of the resources traded through instruments such as export taxes, production quotas or bans on exports or imports.

That said, the present research was developed from the awareness that, in the context of the trade in raw materials deriving from natural resources, timber accounts for approximately 65% of the total worldwide wildlife trade and is an important element in the economies of numerous countries². Timber is also the main forest product traded in terms of value and weight. However, in recent years, the forests have been at the centre of the debate on environmental protection. More precisely, concerns about the destruction of forests, especially tropical forests, has led international institutions to search for ways to increase interest in the role of trade by providing incentives for more sustainable forest management (Barbier, 1998). This link between sustainable forest management and the international trade in forest products was endorsed in the global Forest

² Information reported at Traffic web site. Web site available at the following link: <http://www.traffic.org/timber-trade/>. Last access: 20th October

Principles³ agreed at the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro. Nevertheless, the final declaration of UN Rio Conference specifies how a sustainable forest management *'need to be supported by a market context that enhances the economic values of forest resources and a price mechanism that promotes an adequate and remunerative return for the sustainable use of forest resources'* (United Nations, 1997). One of the best example of this market mechanism supposed in the final declaration of UN Rio Conference was the development of the forest certification scheme Forest Stewardship Council (FSC), that involves the private sector in standard setting, but can lead to the conservation and enhancement of public goods, as forests. According to Humpreys (2008), these market mechanisms necessary to remunerate forest management, supposed in the conclusions of in Rio Conference, are strongly penetrated by a neo-liberalism approach, with the concrete risk that markets are not able to fully value environmental goods and services. In fact, as argued by Nadeau (2013), under the neo-liberalism theory, markets will tend towards stability, not towards sustainability. Private markets seek out the most profitable outcomes, not those that lead to resource conservation (Nadeau, 2003).

Starting from this awareness, in the last twenty years, the global forest governance has been based on an increased involvement of lower level authorities and non-state actors, such as market actors and NGOs, in order to improve effectiveness, quality and legitimacy of policies dedicated to guarantee sustainable development (Agrawal *et al.*, 2008). In the light of this development, international forest policies should be based on non-binding principles for good forest governance and private initiatives, like those related to reporting, standardization, certification and voluntary commitments (Arts and Buizer, 2009). However, for the a correct and an effective policy implementation, the public institutions should maintain an important role. Instead of a traditional 'command-and-control' role, the public institutions should facilitate private initiatives by setting standards and providing incentives, promoting innovative technologies and market-driven strategies (Backstrand and Lovbrand, 2006). Then, currently, new approach of international forest policies should thus be seen as a hybrid of neo-liberalism and other instruments (as legal tools) related to the conservation and sustainable management of forests (Humpreys, 2008).

One of the most recent example of this new approach is constituted by one of the main international forest program to stimulate timber legality, the FLEGT (Forest Law Enforcement, Governance, and Trade) Action Plan, that constitutes one of the key driving forces analyzed in the present research. As highlighted by its name, the FLEGT Action Plan aims to combining legality tools, in which the States cover a key role, stimulating civil society participation with an increasing view towards a market view (Van Heeswijk and Turnhout, 2013).

³ This is the informal name given to the "Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests" at the UNCED Conference.

3. DRIVING FORCES RECENTLY AFFECTING THE INTERNATIONAL TIMBER TRADE

3.1. The economic driving forces at global level

3.1.1 Economic and financial crisis

The global financial crisis, which started at end of 2007⁴ in the USA and spread rapidly to the rest of world, was the greatest shock to the global economy since the Great Depression of the 1930s (UN, 2010; ITTO, 2013). The crisis was preceded by a period of economic increase, characterized by rapid credit growth, the huge availability of liquidity, strong leveraging and the uncontrolled development of the real estate sector (Sally, 2011). This overstretched leveraging situation made financial institutions extremely vulnerable to any deviation in asset markets. As a result, the bursting of the housing bubble in the US was enough to shock the whole structure of the international economy (ITTO, 2013). Between 2007 and 2009, the economic crisis led to a 0.6% reduction in the world's real gross domestic product (GDP); in 2009, global GDP growth was 5.8% lower than in 2007. However, this deceleration in GDP growth varied widely around the world. For instance, between 2007 and 2009, the GDP growth of Eastern European countries (the region most affected by the economic crisis) decreased on average by 15.2%. During the same period, the GDP growth of Latin America and countries in sub-Saharan Africa decreased by 7.6% and 4.8%, respectively. On the other hand, the GDP growth of developing Asian countries dropped by 4% (Dulien *et al.*, 2010). The human cost of the financial crisis was the obliteration of seven million jobs in developed economies, which resulted in an unemployment rate of about 9% in 2009. This was an increase of around 3% with respect to the previous two years, a historically unprecedented growth in the numbers of unemployed people (UN, 2011). The total EU unemployment rate increased from 7.1% in 2007 to 10.0% in 2010⁵. After the economic crisis, in 2010 and 2011, the global economy began to recover thanks to the numerous and resolute fiscal actions undertaken by both developed and developing countries. In particular, the Chinese and Indian economies, although significantly shocked by the crisis, responded to it with significant economic and fiscal measures. Favoured by growing domestic demand, they have led the global recovery from the recession (Nagaraj, 2016). In terms of developed economies, EU countries have faced particularly deep recessions, and have recovered from the financial crisis more slowly than the US and Japan. The two latter countries rapidly reached the same market shares they had reached pre-crisis.⁶

During the economic crisis and the post-crisis period, patterns in the international trading system also underwent numerous and important developments. In general terms, according to the WTO (2015), between 2007 and 2009, the value of merchandise goods traded at the international

⁴ During 2008 the economic crisis has reached its peak. For this reason, in the document the crisis it will be called the 2008 economic crisis

⁵ **Source: Eurostat, 2017.** Unemployment statistics - Eurostat statistics explained. Last access: 10 August. Link:http://ec.europa.eu/eurostat/statistics-explained/index.php/Unemployment_statistics

⁶ **Source: Eurostat, 2017.** National accounts and GDP - Eurostat statistics explained. Last access: 10 August. Link:http://ec.europa.eu/eurostat/statistics-explained/index.php/National_accounts_and_GDP

level dropped by 12.2% as a result of the financial crisis. Obviously, the reduction in international trade was mainly connected to the decline of imports to developed countries (UN, 2010). In fact, at the peak of the economic crisis, the value of imports to the EU-28, Japan and the United States plummeted by more than 40% and exports from producer countries, such as Asian countries, experienced a decline between 10 and 25% (WTO, 2015). Furthermore, the 2008 economic crisis accelerated an economic trend that was already emerging at the beginning of the 2000s: the growth of intra-regional trade, particularly in Asia (Sally, 2011). The economic crisis did not have the same impact on the trade of all goods categories. For instance, the global quantity of agricultural products traded at the international level decreased less than other products, such as fossil fuels and minerals (WTO, 2015).

The international timber sector was heavily damaged by the 2008 global economic crisis (ITTO, 2013). According to UNECE (2010), the global consumption of wood and paper products dropped by 12% between 2008 and 2009, while the global volume of roundwood harvested for industrial purposes collapsed from 1.8 billion m³ in 2005 to 1.5 billion m³ in 2009. In advanced economies, demand for timber products was firstly negatively affected by the collapse of the housing sector and the subsequent reduction in wood building material and furniture demand. In the USA, the annual rate of new housing starts decreased from 2.1 million in 2006 to 0.8 million in October 2008 (FAO, 2009). The crisis of the housing sector led to a collapse in the US demand for sawnwood (-50%) and a 22% reduction in employment in all of the American timber industry (Taylor, 2009). Between 2007 and 2009, the world's furniture consumption decreased by 7.2 % after a period of constant growth characterized by an increase of 21.2% between 2003 and 2007 (CSIL, 2014). Across developed economies, the biggest reduction was reported by the EU furniture sector (-20% between 2007 and 2011) (CSIL, 2014). As a result, between 2005 and 2010, the total number of EU wood-based industries decreased by 9.1%; this represents a more or less similar value to that reported for the whole industrial sector (-8.3%).⁷ In any case, due to the economic crisis, large furniture companies in both America and the EU were forced to adopt various strategies to maintain their competitiveness, including downsizing (by closing plants), increasing production efficiency and continuing to invest intensively in existing and new retailing formats (ITTO, 2013). The collapse of timber demand in developed countries negatively affected the timber sector in many producer countries. In particular, the small and medium-sized enterprises dominating the tropical timber sector suffered the worst effects of the global financial crisis, as they had limited access to finance, weak negotiating power and a limited ability to respond quickly when the timber market began to recover (ITTO, 2013).

In terms of the environmental impact of the economic crisis, the reduced wood demand could theoretically reduce the harvesting of forests and therefore have a positive effect on the conservation of forest resources. At the same time, anyway, the economic crisis could reduce the willingness of civil society to invest in environmental services, as well as any interest in the issues linked to the sustainable management of forests (ITTO, 2013). However, in some cases, the 2008

⁷ **Source: Eurostat, 2017.** Wood products, production and trade. Eurostat statistics explained. Last access: 10th August 2017. Link: http://ec.europa.eu/eurostat/statistics-explained/index.php/Wood_products_-_production_and_trade

economic crisis has made context more competitive, stimulating some timber companies to get advantageous elements to differentiate one from each other, like the third-part forest certification. Furthermore, the declining demand for high-priced wood, the reduced economic capacity of public institutions to protect forests and the growth of unemployment in many rural areas increased illegal activities in forest sector. The link between the increase of illegality in the forest sector and the economic crisis was already identified by Pagiola (2004) in Southeast Asia during the 1997 economic crisis. Another negative environmental effect of the economic crisis in tropical countries occurred as a result of the need of local timber processing companies to focus only on well-known timber species (high value species) in order to improve the efficiency of their own supply chains. Therefore, lesser known timber species (lower value species) were under-utilized, with negative effects on sustainable forest management (ITTO, 2013).

3.1.2 The increasing role of emerging economies

Historically, developing countries have been considered as being on the “periphery” of the economic world, but in the last 15 years "emerging economies" have become a hot topic in economic and policy literature (Lemoine and Ünal-Kesenci, 2007). However, the definition of “emerging economies” remains wide and sometimes vague (Bensidoun *et al.*, 2009). According to the definition supplied by ICEF Monitor (2014), emerging countries can be broadly defined as *“those countries which have started to grow but have yet to reach a mature stage of development and/or where there is significant potential for economic or political instability”*. The political and economic growth of emerging economies, which will also characterize the global economy in the future, was marked by the globalization process that started in the early 1970s. The process of globalization was driven and favoured by technological progress, mainly in terms of lower transportation and communication costs. Beyond the developments in trade, global production patterns have also significantly changed in recent decades. In fact, the recent globalization process has supported the creation of cross-border value networks for the production of goods and services, making production geographically fragmented. For example, industrializing economies in East Asia became much more assembly-oriented (Gereffi, 2015). The general transfer of labour-intensive operations to locations with low labour costs created several opportunities for industrialization in developing countries (Wolfram, 2013). Therefore, in recent years the growth rates of developing countries have been consistently higher than those in the developed world (WTO, 2014). In 2000, emerging economies contributed to just 37% of global GDP; in 2013, this figure reached 50% (Boumphrey and Bevis, 2013). As already mentioned in the previous chapter, the economic crisis constituted another factor indirectly favouring the increase of the role of developing countries in the global economy. Between 2007 and 2010, developing countries expanded their role by 4%, to the detriment of the role played by developed countries (UN, 2011). Not only is their excellent performance in terms of labour costs behind the increase of emerging economies, but also a stronger and more effective cooperation between developing countries which has led to the expansion of intra-regional trade, particularly in Asia (Asian Development Bank, 2013). Indeed, the role of emerging countries has risen not only in terms of their economic performance, but also in the international trade network, such as the leadership role now played by the major emerging economies. Of these emerging economies, Brazil, China, India and Russia form the core of

developments in the emerging markets and are traditionally termed as "BRIC". These four large markets saw their economies double in size between 2004 and 2013 and, in 2013, accounted for 53% of the GDP of emerging markets. They also accounted for 21% of the global GDP and this figure is poised to reach 40% by 2050 (Wilson, 2011). Of the BRIC countries, China and India reported the most significant economic increase and were the countries that led the global economic recovery after the 2008 crisis. The total Chinese GDP in 2014 was EUR 6.4 trillion higher than it had been in 2004, and its role in the world's GDP rose from 4.5 % in 2004 to 13.4 % in 2014. On the other hand, India, driven by export-competitive sectors (such as IT and chemicals) and by increased domestic demand, was the world's fastest-growing economy between 2000 and 2014 with an average annual GDP growth of 7.6%.⁸

In a similar manner to the global economy, the structure of the international timber sector has also undergone significant restructuring over the last 20 years due to the increased role of emerging economies. Former leading countries in the forestry industry, such as USA, Japan and some EU countries (such as Germany and Italy), are losing their relative role in the international timber market. Indeed, emerging economies, such as China, Brazil and India, are becoming the main timber importers and the most relevant finished and semi-finished product exporters (UNECE/FAO, 2013). In 1990, Japan, EU countries and the USA were responsible for over half of the global consumption of pulp, paper, sawnwood and panels; in 2012, they accounted for around just a third of global consumption (FAO, 2015).

It is certain that China is currently the world hub for timber products. It was the world's largest timber consumer in 2015, accounting for 50% of global tropical log imports, and increased its global timber imports by 64% at a time when imports by traditional importers like the EU and the USA grew by just 20% and 33%, respectively (ITTO, 2015). At the same time, China was the world's biggest exporter of furniture between 2004 and 2012, accounting for 40% of global timber production in 2012 (CSIL, 2014) and producing almost half of all timber products imported by the EU (Indufor, 2016). Meanwhile, India has undergone the largest increase in terms of tropical roundwood imports: the value of such imports increased fourfold between 2000 and 2014. In emerging economies, wood imports are partly intended to address growing domestic demand, due to high economic growth and incentives provided to the building industry (ITTO, 2012), and partly to feed industrial production intended (mostly) for exports to Northern markets (Manoharan, 2013). Masiero (2015) supposes that about 2.3 million m³ of tropical timber products, mostly in the form of logs and sawnwood, were diverted from traditional Northern importers to emerging importers, such as China, India and Vietnam between 2000 and 2013. However, the growing role of the Chinese and Indian timber sectors has raised concerns among civil society. In fact, numerous Chinese and Indian companies are accused of being responsible for illegal forest activities in Madagascar (EIA, 2014a), Mozambique (EIA, 2014b), Myanmar (EIA, 2015a) and Cambodia (Forest Trend, 2013). At the same time, India and China in order to guarantee the provision of raw materials to their processing industries are responsible for the development of large forest plantations in African and Asian countries, with consequent potential negative social and environmental impact (German *et al.*, 2011). In fact, The development of these large timber

⁸ Source: World Bank database. Link: <http://data.worldbank.org/>Last access: 10th August 2010

plantations, often favoured by too easy access to state-owned and community lands, has supported the diffusion of land grabbing processes in many developing countries, such as in Indonesia (Gaveau *et al.*, 2016) for the pulpwood production, in Cambodia (Scheidel and Work, 2016) and in Uganda (Lyons and Westoby, 2014) for valuable timber, with a consequent risks of conflicts with local communities.

3.2 The support to renewable energies

3.2.1. The role of renewable energies and the increasing role of woody biomass for energy around the world

Addressing global climate change is considered as one of the key challenges for present and future generations (FAO, 2017). The impact of the increase in temperature is having an effect on most of the world's regions, but will hit poor countries hardest in the near future, as they are already suffering from food insecurity (Turall *et al.*, 2011). According to the IPCC (2011), the increase in anthropogenic greenhouse gas (GHG) concentrations has been recognized as the main cause of the rise in average global temperature. By the end of 2010, CO₂ concentrations had reached 390 parts per million (ppm), a value 39% higher than preindustrial levels. Therefore, GHG emissions must be greatly reduced in the coming decades in order to combat climate change. According to numerous studies (IEA, 2016; FAO, 2014b), the consumption of fossil fuels is the main culprit of global anthropogenic GHG emissions. For this reason, "*green policies*" aiming to improve energy efficiency and spread the use of renewable energies are considered essential for reducing GHGs and addressing global climate change without decelerating economic growth or reducing welfare (IRENA, 2016). In fact, in addition to their large potential to mitigate climate change, renewable energies can provide a wide range of benefits, such as supporting the economic and social development of rural areas, facilitating and guaranteeing access to energy and creating potential employment opportunities. Mainly for these reasons, many governments have enacted renewable energy policies. By 2015, 164 countries around the world had adopted renewable energy targets (IRENA, 2015).

In 2009, the European Union adopted the EU climate and energy package (an energy strategy to be accomplished by 2020) in order to cut GHG emissions by at least 20% by 2020 when compared to levels observed in 1990, to increase the share of renewable energy to at least 20% of total consumption and to achieve energy savings of 20% through improvements to energy efficiency. Concerning the diffusion of renewable energies, the Renewable Energy Directive (2009/28/EC) established an overall policy for the production and promotion of renewable energy in the EU. It stipulated that the target of renewable energy accounting for at least 20% of the EU's total energy consumption by 2020 should be achieved through the meeting of individual national targets. These targets could vary based on the differing starting points of each country. They vary from 10% in Malta to 49% in Sweden (Gerigk *et al.*, 2012). The following table summarizes the national policies along with their related targets, as well as the main support schemes implemented by the four major EU economies (the United Kingdom, France, Italy and Germany).

Table 2. National policies, support schemes, implemented by the four major EU economies

	Policies	Target year	Policies Target	Main support scheme
Italy	National Energy strategy (2013) National Renewable Energy Action Plan (2010)	2020	Overall: 17% Heating/cooling: 17% Electricity: 26% Transport: 10%	Feed-in tariff Premium tariff Auction system Economic/fiscal incentives
France	Energy transition act (2015)	2030	Overall: 32% Heating /cooling: 38% Electricity: 40% Transport: 15%	Feed-in tariff Premium tariff Auction system
Germany	Energy Concept (2010)	2020	Overall: 18% Heating/Cooling:15.5% Electricity: 37% Transport: 13%	Feed-in tariff Premium tariff Auction system
United Kingdom	National Renewable Energy Action Plan (2010)	2020	Overall: 15% Heating/Cooling:12% Electricity: 31% Transport: 10%	Renewable obligations Economic/fiscal incentives for heating

The fixed-price feed-in tariff scheme, based on long-term purchase agreements at fixed prices, is the most widespread support scheme around the world. By 2015, 110 jurisdictions around the world at either the national or the state/provincial level had enacted a feed-in tariff scheme as a result of its demonstrably good energy efficiency. Furthermore, it usually entails lower risk and leads to more transparent market conditions (REN21, 2016). On the other hand, premium-price feed-in tariff policies, which offers a premium above the average market price of electricity, is too dependent upon market conditions; a reduction in energy prices can undermine the profitability of a plant. Mainly for this reason, premium price tariff schemes are less prevalent than fixed-price feed-in tariffs. However, numerous countries currently operate both tariff schemes, depending on the plant size (NREL, 2010). As described in Table 2, among the four main European economies, only the United Kingdom did not opt for the feed-in tariff; instead, the UK’s main support mechanism is the Renewable Obligation (RO). To clarify, this consists of green certificates issued to operators in order to accredit renewable generating stations for the eligible renewable electricity they generate. ROs should be utilized by suppliers to demonstrate that they have met their obligations.

In the USA in 2013, the Obama administration issued the US Climate Action, which aimed to reduce GHG emissions through the establishment of public targets for renewable energy production. However, US state policies are usually the major drivers of the spread of renewable energies in the USA. In fact, many states have implemented their own renewable electricity standards, according to which a certain rising percentage of electrical power production should be generated by renewable sources (IRENA, 2014). These targets are partly supported by financial incentives, used to support feedstock demand, supply and plant building.

The fixed-price feed-in tariff scheme, especially in the EU-28, has caused a sort of explosion in bioenergy supply. Just in the period from 2000 to 2014; 46% of all existing EU plants (equal to 42% of all bioenergy production capacity) were constructed (AEBIOM, 2015). In contrast, the

subsidization systems in Canada and the USA do not include a concrete fixed-price feed-in tariff; this is the main reason for which most plants in these countries are independent from subsidies. Consequently, most North American plants are relatively old and characterized by a large-scale size, reaching an average size of 26 MWel.

The role of solid biomass in the energy production

The term bioenergy means any type of energy produced from organic matter. At the international level, bioenergy is also defined using the term biomass, i.e., all materials of biological origin not embedded in geological formations. In the last years, important factors such as public incentives policies, the decreasing cost of renewable energy generation technologies and the uncertainty of fossil fuel prices, have favoured the recent global increase in bioenergy use (World Energy Council, 2016). In 2016, bioenergy covered almost 90% of renewable heat use and 8% of renewable power consumption. As a result, bioenergy was the largest renewable energy source in primary energy production in 2016. Between 2010 and 2016, the supply of biomass for energy grew at a rate of around 2.5% per year. Global biopower capacity has reached 112 GW, while energy production has reached 504 terawatt hours (REN21, 2016). Solid biomass, including fuelwood, charcoal, agricultural and forestry waste, is the most important single source of renewable energy, providing about 6% of the world' total primary energy supply annually (IRENA, 2016). In Africa, wood is used to produce half of all the energy consumed, while one third of households worldwide (about 2.4 billion people) use wood as their main fuel source for cooking and boiling drinking water (FAO, 2014b). The domestic use of wood for energy is also significant in industrialized countries. According to the FAO (2014b), more than 80 million people in Europe and around eight million people in North America use fuelwood as their main heating source. The use of woody biomass for electricity is prominent in Europe and North America. Nowadays, around 70% of all solid biomass consumed to produce electricity is used in Europe and the USA (World Energy Council, 2016).

However, particularly in the EU-28, this rapid increase in demand for biomass energy has raised numerous worries among civil society. Indeed, there is doubt as to whether the EU-28 countries' future demand for woody biomass for energy can mostly be satisfied by European forests. One of the most cited EU wood studies (Mantau *et al.*, 2010) suggests that, if woody biomass were actually to play the role ascribed to it in every national renewable energy action plan, then the demand for forest biomass would increase by 73% between 2010 and 2030. This would lead to the consequent risk of forest biomass shortages within the EU. Furthermore, the growing demand for biomass could create competition with the sectors for which it has traditionally been used, such as construction, the paper and pulp industry and biochemistry. As a result, if energy prices were to rise, the effect of this would be to divert the price of timber for industrial purposes (European Commission, 2014). These numerous concerns have led to action at various levels (both voluntary and legislative) to guarantee the sustainability of biomass; a growing number of stakeholders, such as NGOs, are starting demand that the procurement of raw material meets a set of minimum sustainability requirements (Fritsche and Iriarte, 2014).

3.2.2 The increasing role of wood for energy in Italy

Woody biomass for energy: a multi-disciplinary supply chain

The term wood energy refers to any energy source that comes from woody biomass, including fuelwood, charcoal, industrial wood residues, wood pellets, cellulosic ethanol and other advanced forms of bioenergy. These different types of woody biomass can be collected from: (i) forests (trunks, dead trees, prunings and other woody waste materials), (ii) trees planted in marginal and farming lands and (iii) recovered material from wood processing industries (material from pre- and post-processing) (Trossero, 2002). Around two thirds of woody biomass used in the countries included in the United Nations Economic Commission for Europe (UNECE) came from directly from forests, while one third of woody biomass used for energy in these countries came from indirect sources, such as trees planted in marginal areas and recovered material (Steierer, 2010). Both types of supply chain, i.e., those utilizing direct and indirect sources, consist of a varying number of stages. Different actors may be involved in production at each stage, such as processing, transportation and the use of woody biomass for energy purposes. As a result, assessing the wood energy sector can be complex, with numerous and relevant interlinks in wood use and flows between different wood-processing actors. This issue of multidisciplinary is gaining increasing attention not only from policymakers, scientists and stakeholders in the energy sector, but also from stakeholders and interest groups representing other sectors like agriculture, forestry, the environment, industry and consumption (Ferranti, 2014).

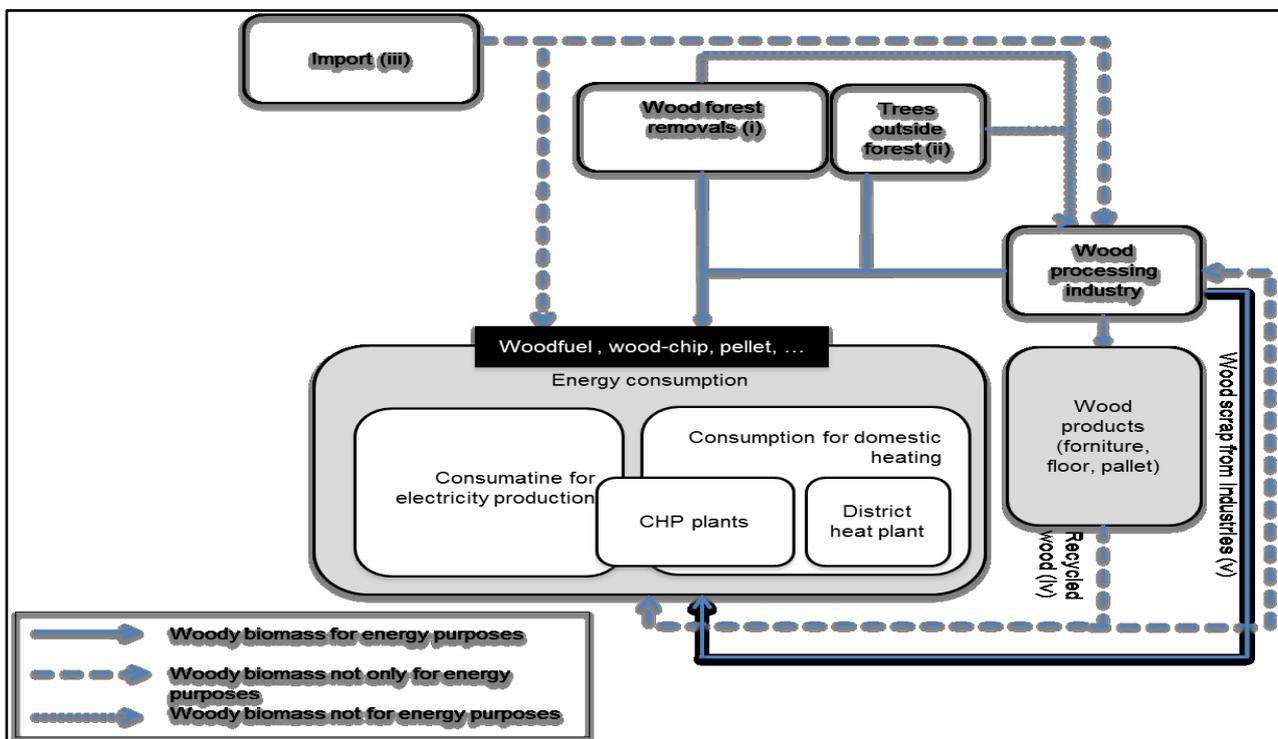


Figure 2. The main stages of woody biomass for energy supply chain

Data of woody biomass consumption for energy in Italy

The National Renewable Energy Action Plan, developed by the Italian Ministry of Economic Development (2010) in the context of the European Directive 2009/28/E, assigns a key role to solid biomass in achieving targets for 2020. Indeed, solid biomass should become the largest source of renewable energy in Italy by 2020, accounting for 8% of electricity production and 50% of heating and cooling production supplied by renewable energies. There are two major reasons behind this heavy reliance on woody biomass in Italy's renewable energy targets. Firstly, the cost of woody biomass makes it competitive compared to other renewable energy sources, such as hydropower (which has been a dominant renewable energy source (RES) in Italy in past decades) and geothermal energy (Scarlet and Dallemand, 2011). Secondly, woody biomass is highly available in Italian forests, which have previously been little used, and this could consequently lead to opportunities for the enhancement of active forest management, an increase in job opportunities and therefore a rise in income in rural areas. According to Eurostat⁹, the felling rate (wood harvested/net annual increment) in Italy is one of the lowest in Europe: 39.2%, against 47.3% in France, 80.3% in Germany and 55.5% in Spain. Mainly for these reasons, the Italian government has promulgated important laws over the past few years to support the utilization of woody biomass for energy, such as:

- *The RES Promotion Law* (Decree No. 28/2011), a decree implementing European Directive 2009/28/EC;
- *The Renewable Electricity Decree 2012* (Ministerial Decree of 6 July 2012) in support of heat production from renewable sources;
- *The Income Thermal Decree* (3 March, Decree No. 28/2011) in support of heat production from renewable sources.

Mainly due to the economic incentives foreseen in these decrees, the bioenergy market in Italy has experienced continuous growth, a trend which is expected to continue in the near future (Pra and Pettenella, 2015). According to data supplied by "Gestore dei Servizi Energetici", in its "Yearly Statistical Report" (GSE, 2017), a total of 23.7 million (M) tons of wood was used in primary energy production in 2015. Table 3, developed with the direct support of GSE, aims to identify the different uses of woody biomass for energy in Italy.¹⁰

⁹ **Source:** Eurostat, 2017. Forestry statistics. Eurostat statistics explained. Last access: 10th August 2017. Link: http://ec.europa.eu/eurostat/statistics-explained/index.php/Forestry_statistics

¹⁰ The table and its related data will also be utilized in **the Joint Wood Energy Enquiry 2017** for Italy.

Table 3¹¹. Consumption of woody biomass for energy in Italy in 2015

	Quantity (1000 ton)	Energy produced (Tj)
HEATING PRODUCTION		
Fuelwood	16709	232409
<i>First home</i>	16532	229973
<i>Second house</i>	177	2436
Pellet	1938	33490
<i>First home</i>	1919	33161
<i>Second house</i>	19	329
Wood charcoal	57	1756
Woodchips	846	9660
<i>Industry</i>	536	6110
<i>Agriculture</i>	125	1431
<i>Trade and service</i>	185	2119
Post consumer material	828	9433
ELECTRICITY		
Woodchips	3382	68986
<i>CHP</i>	2124	43337
<i>Only electricity</i>	1257	25649
Total consumption (1000 ton)	23703	

With regard to electricity produced from woody biomass, Italy has no electric plants that run on wood pellets (AEBIOM, 2015); all of the country's plants run using woodchips. In southern regions, some plants may use Mediterranean solid biomass (e.g., olive pomace, pits and grape residues) to integrate woodchips. According to GSE (2017), there were 300 electricity production plants using solid biomass in 2015 (either directly or by CHP), although this number does not include urban waste. Their average power capacity was equal to 2.1 MW.

Image 3 aims to describe the distribution of existing (and active) electricity production plants (either directly or by CHP) in Italy in 2014, with a power capacity greater than 2 MW. It is possible to see that most of these plants are close to the Alps, since most Italian forests are located in the mountains. However, the six major plants (those with a capacity of more than 30 MW) are close to important harbours (such as Monfalcone and Crotona), because woodchips imported by ships can easily supply the plants. The tendency to build the largest plants near harbours is also common in other EU countries, such as the United Kingdom (Client Earth, 2011). At the same time, this tendency is considered to be a distortion effect of the large economic incentives granted for energy incentives in the context of the EU's biomass strategy, which cover the cost for importing large amounts of raw material from far away countries (Pearce, 2015).

¹¹ The conversion factor utilized are included in the "Manual for statistics on energy consumption in households", published by International Energy Agency in 2005



Figure 3. The distribution of existing woody biomass plants that produce electricity (directly or by CHP) in 2014, in Italy. Source: own elaboration of data supplied by "Eco-program volume 2014"

In 2015, more than 20% of Italian households used woody biomass as their main heating source; as a result, the total amount of woody biomass used for residential purposes was 19.2 million tons, which can further be divided into 16.7 million tons of firewood and 1.9 million tons of wood pellets. These numbers would make woody biomass the second largest heating source for Italian households, just after methane (GSE, 2017).

In any case, if GSE are able to supply a rough overview of woody biomass consumption in Italy, the question of the origin of this woody biomass is still open. In order to answer this question, different potential sources of biomass shall be analysed, including:

- *Domestic forest removals:* according to the most recent available data, in 2012, forest removals for energy purposes in Italy amounted to 5.4 million m³ (2.7 million tons), or about 70% of total roundwood removals on a national scale.¹²
- *Removals from trees not contained in forests:* there are no official statistics regarding domestic wood production from trees not contained in forests; however, the Italian Producer of Renewable Energy Federation (FIPER, 2013) indicates that at least three to four million tons of woody biomass are potentially available from these sources every year.
- *Imports:* in 2015, Italy imported 3.8 million tons of woody material (firewood, chips and pellets) to be used for energy purposes¹³

¹² **Source: Eurostat, 2017.** Forestry statistics. Eurostat statistics explained. Last access: 10th August 2017. Link: http://ec.europa.eu/eurostat/statistics-explained/index.php/Forestry_statistics

- *Recycled wood*: finally, recycled wood waste was estimated to amount to around 1.4 million tons in 2013, 50% of which was utilized for energy purposes (Fondazione per lo Sviluppo Sostenibile e FISE UNIRE, 2014).

Table 4 summarizes the estimated contribution made by different sources to national supplies of woody biomass, together with data on total and domestic consumption at the national level. Due to a lack of clear and reliable industrial data, wood waste and scraps have not been taken into account in the analysis.

Table 4. Different sources and the their annual contribution (estimated) of woody biomass for energy.

Annual supplies	Quantities (M tons)	Data sources
Forest removals for energy purposes	2.7	Eurostat, 2014
Woody material from trees from outside the forest	3 to 4	Fiper, 2013
Import	3.8	Comtrade, 2016
Recycled wood utilized for energy purposes	0.7	Fise Unire, 2014
Total sources	10.2 to 11.2	

Even though the data presented in table 4 are not totally complete (there are no data available on wood scraps from manufacturing industries), and though they refer to a period (2013 to 2014) rather than a single year, the gap between the consumption of woody biomass and the supply available is evident. Even if we assumed that all of the available biomass was destined for energy production (which is not a fully realistic scenario), the total amount would cover less than 60% of household consumption of woody biomass, and only 45% of total consumption. These figures suggest that, as has already been supposed by many studies (Tomassetti, 2010; Gasperini and Tabacchi, 2011), a significant proportion of the biomass utilized in Italy for energy purposes is obtained from unclear sources, which might include wood from illegal activities such as irregularly harvested/traded or illegally imported domestic wood. In 2012 in Italy, 823 cases of wood theft were reported by the State Forestry Corps (CFS, 2013). In addition to wood theft, empirical experience indicates that the Italian wood energy sector is characterized by an informal market, with consequences in terms of Value Added Tax (VAT) fraud.

In conclusion, the rapid increase in the use of woody biomass for energy in Italy does not appear the outcome of a well-coordinated, intersectorial policy strategy. In fact, energy incentives have favoured the construction of very large electric plants that run mainly on imported biomass; at same time, the woody biomass heating sector is mainly informal, and lacking in data and statistics able to supply a coherent picture of the sector. Both factors appear to be limiting factors for the correct development and implementation of effective strategies and measures to support the woody biomass sector for energy purposes in Italy.

¹³ Source: Comtrade Database. Last access: 10th January 2017. Link: <https://comtrade.un.org/>

3.3 Illegality and corruption in the forestry sector and related policies to contrast them

3.3.1 *The emerging problems of illegality and corruption*

Illegal logging has no single definition. In a general sense, since the word "illegal" means something "*not allowed by the law*", it can be assumed that illegal logging takes place when timber is harvested, transported, bought or sold in violation of national laws (Brack and Hayman, 2001). Tacconi *et al.* (2003) tried to give a more comprehensive definition by adding more detail; they define illegal forest activities as: "*all illegal acts that relate to forest ecosystems, forest-related industries, and timber and non-timber forest products. They include acts violating rights to forest land, corrupt activities to acquire forest concessions, and activities at all stages of forest management and the forest goods production chain, from the planning stages to harvesting and transport of raw material and finished products to financial management.*" However, a recent report published by Chatham House (Hoare, 2015) expanded the definition of "illegal logging" to include activities involving the illegal clearance of forests for other land uses (a practice known as "illegal forest conversion"). With this practice, forest land is cleared to meet other land needs without a permit, or thanks to a license obtained through illegal processes, such as corruption.

To try and estimate the scale of the problem, according to Interpol¹⁴ (the world's largest international police organization), in 2010, illegal timber represented 15–30% of all timber traded at the international level. In some key producer countries, such as tropical countries, the extent of illegal logging can vary from 50% to 90% of the total volume of timber harvested. Meanwhile, the global economic value of illegal logging, including processing, is estimated to be worth between 30 and 100 billion USD. In 2012, 52.7 million m³ (with a total value of 12.4 billion EUR) of timber imported by Europe came from "high risk" countries; these countries have national Corruption Perception Indices (CPI) of less than 50 out of 100 (Forest Trend, 2013). In recent years, numerous studies and reports have attempted to assess the recent illegal logging trend, presenting different data and contrasting views. Hoare (2015) states that between 2000 and 2010, illegal logging declined by 25% and that the international trade of illegal timber products decreased by 30%. Similarly, Lawson and MacFaul (2010) and Chatham House, in the project "*Illegal Logging and Related Trade: Indicators of the Global Response*",¹⁵ highlighted a significant reduction in illegal logging in numerous producer (and processing) countries. In contrast, Nellemann and INTERPOL (2012) state that illegal activities in the forest sector have remained very frequent, and that direct illegal logging has transformed into more advanced activities for laundering, selling and trading illegal timber. The paragraph below presents a review of the most advanced fraudulent actions in timber harvesting.

¹⁴ Data published on the Interpol website (Project LEAF). Last access: 22th May 2017. Link: <https://www.interpol.int/Crime-areas/Environmental-crime/Projects/Project-Leaf->

¹⁵ The main outputs of this project are available at: <https://indicators.chathamhouse.org/explore-the-data>

Emerging forms of illegal logging

At the international level, at least 30 types of illicit operations, from the falsification of logging permits, to obtaining logging permits through corruption, to mixing illegal timber with legal logs, were recently observed in the main producer countries of tropical timber (Nellemann and Interpol, 2012). In the Democratic Republic of the Congo (DRC), the "*Permis de Coupe Artisanaux*" (Artisanal Logging Permits), intended to allow Congolese communities to engage in small-scale logging activities in their forests, are systematically used in a fraudulent capacity by foreign loggers on an industrial scale (Global Witness, 2012). Greenpeace revealed that in Cameroon, another country in the Congo Basin, the "*Vente de Coupe*" (VC) (Sales of Standing Volume), which permits forest activities to be carried out over a maximum area of 2,500 hectares and which mainly addresses local community needs, is very frequently beset by corruption in the allocation phase so as to indirectly favour large foreign timber companies (Greenpeace Netherlands, 2015). Just like in the Congo Basin, the fraudulent obtainment of official documentation for the laundering of illegally logged timber is a phenomenon that is also becoming more and more common in Brazil. Greenpeace Brazil's (2014) report, "*The Amazon's Silent Crisis*", revealed how illegal loggers systematically submit applications to harvest timber that they have no intention of logging, or overestimate the amount of timber they could log in a given area.

In another part of world, the Russian Far East, two investigations carried out by the EIA (2014c; 2015b) have demonstrated how well-organized criminal organizations, by exploiting the numerous weaknesses of forest law enforcement in Russia, have developed a system to control the harvesting, processing, trade and export of valuable temperate hardwoods such as Mongolian oak (*Quercus mongolica*), Manchurian ash (*Fraxinus mandschurica*), Japanese elm (*Ulmus propinqua*), Amur linden (*Tilia amurensis*) and Manchurian linden (*Tilia manshurica*).

In South-East Asia, the timber sectors of Laos and Cambodia are undergoing a significant transition. In fact, both countries are becoming very important for the production and export of high value wood products (such as rosewood) to China, Vietnam and Thailand. The export value of Lao wood products in the period between 2009 and 2014 increased more than eightfold (Smirnov, 2015). However, many logging operations in Laos are linked to forest clearance for large infrastructure projects; this is due to the fact that, in the last few years, the Lao PDR government has tended to support large-scale foreign concessions for crops, mining explorations and road building. Smirnov *et al.* (2013) analysed two case studies (a road project and a quarry project), and revealed that 100% of the timber extracted from the road project and 99% of that extracted from the quarry was harvested illegally. In fact, in the two case studies under consideration, the volume of timber extracted was much higher than ought to have been permitted, while logging activities took place outside of concession boundaries and involved species not permitted to be cut under Lao law.

In key producer countries, such as Indonesia, Malaysia and Brazil, in recent years a growing proportion of timber has been coming from clear-cutting in order to convert forests into commercial agricultural plantations. For example, in Indonesia in 2012, timber from forest conversion represented 72% of reported consumption and in Malaysia in 2010, at least 66% of timber production derived from forest conversion (Blundell, 2014). As reported by Lawson (2014), most forest conversion for large-scale agricultural investment are carried out in violation of laws in force

in the main producer countries. For example, some estimations indicate that in Brazil during the period 2000 to 2012, at least 90% of the conversion of the Amazon rainforest to agriculture was illegal. In Indonesia in the same period, at least 80% of forest conversion to commercial agriculture and timber plantations should be considered illegal. Consequently, it is possible to assume that between 2000 and 2010 in Indonesia, at least 80% of timber produced from forest conversion should be considered illegal (Blundell, 2014).

3.3.2 The public institutions' reaction: non-tariff policies to contrast illegal logging

Until the 1990s, political actions to address illegal logging were only marginally present on the international policy agenda. Many experts identify the starting point of many political activities to fight against illegal timber, as well as the increase in private sector initiatives, to be the failure of the 1992 UN Earth Summit in Rio de Janeiro to deliver a global forest convention (FERN, 2013). In 1994, the illegal timber trade entered into international debate, but it was merely identified as “undocumented trade” in the International Timber Trade Agreement (Humphreys, 2016). In 1997 “illegal logging” “officially” became a global environmental threat for the first time, something that most developed countries committed to combating. In fact, at their Summit in Denver, USA, members of the G8 agreed to launch an Action Plan on Forests (FERN, 2013). The G8 Action Plan also cooperated with the World Bank Forest Governance Programme, working on an operational partnership to enforce forest law in South-East Asia. This culminated in the Bali Declaration of 2001, which was the starting point for the first of the World Bank Forest Law Enforcement and Governance (FLEG) regional initiatives in Eastern Asia and the Pacific (EAP FLEG, launched in 2001), Africa (AFLEG, launched in 2003), Europe and Northern Asia (ENA FLEG, launched in 2005) and Latin America and the Caribbean (LAC FLEG, launched in 2006).

In 2003, the European Union, which is historically one of the world’s biggest wood consumers and importers, undertook its first official initiative to fight against illegal logging, publishing its FLEGT Action Plan. Some years later, in 2008, the US Congress amended its Lacey Act and, in 2012, the Australian Parliament approved the Australian Illegal Logging Prohibition Bill. Recently, other governments, such as the Japanese government, have been developing new laws or adapting existing ones to adopt specific measures against illegally sourced timber.

The FLEGT Action Plan

The main goal of the FLEGT action plan is to prevent illegal timber from being imported into the European market, through increasing the demand for timber from responsibly managed forests. The Action Plan is organized under the following seven key areas (EC, 2003):

1. Supporting timber-producing countries, including promoting equitable and fair solutions to the illegal logging problem;
2. Promoting trade in legal timber, including developing and implementing specific bilateral agreements between the EU and timber-producing countries;
3. Promoting public procurement policies, including guidance on how to deal with legality when specifying timber in procurement procedures;

4. Supporting private sector initiatives, including encouraging voluntary codes of conduct for private companies sourcing timber;
5. Safeguarding financing and investment, including encouraging financial institutions investing in the forest sector to develop due care procedures;
6. Using existing or new legislation to support the Action Plan;
7. Addressing the problem of conflict timber, including supporting the development of an international definition of conflict timber.

Two areas in the above list, i.e., the development of bilateral agreements and the creation of additional EU legislation, play a prominent role and have required additional, specific Regulations.

Council Regulation (EC) No. 2173/2005

Concerning the development of bilateral agreements, Council Regulation (EC) No. 2173/2005 defined requirements for the establishment of the FLEGT licensing scheme in producing countries that have made a voluntary partnership agreement (VPA) with the EU. The system, defined as the Timber Legality Assurance System (TLAS), enables a FLEGT licence to be issued by a competent national authority by tracking wood products and verifying that the products are harvested and processed legally. To this date (May 2017), the agreement has only been totally effective in one country (Indonesia), although five other countries have signed a VPA with the EU and are currently developing the systems necessary to control, verify and license legal timber; nine more countries are in negotiations with the EU (Table 5). Since 15 November 2016, Indonesia has been issuing FLEGT licenses for products exported to the EU-28. Negotiations between the EU and Indonesia started in 2007, and after four years, the two parties ratified the agreement and began implementing the commitments outlined in the VPA in 2011. In 2016, the EU confirmed that Indonesia had met the final requirements of the VPA, and that Indonesia could start exporting timber products to the EU accompanied by FLEGT licenses. In the period between 15 November 2016 and 31 December 2016, 608 FLEGT licences were received for a total weight of 13,000 tons of timber (UNEP, 2017)

Table 5. Exporting countries that have ratified VPA or are in phase of negotiations

FLEGT totally effective	VPA countries, where FLEGT is not totally effective	VPA negotiations
Indonesia	Cameroon	Guyana
	Ghana	Honduras
	Central African Republic	Laos
	Liberia	Malaysia
	Republic of the Congo	Thailand
		Vietnam
		Gabon
		Ivory coast
		Democratic Republic of the Congo

Regulation (EC) No. 2173/2005, as well as its related VPAs, covers supply side measures to combat the illegal timber trade in the context of the FLEGT Action Plan. In terms of demand-side

initiatives, the European Commission issued the EU Timber Regulation (also known as EUTR) in 2010, in order to prevent European importers from placing illegal wood on the European market.

The Regulation (EU) No. 995/2010

Regulation (EU) No. 995/2010 was approved by the EU Parliament in October 2010, and came into effect on 3 March 2013. The ultimate goal of the EUTR is to stop illegally harvested timber products being introduced onto the market, by setting out specific requirements for all European companies involved in the timber and timber products industry. According to Art. 2, section (h) of Regulation (EU) No. 995/2010, illegal wood is defined as material which has not been harvested in accordance with the legislation applicable in the country of origin. The EUTR classifies organizations involved in timber supply chains as either “Operators” or “Traders”. An Operator is any organization which is placing timber or timber products on the European market for the first time (Art. 2, sections (b) and (c)). This definition of Operator not only includes organizations timber or timber products to Europe from outside the EU, but also European companies harvesting timber within the EU and then placing it on the European market. Meanwhile, Traders are defined as organizations that buy or commercially use timber or timber products already placed on the EU market. Most of the requirements included in Regulation (EU) No. 995/2010 concern Operators, who constitute the core of the EUTR. Operators, in fact, are obliged to implement a Due Diligence System to evaluate and minimize the risk of their own timber products being made from illegal timber. An effective Due Diligence System should be made up of three main phases (Art. 6): (i) collection of information, (ii) risk assessment based on information collected and (iii) mitigation of any risks detected (Figure 4). The information collected during the first phase of the DDS must include data on: (i) timber species, (ii) timber origin (country, sub-national region and/or concession of harvest), (iii) volumes, (iv) supplier details and (v) documents indicating legal compliance in the country of origin. In the second phase of the DDS (the risk analysis), the Operator, in consideration of the country of origin, species, complexity of the supply chain and third-party certification, should classify the risk of illegal origin as "negligible" or "non-negligible". If the risk is classified as "non-negligible", the operator must implement mitigating actions to reduce this risk. These mitigation measures can include: (i) collecting additional information to support a classification of negligible risk, (ii) conducting supplier or forest-level verification audits and (iii) sourcing certified or verified materials and/or replacing suppliers or supply chains.

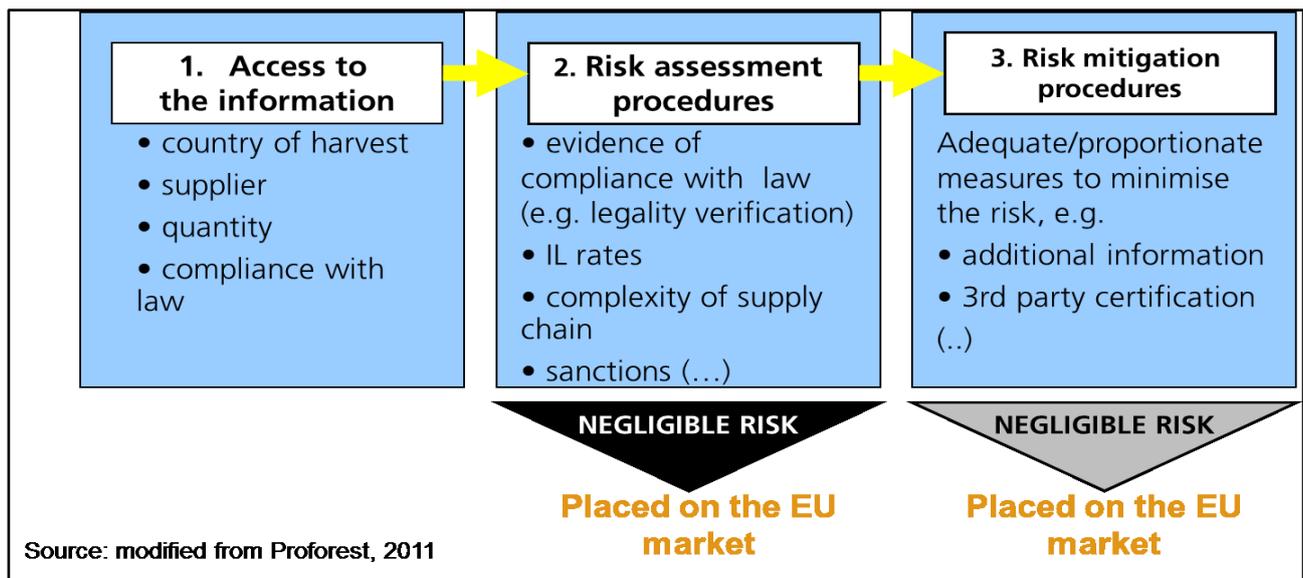


Figure 4. The three steps of DDS, requested by Reg. (EU) No 995/2010

As described by Art. 8 of Regulation (EU) No. 995/2010, Operators can be supported by Monitoring Organisations (MO) in developing and maintaining their DDS. MO are private entities, assessed by the European Commission, which have created their own DDS following the criteria included in EU Regulation No. 607/2012 to then offer it to Operators (Table 6).

Table 6. Monitoring Organization (MO) already recognized (at June 2017) by EU Commission

Monitoring Organization	Countries where MO can supply its services	Recognition date	Organization type
BM trada Latvija	All the EU Member States	01/06/2015	Certification body
Bureau Veritas certification	All the EU Member States	27/03/2014	Certification body
Consorzio servizi legno-sughero (conlegno)	IT	19/08/2013	Private consortium
Control Union	All the EU Member States	27/03/2014	Certification body
Din Certo	AT, BE, CZ, DE, DK, EE, ES, FI, FR, IT, LT, LU, LV, NL, PL, RO, SE, SK	01/06/2015	Certification body
GD Holz service gmbh	AT, DE, LU	30/01/2015	Timber trade federation
Icila s.r.l.	IT	30/01/2015	Certification body
Le Commerce du Bois	FR	30/01/2015	Timber trade federation
Nepcon	All the EU Member States	19/08/2013	Certification body
SGS United Kingdom limited	All the EU Member States with the exception of IT	30/01/2015	Certification body
Soil Association Woodmark	All the EU Member States	30/01/2015	Certification body
Aenor	Spain, Portugal	19/10/2015	Timber trade federation
Timber Checker	Netherland	01/03/2016	Technical certification body

Regulation (EU) No. 995/2010 covers a wide, but not exhaustive, range of timber and wood products, which are listed in Annex I of the Regulation. Major wood products, such as fuelwood, plywood, raw timber, sawnwood, furniture, pulp and paper, are included. Nevertheless, some products, such as seats, charcoal and musical instruments, are not covered by the EUTR, and are therefore exempt from the requirements of Regulation (EU) No. 995/2010. Furthermore, Art. 3 of the EUTR specifies that, in the context of the Timber Regulation, products carrying CITES or FLEGT licenses are considered automatically legal, while Art. 6 of the same clarifies that third-party verified schemes, which include verification of compliance with the applicable legislation (such as forest certification), may be used in the risk assessment procedure, although they are not automatically synonymous with legality.

As already mentioned, in parallel with Europe, the USA and Australia have also developed specific legislation to fight against illegal timber imports (Hoare, 2015). In fact, the USA amended the Lacey Act to this effect in 2008, while in 2012, Australia introduced similar legislation in the form of the Illegal Logging Prohibition Act. Some years later in 2016, Japan, as one of the world's largest importers of timber, established a voluntary measure for businesses trading in timber, which is expected to enter into force in May 2017. The next two brief paragraphs will describe the main content of the Lacey Act and the Australian Illegal Logging Prohibition Act.

The Lacey Act

The Lacey Act is a US Law dating from 1900, which aimed to stop trafficking in illegal wildlife. In 2008, the Lacey Act was amended by the US congress in order to stop illegally sourced forest products. According to the amended Lacey Act, the import, export, transport, sale, reception, acquisition or purchase of plants and plant products in violation of any US State or foreign law is considered illegal. The amended Lacey Act requires any companies aiming to import plants into the USA to fill out and provide to the Animal Plant Health Inspection Service (APHIS) a "*Plant and Plant Product Declaration*" for each product. This declaration should include: (i) scientific name of the species used, (ii) country of harvest, (iii) quantity and (iv) quantity (or value). In addition to the declaration, operators should exercise a "*due care process*" in order to identify the source of their products and to ensure that the timber was legally harvested. The due care process has been defined in the Lacey Act as the "*degree of care that a reasonably prudent person would exercise under the same or similar circumstances*". As a result, the Lacey Act does not specify in detail the operative steps that importers must implement and, at the same time, these steps depend on the different degrees of knowledge and responsibility of the actors involved. Therefore, US Operators can implement a wide range of tools and resources to implement their own due care system, including company policies and tracking procedures, questionnaires to suppliers, record keeping systems, etc. (EIA, 2009; Arnold and Porter, 2012). Legality verification systems, as well as forest certification, might be used as part of a due care system; however, they cannot be used as standalone elements to comply with the Lacey Act. There are no specific documents, licenses, marks, etc. that are accepted as final proof of legality; it remains up to each individual enterprise to work out the best conduct to engage in to avoid buying illegal timber, depending on its profile, suppliers and sources (Forest Legality Alliance, 2015). Notwithstanding the different wording, it can be assumed that in practice the approach and operative steps undertaken to implement a due care system for the purposes of the Lacey Act are not very far from those required by a Due Diligence System under the EUTR.

The Australian Illegal Logging Prohibition Act

The Illegal Logging Prohibition Act of Australia came into effect in November 2012. This act made it a criminal offence to carry out any activities that “*intentionally, knowingly or recklessly import or process illegally logged timber or timber products*” (ADA, 2014). This act was enforced through the Illegal Logging Prohibition Amendment Regulation, which came into effect on 30 November 2014. Together, these two pieces of legislation make up the Australian Illegal Logging Prohibition Act (AILPA). Like the EUTR, the AILPA aims to both prevent the importation of illegally harvested wood from outside Australia and prohibit the processing of any domestic timber that has been logged illegally. The definition of illegally logged timber is also similar to that used under the EUTR, focusing on timber harvested in contravention of the legislation applicable in the country of origin. The AILPA outlines the obligations of two types of actors: ‘*Importers*’ and ‘*Processors*’. Importers are any persons or organizations importing timber or timber products into Australia. Processors are any persons or organizations processing raw logs for the purpose of trade and commerce. The law defines the due diligence requirements for Importers and Processors, which are made up of four main steps. The first step requires information to be collected concerning the timber product being imported or processed. The second step is optional. In fact, Importers/Processors may use a Timber Legality Framework and/or a “Country/State Specific Guideline” to assess the associated risk of timber or timber products. Timber Legality Frameworks includes the FSC forest management certification, the PEFC sustainable forest management and the EU FLEGT licensing schemes. Importers/Processors are then required to demonstrate that the Timber Legality Framework applies to the timber that their products are made from or to the area from which the timber was harvested. If this link is demonstrated and the risk is concluded as low, the Importer/Processor is not obliged to conduct any further steps in the due diligence process. Similarly, organizations may use Country or State Specific Guidelines, which provide a list of the applicable legislation in the place of harvest to assist organisations in complying with their due diligence requirements. These guidelines are also described in Schedule 2 of the Act; however, at the time of writing, neither Country nor State Specific Guidelines are listed. Step 3 involves a risk assessment of the timber or timber products intended for importation or processing. Similarly to the EUTR, a risk assessment under the AILPA should consider both the risk associated with the species and the origin of the timber. The risk assessment process must identify the risk level of products as either “no risk” or “at risk”. If “at risk” is concluded and cannot be defined as “low risk”, then mitigating actions must be implemented as part of this step.

Table 7 presents the main differences among EUTR, Lacey Act and Australian Illegal Logging Prohibition Act.

Table 7. A comparison between Reg. (EU) No. 995/2010, Lacey act and the Australian Illegal Logging Prohibition act

	Reg. (EU) No. 995/2010	Lacey Act	Australian Illegal Logging Prohibition Act
Definition of illegal timber	<p>Timber is considered illegal when it is harvested in contravention of applicable legislation in the country of harvest:</p> <ul style="list-style-type: none"> • rights to harvest timber within legally gazetted boundaries; • payments for harvest rights; • timber harvesting, including environmental and forest legislation; • third parties' legal rights; • trade and customs 	<p>Timber is considered it illegal whether it is transported, or sold:</p> <ul style="list-style-type: none"> • in violation of federal US or Indian tribal law, of State law or of foreign law; • without payment of appropriate royalties, taxes or stumpage fees required by State or foreign law; • in violation of State or foreign law governing the export or transhipment of timber. 	<p>Timber is considered is it harvested in contravention of laws in force in the place (whether or not in Australia) of origin</p>
Key Requirements	<p>Those who first place timber/products on the EU market must exercise <i>due diligence</i> system (DDS), that should comprise:</p> <ol style="list-style-type: none"> 1. <i>Access to relevant information</i> about the timber 2. <i>Assessment of the risk</i> that the timber was logged illegally 3. <i>Mitigation of the risk</i>, if the identified risk is greater than negligible 	<p>Those aim to import plants into the USA, shall fill a "<i>Plant and Plant Product Declaration</i>" (scientific name, country of harvest and quantity). In addition to the declaration, importers should exercise a "due care process" in order to identify the source of their products and ensure that the timber were legally harvested. Due care means the amount of attention a reasonable person in the same circumstances would use.</p>	<p>Importers of timber/products and processors of domestic raw logs must carry out due diligence:</p> <ol style="list-style-type: none"> 1. <i>Gathering information</i> about the timber/products 2. <i>Assessing the risk</i> that the timber has been illegally logged (3. <i>Risk mitigation</i>: if the risk identified is not low, taking adequate and proportionate steps to reduce the risk
Enforcement and Penalties	<p>The EUTR is enforced by 'competent authorities' in each of the EU member states. The level of penalties must be set at member state level but they must be effective, proportionate and dissuasive. Penalties in force include vary across EU</p>	<p>The US Dep. Of Agriculture's Animal Plant Health Inspection Service processes the import declaration and works with the Dep. of the Interior's Fish and Wildlife Service on investigating illegal plant cases</p>	<p>The Illegal Logging Prohibition Act is enforced by the Australian Government Department of Agriculture</p>

3.3.3 *The civil society's reaction: certifications and commitments to contrast deforestation*

Since 1990, consumers have been rapidly shifting their buying patterns and becoming more socially and environmentally conscious. According to a survey carried out by Nielsen (2015) in 2014, 66% of global consumers affirm that they are willing to pay more for sustainable products. Mainly for this reason, voluntary sustainability standards (VSS) are rapidly spreading, since they are able to cover multiple sustainability issues that cannot be guaranteed solely by compliance with national and international legislation. Now, voluntary sustainability standards cover many products from crops to electronic devices, as well as covering other issues such as decent working conditions and the respect of human rights (ITC, 2016). Most of the voluntary standards have emerged in developed countries, and aim to deal with sustainability problems driven by production issues sourced from developing countries. However, in the last few years, there has also been an increase in the development of standards in developing countries, such as Brazil, India, Kenya and South Africa (Potts *et al.*, 2016). Between 2008 and 2014, the volume of a variety of agricultural products (as bananas, cotton, coffee, etc.) compliant with an internationally sustainable standard increased by 35% per year. In the same period, areas certified by the Roundtable on Sustainable Palm Oil increased almost thirtyfold, while the area covered by the Rainforest Alliance/Sustainable Agriculture Network expanded more than ninefold (Potts *et al.*, 2016). Furthermore, the main global brands have integrated the commitment to increase the proportion of products that respect international sustainability standards into their corporate strategies (ITC, 2016). For instance, Unilever aims to source 100% of its agricultural raw materials sustainably by 2020,¹⁶ while IKEA aims to be purchasing 100% of its wood, paper and cardboard from sustainable sources (certified or recycled) by August 2020 and is contributing to the certification of another 15 million hectares of forest area (IKEA, 2014).

In addition to a preference towards forest certifications in their purchase policies, many and large companies, since 2010, begun to made voluntary commitments to eliminate forest deforestation in the activities related to the supply chain of production of their products (Zero Deforestation Commitment). In fact, it has been increasingly recognized that the commodities consumed, from leather to paper, can have impacts on how land is used internationally, leading, in some cases, to the destruction of forests. (FERN, 2017). An European Commission's study (2012), has demonstrated that, between 1990 and 2008, EU consumption of food and non-food products had lead to deforesting an area equivalent to the size of Portugal. As of March 2017, 447 companies had made 760 commitments to curb forest destruction in supply chains linked to production of their products. with an increase of 20% compared to one year before. Most of companies that have specific commitments to eliminate deforestation from supply chains operate in food sector (as food producer or retailers). (Forest Trend, 2017).

However, more in general, the public sector, particularly in developed countries, plays a fundamental role in supporting the spread of goods produced in respect of responsible and

¹⁶ **Source: Unilever Sustainable Living Plan.** Data and information are available at: <https://www.linkedin.com/e/rpp/90824204/nico%2Eandrightetto%40libero%2Eit/4436269699608383058/?hs=true&tok=2kSIJiUfwNcTU1>

sustainable practices. In 2015, during their meeting in Hangzhou, China, the 20 leaders of the G20 countries highlighted the importance of combining sustainable growth with social responsibility in their final declaration (ITC, 2016)

The origin and the current diffusion of forest certification

The issue of forest certification was introduced in the early 1990s to address concerns over deforestation and forest degradation, as well as to promote the maintenance of biological diversity, especially in the tropics (Rametsteiner and Simula, 2003). At the global level, the major certification schemes for certified forest products are the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC) schemes. Both the FSC and PEFC are independent, non-governmental, non-profit entities. The FSC was established in 1993 as a multi-stakeholder organization for the promotion of the responsible management of the world's forests. On the other hand, the PEFC was established some years later in 1999, under the name of the Pan-European Forest Certification and limited to the European context; then, in 2003, it became international in scope and adopted its current denomination (Francescato *et al.*, 2012). Despite the fact that the two certification schemes share the same general goal, and that the differences between the two have been narrowing over time (NEPCon, 2012; O'Reilly, 2006), the two schemes retain strong differences (Da Silva *et al.*, 2016). These differences come mainly from the origins of the two standards. The FSC was founded by environmental groups in association with indigenous people's organizations and some industrial companies to protect the interests of consumers, while the PEFC was founded by producers to preserve their own interests. Perhaps for this reason, certain specific studies indicate that the FSC tends to be more stringent in its standards than those developed by the PEFC (McDermott *et al.*, 2008). Understanding the direct effects of forest certifications on the timber products trade does not appear to be easy. However, Da Silva *et al.* (2016) highlighted how the increase in FSC-certified areas in a given country is positively correlated with an increased trade in timber products, both in terms of imports and exports. Conversely, the increase of PEFC-certified forest area has no significant impact on trade. In terms of the types of products affected, an increase of FSC-certified forest area has a positive impact on the trade of paper, paperboard and coniferous sawlogs, but does not seem to have an impact on the trade of fuelwood.

According to UNECE (2015), the total area of internationally certified forest (both PEFC and FSC) has increased from approximately 13.8 million ha in 2000 to 433 million ha in 2015, with an average annual growth of around 30 million ha. In 2015, PEFC-certified forest area amounted to 275.3 million hectares in 34 countries, while FSC-certified forest area was 187 million hectares across 81 countries. In 2015, certified tropical forests accounted for no more than 6% of all internationally certified forest area; indeed, more than 80% of FSC-certified forest area is located in Europe and North America, while 94% of PEFC-certified forest area is found in Europe, North America and China (MacDicken *et al.*, 2015). Between 2008 and 2015, the global volume of industrial roundwood increased by 25% and Europe was the main driver of this increase. European production of certified roundwood increased by 85 million m³ between 2008 and 2015 (Table 9).

Table 8. Total forest area certificates according to FSC and PEFC standard (M ha). Source: own elaboration of data supplied by "Forest Products Annual Market Review" - edition from to 2008 to 2016 (UNECE/FAO).

Region	2008	2009	2010	2011	2012	2013	2014	2015
North America	181.7	180.3	199.8	201	198	215.8	221.3	217.3
Europe	84.2	82.2	85	85.3	95.4	100.2	106.6	109.6
CIS	24.6	25.2	29.9	44.3	47.5	53.4	55.5	62.9
Oceania	9.4	10.3	11.6	12.3	13.2	11.9	12.6	12.5
Africa	3	5.6	7.3	7.6	7.3	7.5	6.4	6.5
Latin America	15	14.6	14.4	16.1	14.7	15.7	16.3	17.1
Asia	2	3	8.6	8.1	9.5	12.5	14.1	13.1

Table 9. Total production of round wood certified according to FSC and PEFC standard (M m³). Source: own elaboration of data supplied by "Forest Products Annual Market Review" - edition from to 2008 to 2016 (UNECE/FAO).

Region	2008	2009	2010	2011	2012	2013	2014	2015
North America	232.5	175.6	194.5	227.5	224	244.2	250.5	246
Europe	173.4	238.1	261.7	201	224.7	236.1	251.1	258.1
CIS	4.3	4.9	5.8	8.5	9.1	10.2	10.6	12
Oceania	2.4	2.5	2.8	3.5	3.8	3.4	3.6	3.6
Africa	0.3	0.6	0.8	0.8	0.8	2.2	1.9	2
Latin America	2.6	3.6	2.7	3.2	2.9	1.2	1.2	1.3
Asia	0.8	3.1	3.4	2.8	3.2	4	4.5	4.5

Regarding the spread of chain-of-custody certifications, the number of FSC validated certificates amounted to around 30,200 in 2015, whereas PEFC validated certificates did not exceed 10,200. Between 2008 and 2014, both FSC and PEFC validated certificates almost doubled, although recently, between 2012 and 2015, PEFC certificates have increased by 13.8%, whereas FSC certificates have increased by 21.8% (Figure 5).

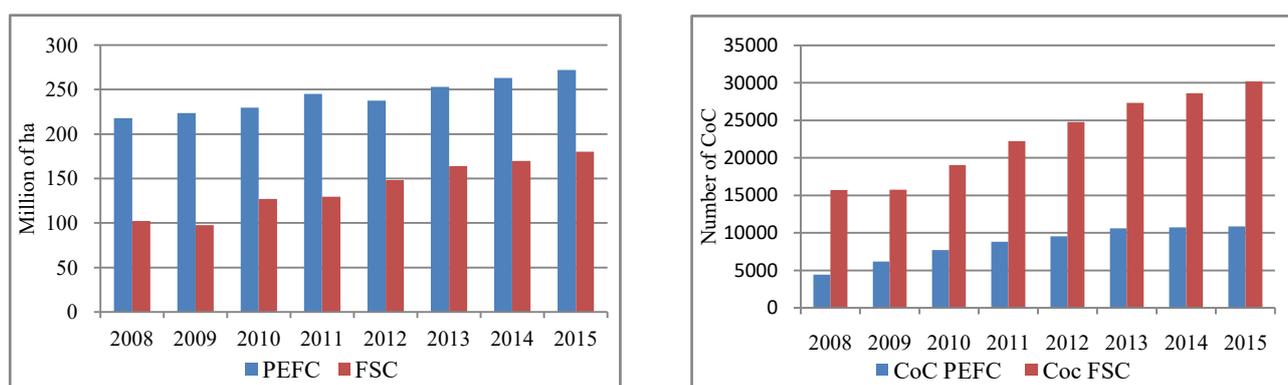


Figure 5. The trend of forest area certificated (Mha) and number of chain of custody certificates between 2008 and 2015. Source: own elaboration of data supplied by "Forest Products Annual Market Review" - edition from to 2008 to 2016 (UNECE/FAO).

3.4 Trend towards protectionism

In general, free trade is based on a system in which the trade of goods or services between or within countries flows without any government restrictions, such as taxes and tariffs, or regulatory legislation and quotas. One of the strongest arguments for supporting free trade was developed by classical economist David Ricardo, who explains how free trade will naturally benefit different parties (countries, regions or individuals) if they have different opportunity costs of production. In contrast, protectionism, which can be implemented through imposing high tariffs on imported goods, is an economic policy designed to discourage imports and to prevent the foreign takeover of local markets and companies (Fouda, 2012).

Despite the fact that the imposition of tariffs is considered to inhibit investment and trade (Pierce and Schott, 2016), the whole international trade law system, which has recently been characterized by a decrease in tariff measures, will probably be reshaped in the near future (Clifford Chance, 2017). Indeed, UK voted to leave the EU-28 in its 2016 referendum and American citizens voted for Donald Trump to become their President. Both issues, i.e., "Brexit" and the Trump election, were mainly led by growing scepticism of the process of globalization. Both of these political decisions have the potential to strongly affect international trade agreements, such as the *Trans-Pacific Partnership* (TPP) and the *Comprehensive Economic and Trade Agreement* (CETA) (Inglehart and Norris, 2016). In fact, during his presidential campaign, Donald Trump focused on the slogan "Put America First". In his speeches, he aimed to set the US apart from the rest of the world, closing borders and protecting local industries. This is because, according to him, the American economy and American workers were suffering due to badly negotiated trade agreements.¹⁷

Until today (August 2017) Despite Trump's declarations during his campaign, the precise contours of his administration's trade policies are still unclear. However, once he had been elected, one of the first acts of the Trump administration concerned US timber imports. In fact, on 24 April 2016, the Trump administration announced an average imposition of a tax of up to 24% (the real amount of tax depends on the Canadian province from which the timber originates) on softwood lumber coming into the United States from Canada. Imports of Canadian softwood cover one third of all imports to the US of softwood lumber, at an annual value of 5.5 billion USD, and its input is essential for the US construction and home repair industries.¹⁸ The Trump administration acted in response to American lumber producers, who have long complained that the Canadian provinces subsidize logging activities to allow Canadian producers to sell the lumber to the US at below-market prices.¹⁹ Canada is expected to appeal this US decision to NAFTA dispute resolution panel and to the World Trade Organization (WTO). Furthermore, the US National Association of Home Builders (NAHB) warned that this decision could have a negative impact on the whole construction

¹⁷ **Source:** Telegraph on-line. Title of article: *Donald Trump is a bigger threat to the global economy than Brexit*. Date: 16 August 2016

¹⁸ **Source:** Forbes on-line. Title of article: *Trump Takes Hard Stand On Softwood Lumber From Canada, Which Has Doubled In Five Year*. Date: 25 April 2017

¹⁹ **Source:** Zerohedge. Title of article: *Trade Wars Begin: Trump Announces 20% Tariff On Canadian Softwood Lumber Imports*. Date: 25 April 2017

sector due to an increase in the cost of raw material. An analysis carried out by the NAHB²⁰ showed that, as a result of the decision to impose taxes on Canadian timber, more than 8,000 full-time jobs and 350.2 million USD in tax revenue will be lost between 2017 and 2018.

As cited above, the second fact with the potential to have a strong impact on the international economy is the 2016 *Brexit* vote. The UK, the world's fifth largest economy and the second largest among the EU-28 Member States, actually decided to leave the EU. Firstly, *Brexit* will throw obstacles in the way of UK trade with the rest of the EU, and it will probably hit the UK's economy more than the EU's. In fact, the UK's total exports to the EU account for about 13% of the UK's GDP, while the same figure for the EU is just 3%. At the same time, *Brexit* will create problems in terms of maintaining the economic efficiency of supply chains connecting the UK with EU member states. In fact, goods such as furniture are currently able to enter and leave the UK at various stages in the manufacturing process, and UK manufacturers and suppliers can easily participate in cross-EU supply chains, as goods are able to move through the EU without tariffs or restrictive customs requirements. With *Brexit*, the economic efficiency of these supply chains is under threat (Clifford Chance, 2017). *Brexit* will also have significant implications for the tropical timber sector. The UK is actually the largest importer of tropical timber in the EU-28, accounting for 25% of the total value imported into the EU from tropical countries in 2015. Furthermore, the UK import value of tropical timber products increased by 32% between 2011 and 2015, contrasting with other leading EU markets, which reported a decrease. However, in the short and medium term, the weakening of the pound due to the results of *Brexit* will probably induce a reduction in the UK's imports of tropical timber (ITTO, 2016).

Tariff and non-tariff barriers to protect domestic timber production

At the international level, in a context where no single country is completely self-sufficient, the rapid growth of the world's population and the expansion of the "global middle class" are driving the increasing demand for natural resources and the trade that goes alongside it (ICTSD, 2012). In order to ensure the correct management of natural resources, since the 1970s many export countries have been implementing strategic export restrictions in the key resource sector. These export restrictions aim not only to improve resource management, but also to encourage local industrial development and to attract investments in downstream industries. Export restrictions can manifest themselves in a variety of forms, such as quantitative restrictions (quotas), export taxes, duties and charges, and mandatory minimum export prices (Karapinar, 2010). Regarding the timber sector, the response of governments in tropical countries to fight against the depletion of timber resources or to increase revenue has typically been the restriction of raw log exports in order to encourage exports of value-added products, like sawnwood and furniture (ITTO and ITC, 2012). The idea behind this is that, instead of exporting raw materials for a low profit, a country can increase its revenue by exporting higher value products, thereby stimulating domestic industry. Since the 1970s, countries in Africa, such as Gabon and Nigeria, in Asia, such as Myanmar, Indonesia and Thailand, and in Oceania, such as Papua New Guinea, have implemented log export

²⁰ The analysis of the NAHB is available at: <http://nahbnow.com/2017/04/what-is-the-impact-of-new-duties-on-canadian-lumber/> (last access: 10th July 2017)

bans to foster the development of value-added product industries. A second, less common option being implemented by some countries like Timor East to fight against widespread illegal logging, is a temporary moratorium on all logging operations to create a period during which the government can reassert control over the forestry sector (Chew, 2012). In most cases, bans on the export of unprocessed timber have achieved limited success in developing domestic timber industries (Weng *et al.*, 2014). Furthermore, numerous reports (Global Witness, 2015; EIA, 2014) have revealed how certain difficulties in enforcing bans remain persistent in Asian countries like Cambodia and African countries like Mozambique. Table 10 presents a list (although incomplete) of countries that are currently enforcing a ban on timber exports.

Table 10. Timber export ban in force. Source: forestlegality.org

Country	Ban scope	Year of entry into force
Cameroon	Log export ban on more than 20 species	1999
Cote d'Ivoire	A ban on the export of logs	1999
Gabon	Export ban on logs	2010
Ghana	Ban on rosewood export	2014
Mozambique	Ban on all logging activities	2017
Nigeria	Log export ban	1976
Sierra Leone	Ban on all logging activities	2013
Belize	Ban on harvest and export of rosewood	1992
Brazil	Wood exports of valuable species (e.g., Imbuia, Virola) require authorization from the Brazilian Institute of Environment and Natural Resources	1969
Bolivia	Wood exports require authorization from Bolivian government	1996
Costa Rica	Log export ban	1986
Honduras	Log export ban	1998
Guatemala	Ban on export of logs with dm>11cm	2006
Nicaragua	export ban on logs of valuable species (mahogany, royal cedar and pochote)	1997
Peru	Log export ban	1972
Timor East	Ban on all logging activities	2000
Cambodia	• Log export ban	1996
	• Embargo on all timber exports to Vietnam	2016
Laos	Ban for all harvesting activities in natural forests	2015
Myanmar	Log export ban	2014
Thailand	Ban for all harvesting activities in natural forests	1989
Vietnam	Ban on export of timber from natural forest	1992

However, in the last decade, it is not only tropical countries that have implemented barriers to the export of timber. For example, Russia decided to impose a gradual increase of customs duties on the export of unprocessed timber in 2007. It was planned to introduce the increasing duties in three stages from 2007 to 2010: a 15% increase in 2007; a 25% increase in 2008; and up to an 80% increase of the contract export price has been in place since 2010. The decision to raise tax to 80% was first postponed before finally being modified. Since 2010, the export duty has actually only been applied to above-quota exports of spruce and pine logs. This change in Russia's export policy

immediately provoked relevant modifications to the whole structure of the East Asian timber market: for instance, buyers from Japan, China and South Korea, have been focusing on roundwood from the US, Canada and New Zealand since 2008 (Roos *et al.*, 2014).

3.5 Technological drivers

As has already been seen, the forest-based sector in developed countries is facing a period of profound structural change, mainly due to increased competition with emerging economies. As a result, forest industries in traditional markets should try to respond to these challenges by developing new and innovative products, materials and services, such as new building materials, biodegradable plastics and bio-fuel (Hurmekoski and Hetemäki, 2013). The growing attention paid by forest-based industries to innovative products is also being led by the demand for environmentally-conscious products and processes (Jonsson, 2011). Wood, in fact, is considered a sustainable resource that can fundamentally contribute to the development of the circular economy and the bioeconomy, since it is able to replace fossil fuels on a large scale, not only for energy applications, but also application in the chemical and construction industries (Scarlat *et al.*, 2015). For this reason, innovations in forest-based industries have recently been focusing on processes to save on raw materials, to diversify product portfolios and to develop added-value products with the potential to increase industry competitiveness (Manninen, 2014).

Following, there it will be described the most innovative process, biorefineries, and the most innovative type products, that, recently, Western forest-based industries have developed in order to improve their competitiveness in international market.

Biorefineries

Biorefinery can generally be defined "*as a process that integrates biomass conversion processes and equipment to produce fuels, power and chemicals from biomass*". The term biorefinery then includes a broad group of processes that refine different forms of biomass into one or many products. (Berntsson *et al.*, 2012). Possible sources of biomass include sugar cane, maize and lignocellulosic materials. Certainly, in Europe, biorefineries that are able to use lignocellulosic materials are expected to become the most relevant in the near future, due to the large quantity of readily available biomass and the big plants that already exist for pulp and paper production and that have the ability to integrate biorefinery processes into their production processes (De Jong and Jungmeier, 2015). The possibility for EU pulp and paper companies to integrate this synergetic process to produce bioenergy (e.g., biodiesel, bio-oil and bio-ethanol) and bio-products (e.g., bio-composites and bio-plastics) is an opportunity for them to diversify their portfolio, increase their revenues and therefore respond to the general crisis affecting the whole sector. In fact, between 2000 and 2013, the production of and demand for pulp and paper, which have historically been the most important products in the EU forest-based sector, is facing a deep crisis that has reduced the entire sector by one third. The reasons behind this decline are not only the 2008 economic crisis and the growing role of emerging economies, but also the spread and evolution of digital media, which has resulted in a sharp reduction in demand for paper in developed countries (Hetemäki *et al.*, 2014). For these reasons, most existing and planned biorefineries are based in large pulp and paper plants. (Nayana and Pesonen, 2012). For instance, the two biggest biorefineries in Europe,

the Domsjö Mill (1.6 Mm³ used annually in the biorefinery process) and the Metsä Bioproduct Mill (around 2 Mm³ used annually in the biorefinery process) were developed in big old paper companies in Sweden and Finland, respectively.²¹

However, the growing economic and political interest surrounding biorefineries should take into account the possible social and environmental impact of each biorefinery (Bauer *et al.*, 2017). Regarding this, one of the most recent biorefineries was developed in Piedmont, Italy, as a joint venture between the Italian Mossi Ghisolfi Group and the US-funded Texas Pacific Group to produce cellulosic ethanol from wheat and rice straw, *Arundo Donax* and wood waste. It has been the source of numerous protests on the part of the local population due to its potential to cause air and water pollution.²²

Engineered Wood Products

In the context of the numerous and large global changes which have been reshaping the international forest sector, forest-based industries which are able to diversify their product portfolio beyond innovative process like biorefineries have focused on increasing their range of value-added wood products. Engineered Wood Products (EWP) are a class of innovative products that have recently been reporting significant growth, in spite of the 2008 economic downturn (Manninen, 2014). EWPs include wood products made by bonding lumber, veneers and strands together, usually with a specific kind of glue. This manufacturing process can generate stable and solid products, characterized by an extensive range of dimensions with the ability to be adapted to building projects of different sizes.

EWP production started in the USA in the 1950s, mainly for the production of surface layers. Later, in the 1990s, they were developed and improved upon to become structural elements, due to the demand for lightweight, strong joints with large diameters (American Wood Council, 2013). These innovations made it possible to use wood of an even smaller scale in load-bearing joints. EWPs in use today as structural elements are of particular interest in Europe, where the construction sector has traditionally been dominated by concrete and steel. EWPs provide lightweight, prefabricated and standardized elements, which are mainly constructed in factories and only have to be assembled at building sites, saving a significant amount of money. The most frequently used products which are classified as EWPs are:

- *Glued-laminated timber* (Glulam) is a stress-rated engineered wood beam composed of wood laminations, or "lams", that are bonded together with durable, moisture-resistant adhesives. The grain of the laminations runs parallel with the length of the member.
- *Cross-laminated timber* (CLT) is made of several layers of wood, each layer perpendicular to the next – this gives the material strength and rigidity.
- *Finger-jointed structural timber* is produced by gluing coniferous solid wood lengthwise using finger joints.

²¹ Source: **Biorefinery Blog**. Link: <https://biorrefineria.blogspot.it/p/portada.html>. Last access: 10 August 2017

²² Source: Info-Vercelli 24. Title of article: *Bioraffineria di Crescentino: solidali con le proteste della popolazione*. Last access: 10 August 2017

In the EU-28, the production and trade of EWP products is recent and the market is still in the early development stage. Therefore, information on the trade of EWP products tends to be quite scattered. It is certain that most of EU EWP products are produced as well as traded within the EU-28. Pahkasalo (2013) estimated that over the last decade, the consumption of Glulam has doubled, reaching three million cubic metres in the EU-28 in 2012 (about 5 million m³ worldwide). The majority of European Glulam is produced in Germany, Austria and Finland. At the international level, Japan is another important actor; it is to Japan that Finland exports about 70% of its total production.

The demand for finger-jointed structural timber, which is a sort of competitor for glulam, has also grown remarkably since the 2000s (17% annual growth); in 2012, the European production of finger-jointed structural timber was around 3.5 million m³ per year. Also the European production of CLT has increased rapidly in the last few years (20-30% annual growth), reaching about 450,000 m³ in 2012. CLT production is concentrated in Central Europe, especially Austria, the largest producer country with a 70% market share (European Timber Committee, 2012; Pahkasalo *et al.*, 2012).

4. POLICY IMPLEMENTATION

4.1 EUTR enforcement in EU-28

4.1.1 *An analysis of scientific literature concerning the EUTR enforcement*²³

This chapter aims to present and summarize the findings of the main scientific papers dealing with EUTR implementation, which were published after the EUTR was enforced (March 2013). Some of the findings and elements identified in these papers, particularly inconsistencies in the enforcement of the EUTR, will be re-examined in the subsequent chapters to gain an understanding of whether they could have an impact on the international timber trade. Specifically, the present research has identified 20 papers (published between 2013 and 2015) through a search on the major academic search engines/databases, such as Scopus and Google Scholar. The selection did not include the official report published by European Commission or documents and reports published by NGOs.

Papers before EUTR enforcement

In 2011, two years before the EUTR was enforced, the two following scientific papers entirely dedicated to Regulation (EU) No. 995/2010 were published:

- Buckrell, J., Hoare, A. (2011). **Controlling Illegal Logging: Implementation of the EU Timber Regulation**. Chatham House, London (UK);
- Levashova, Y. (2011) **How effective is the EU Timber Regulation in the fight against illegal logging**. *Review of European, Comparative & International Environmental Law*. 20 (3): 290–299.

Both papers recognized that the EUTR is an innovative tool with admirable goals; however, the following principal concerns emerged in both papers:

1. A correctly enforced EUTR should be based on a uniform approach across member states and on adequate economic and human resources on the part of national Competent Authorities.
2. In 2011, the level of knowledge of EUTR requirements, in particular in the context of small private companies, was extremely low.

Furthermore, the first paper underlines that:

3. The role of forest certifications in DDS appears unclear.

On the other hand, the second paper highlighted that:

²³ The present paragraph includes many contents already reported in the document entitled "*Review of the European Union's Timber Regulation*", that was the main output of the three-years project "*Support to the implementation of the EU timber Regulation*" (Partners: LERH Department of Padua University, Indufor, Efeca). link: http://ec.europa.eu/environment/forests/eutr_report.htm.

4. The scope of the Regulation is too narrow. For example, the fact that the issue of printed paper is missing from the content of the Regulation could hamper its effectiveness in the fight against illegal timber.

In 2012, the paper of Florian (2012) "**How to support the implementation of due diligence systems through the EU Rural Development Programme: problems and potentials**" focused on the economic impact on private companies that DDS implementation could have, specifying that:

5. Timber producers must make additional investments to introduce Due Diligence Systems into their management system. In the case of small private companies, this investment could have a significant impact on their economic competitiveness.

As we will see later, many papers published after the EUTR was enforced reported similar findings and concerns (Table 12).

The analysis of papers published after EUTR enforcement

As reported previously, the present chapter aims to identify the findings of scientific papers published after the EUTR was enforced (3 March 2013). The papers identified were first classified based on the following topics:

- The coherence of the EUTR, for example, the timber products covered by the EUTR; the consistency of Regulation (EU) No. 995/2010 with World Trade Organization (WTO) rules;
- The relationship between the EUTR and other public (FLEGT licenses and CITES permits) and private initiatives (forest certifications);
- European stakeholders' perceptions of the EUTR;
- Non-EU stakeholders' perceptions of the EUTR;
- The impact of the EUTR on private companies;
- The impact of the EUTR on the international timber trade.

As reported by the following table, the classification of the selected papers was based on the main topics dealt with by each paper. The numbers in the first column aim to classify the papers, and will be used as a reference in the following paragraph. The key findings of each paper identified are included in Appendix I, while Table 12 aims to match the key findings of papers published in the years before the EUTR was enforced (2011-2012) and the key findings of papers published in the years after it was enforced (2013-2015).

Table 11. List of papers published between 2013 and 2015 concerning the EUTR enforcement

	Title	Year of publication	Author/authors
EUTR Coherence			
1	Market coverage of wood imports by the EU Timber Regulation	2015	Weimar H., Janzen N., Dieter M.
2	Import of secondary timber products by the EU28. The Netherlands in focus	2014	Oldenburger J. Van Bentem M. De Groot C, Boosten M., Jansen P.
3	The WTO consistency of the European Union Timber	2014	Geraets D. Natens B.

	Regulation (EUTR)		
4	European Union Timber Regulation: Is It Legal?	2014	Fishman A. Obidzinski K.
Relations between EUTR and other public and private initiatives			
5	The EU Timber Regulation and CITES	2014	Saunders J.
6	Impact of European Union Timber Regulation on Forest Certification Strategies in the Finnish Wood Industry Value Chain	2015	Holopainen J., Toppinen A., Perttula S.
7	The interaction between FSC certification and the implementation of the EU timber regulation in Romania	2015	Gavrilit I., Halalisan A, Giurca A.,Sotirov M.
8	Legal Harvesting, Sustainable Sourcing and Cascaded Use of Wood for Bioenergy: Their Coverage through Existing Certification Frameworks for Sustainable Forest Management	2014	Sikkema R., Junginger M., Van Dam J., Stegeman G., Durrant D., Faaij A.
9	Constructing a transnational timber legality assurance regime: Architecture, accomplishments, challenges	2014	Overdevest C.,Zeitlin J.
10	Verified Legal? Ramifications of the EU Timber Regulation and Indonesia's Voluntary Partnership Agreement for the Legality of Indonesian Timber.	2015	Fishman A., Obidzinski K.
Perceptions of European stakeholders			
11	Survey among private forest owners on the European Union Timber Regulation (EUTR) implementation – Synthesis report.	2015	Pra A.
12	The opinions of some stakeholders on the European union timber regulation (EUTR): An analysis of secondary sources.	2015	Giurca A., Jonsson R.
Perceptions of non-European stakeholders			
13	Forestry professionals' awareness of the EU Timber Regulation in the federation of Bosnia - Herzegovina	2014	Bećirović D., Delić S., Avdibegović M., Marić B., Bećirović S, Malovrh S.
14	Annotation of European Union Timber Regulation and Its Influences on Chinese Forestry Industries.	2013	Dong J. Liu J., Long H.
EUTR impacts on private companies			
15	The impact of timber legality regulations on business practices in Vietnam	2014	Roe B, Eastin I, Ganguly I.
16	Effects of the EU Timber Regulation and the demand for certified legal timber on business and industry in India	2013	Manoharan T
17	Placing Timber and Timber Products on the Market in the Czech Republic and Related Economic Impacts	2014	Dudík R, Sišák L.
18	Exploratory Assessment of a Company's Due Diligence System against the EU Timber Regulation: A Case Study from North-western Russia	2015	Trishkin, M., Lopatin, E., Karjalainen, T.
EUTR impacts on timber trade			
19	Legality constraints: the emergence of a dual market for tropical timber products?	2015	Masiero, M., Pettenella, D., Cerutti, P.
20	Ambiguity in Timber Trade Regarding Efforts to Combat Illegal Logging: Potential Impacts on Trade between South-East Asia and Europe	2013	Giurca, A., Jonsson, R., Rinaldi F., Priyadi, H.

Generally speaking, in the analysis of scientific papers published between 2013 and 2015, evidence was found showing that in the first two years of its application, the Regulation (EU) No. 995/2010 has contributed to raising awareness of the problem of illegal logging among different actors in the EU timber sector (7, 10, 11, 12, 13, 14 and 20). Despite this, many EU Operators and non-EU exporters, particularly small ones, are not adequately prepared to meet the requirements of the EUTR, even two years post enforcement (11, 12, 13, 14 and 18). One of the main reasons behind this inadequate preparation is, in many cases, stakeholders' lack of confidence in the real effectiveness of the EUTR (12). Among European Operators, the EUTR's definition of and requirement for of legal timber appears too stringent (11 and 13). As a result, Operators are concerned about the large quantity of documents that they have to collect in order to demonstrate the legality of their own products (6, 7 and 18).

As regards the coherence of the EUTR, Regulation (EU) No. 995/2010 can be considered as coherent with the General Agreement on Tariff and Trade (GATT) (3 and 4). However, the EUTR's current product scope was not seen as optimal; it should be expanded to include more timber products, such as printed products and seats (1, 2). These products are exempt from EUTR rules and, for this reason, are not subject to checks to verify their legality. This limited product scope could favour a "circumvention" process, in which illegally logged wood is traded to third countries to be transformed into EUTR-exempt products before being traded to EU-28 countries (2). Furthermore, since timber products with CITES or FLEGT licenses are considered automatically legal by the EUTR, it is necessary to rigorously assess CITES certificates (5) and to give strong support to VPA countries in the introduction of the FLEGT Action Plan (9). In its first two years, the EUTR appears to have been enforced poorly and slowly in many EU countries, with very few activities on the part of Competent Authorities to disseminate it (7). Furthermore, the EUTR was enforced unevenly during the first two years, with different types and levels of sanctions across Member States. This incoherency and inconsistency in EUTR enforcement in each individual EU member state could lead to unfair competition among EU Operators and increase the risk that Operators will attempt to import illegal timber into European countries where the EUTR has been more poorly enforced (11, 12 and 18). The effectiveness of the EUTR would be improved if national CAs were to implement more coordinated and supportive activities (9).

Concerning the impact of the EUTR on the private sector, the major consequence to emerge from the analysis of scientific papers was the cost needed to set up and maintain a DDS. Large companies seem to have been able to adapt better and more rapidly to EUTR requirements than have small and medium enterprises (SME). SMEs seem to be at a disadvantage due to their low economies of scale, as the cost of the DDS must be covered by a lower turnover (6, 7, 11, 12, 14, 15, 16, 17 and 18). In the first two years of the EUTR's implementation, despite the fact that the main timber certification schemes have adapted their standards to reflect the scope of the definition of legality embedded within them, the role of third-party verified schemes in the DDS remains unclear in the opinion of various stakeholders (8 and 19).

As regards the impact of the EUTR on international trade, the direct impact of the Regulation on international trade was still not evident after two years in force (19 and 20). In fact, the decline in European imports of tropical wood products had started before the 2008 economic crisis; indeed, the first trade analysis showed no significant variation in the volume of European imports of

tropical wood products within the first two years of the EUTR's enforcement (19). However, it is possible to suppose that European importers might soon start to opt for temperate hardwoods to the detriment of tropical hardwoods as a risk avoidance strategy. It may also be the case that non-European exporters will prefer to export their products to other, more weakly regulated markets to avoid the extra costs inherent in demonstrating the legality of their products (19 and 20).

Table 12. Key findings of papers published before the EUTR enforcement key findings of papers published after EUTR enforcement

<i>KEY FINDINGS IN PAPERS PUBLISHED BEFORE EUTR ENFORCEMENT</i>	<i>PAPERS PUBLISHED AFTER EUTR ENFORCEMENT</i>																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
EUTR enforcement should be based on uniform approach																				
The low level of knowledge about EUTR requirements																				
The unclear role of forest certifications																				
The regulation scope too narrow and important products are exempt																				
The high cost for small companies																				

4.1.2. An analysis of the legislative frameworks across EU member states to enforce EUTR²⁴

As we have just seen in the previous chapter, one of the main concerns to emerge in the analysis of the findings of the scientific papers was the lack of the homogeneity in enforcing the EUTR across EU member states. This non-uniformity of enforcement mainly originates from differences in types of sanctions, particularly the level of fines, as well as from the different financial and technical resources allocated by individual Member States to implement controls. This lack of consistency across the EU-28 is recognized as one of the major challenges in making the EUTR truly effective, since it can create unfair economic competition among Operators (Giurca *et al.*, 2013) and increase the risk that EU importers will opt to import illegal timber into countries where the EUTR is very weakly enforced (Greenpeace International, 2014). This chapter aims to analyse the legislative framework/processes put in place by each EU Member State in order to appoint their CA and define the necessary measures for implementing the EUTR. The study was mainly carried out by analysing the reports submitted to the European Commission by each Member State until 30 April 2015, two years after the EUTR was implemented.

EUTR: a slow implementation since the beginning

In the two years after Regulation (EU) No. 995/2010 (2010) was published, its implementation in many Member States was dramatically slow. In October 2012, just six months before the EUTR become fully operative, most of the appointed CAs were not yet ready to implement the Regulation because there was no protocol in place for evaluating the DDS of Operators. Most of them also admitted to suffering from a lack of expertise in assessing the legality of timber imports (Hein and Hoare, 2014). Furthermore, 15 months (June 2014) after the EUTR had been fully enforced, 12 member states, including France, Italy and Spain, reported relevant delays in terms of designating a Competent Authority and establishing rules on the penalties applicable to EUTR infringements, according to European Commission (2014).

The analysis of biennial report submitted at April 2015

The submission of the biennial report was a requirement stipulated by Art. 20 of Regulation (EU) No. 995/2010, which obliged all EU Member States to present reports ("*biennial reports*") on the national application of EU Regulation No. 995/2010 in the two preceding years. Before 30 April 2015, all Member States submitted their reports and therefore fulfilled their obligation, although several of the biennial reports contained numerous inconsistencies and gaps. In June 2015, according to an analysis of the biennial reports supplied, there were four countries whose

²⁴ As the previous chapter, also the present one includes many contents already reported in the document entitled "*Review of the European Union's Timber Regulation*", that was the main output of the three-years project "*Support to the implementation of the EU timber Regulation*" (Partners: LERH Department of Padua University, Indufor, Efecsa). link: http://ec.europa.eu/environment/forests/eutr_report.htm.

enforcement of the EUTR was significantly delayed: Greece, Hungary, Romania and Spain. In particular, Hungary and Greece submitted an almost blank biennial report, while Spain had not completed the process of appointing its own Competent Authorities in 2015 and Romania had no adequate legislative framework for establishing rules on the penalties for EUTR infringements. As a result, the European Commission took action at the end of 2015, serving formal notices to Greece, Hungary and Spain and asking them to adopt the obligatory national measures and to introduce penalty rules into their national laws. This was the first step in a process which could lead to the case being brought before the European Court of Justice if the countries concerned do not take action. In September 2016, the EU Commission dropped infringement procedures against Hungary and Romania because both countries had demonstrated that they had adopted new rules on penalties for EUTR violations. Meanwhile, the new rules adopted by Greece and Spain were still being assessed by the Commission at the end of 2016 (ClientEarth, 2017).

According to Art. 7 of the EUTR, each Member State was required to appoint its own Competent Authorities (CA) by 3 June 2011. Despite this, Spain was not even able to officially name its own Competent Authority in 2015. Table 13 reports the CAs responsible for EUTR enforcement in all 28 member states in April 2017. With respect to the information reported, in its 2015 biennial report Spain had officially appointed its CA (*Dirección General de Desarrollo Rural y Política Forestal*); in the UK, the National Measurement and Regulation Office (NMRO) was appointed as the Competent Authority (CA) from 2015, and was contracted by the Department of Environment, Food and Rural Affairs (ClientEarth, 2016). Except for in one case (England), all of the CAs identified by Member States are the domestic forestry authorities of national agencies related to the primary sector, with little experience of international trade or the nature of illegal activities in the forest sector in timber-exporting countries (Hein and Hoare, 2014).

Table 13. Competent Authorities appointed by Single Member States for the EUTR enforcement. Source: webpage of EU Commiss.

MEMBER STATE	COMPETENT AUTHORITY (CA)
Austria	Federal Forest Office (FFO)
Belgium	Federal Public Service of Health, Safety of Foodchain & Environment (FPSHSFE)
Bulgaria	Executive Forest Agency (EFA)
Cyprus	Department of Forests (DoF)
Croatia	Ministry of Agriculture- Directorate for Forestry, Hunting and Wood industry
Czech Republic	Forest Management Institute (FMI) & Ministry of Agriculture (MoA)
Denmark	Danish Nature Agency (DNA)
Estonia	Environmental Inspectorate (EI)
Finland	Agency for Rural Affairs (ARA)
France	Ministry of Agriculture, Nutrition and Forestry (MAAF)
Germany	Federal Agency for Agriculture and Nutrition (BLE)
Greece	Ministry of Productive Reconstruction, Environment and Energy
Hungary	Ministry of Agriculture
Ireland	International Forestry Division (IFD), Department of Agriculture, Food & the Marine
Italy	Ministry of Agricultural, Food and Forest Policies (MiPAAF)
Latvia	State Forest Service (SFS)

Lithuania	State Forest Service (SFS) & State Non Food Products Inspectorate (SNFPI)
Luxembourg	Nature and Forest Administration (NFA)
Malta	Agricultural Directorate (AD)
Netherlands	Food Safety Authority (FSA)
Poland	Voivodship Inspectorates of Environmental Protection (VIEP)
Portugal	Institute of Nature Conservation and Forests (ICNF)
Romania	National Environmental Guard (NEG)
Spain	Direccion General de Desarrollo Rural y Política Forestal (DGDRPF)
Sweden	Swedish Forest Agency
Slovakia	Ministry of Agriculture and Rural Development (MARD)
Slovenia	Forestry Inspection (FI)
United Kingdom	National Measurement and Regulation Office (NMRO)

The EUTR is directly applicable and confers rights or imposes obligations on Member States and EU citizens in the same manner as national law. In particular, Art. 19 of EU Regulation (EU) No. 995/2010 states that “*Member States shall lay down the rules on penalties applicable to infringements of the provisions of this Regulation and shall take all measures necessary to ensure that they are implemented.*” In their biennial report of June 2015, Greece, Hungary, Romania and Spain did not supply adequate information as they were still in the process of developing adequate sanctions provisions. The remaining Member States indicated the relevant national law and the sanctions defined for infringements of the Regulation’s obligations. In particular, of the 24 Member States that supplied data/information on this topic:

- *13 Member States* (such as Italy) have recently introduced new specific laws for the application of the EUTR, or have revised their national legislation to directly refer to the EUTR;
- *11 Member States* (such as Belgium) declared that they are using existing rules on penalties to sanction violations of the EUTR.

In their biennial reports, Member States were requested to provide information on the human and economic resources made available to enforce the EUTR, in addition to a description of the process to designate their Competent Authorities and their legal framework. Of the 28 Member States, only 23 provided information on this issue. In total, 850 monthly payments (equal to 70 annual payments) were reported to be allocated annually in support of the implementation and enforcement of the EUTR. However, the human resources allocated varied very significantly across individual Member States. For instance, Malta only makes one monthly payment each year, while Portugal makes available 84 monthly payments (equal to seven annual payments) each year.

The analysis of data included in the biennial reports also demonstrates that the type and range of sanctions are not coherent across Member States. The forms taken by sanctions vary from a simple remedial actions notice to imprisonment. In any case, all of the EU Member States that supplied information concerning this issue include fines as possible sanctions for EUTR infringements. In addition to the fines, of the 24 Member States to have supplied information:

- 20 apply remedial actions notices;
- 19 apply the seizure of timber;

- 17 apply imprisonment;
- 14 apply the suspension of authorization to trade;
- 17 apply other penalties, such as written warnings (Austria), the acquisition of assets (Ireland), forced labour (Latvia) and the withdrawal of financial subsidies or other public support for forest activities (Portugal).

It is interesting to see how the seizure of timber, even if it is illegal in origin, is not a sanction implemented in all Member States. In fact, the Regulation (EU) No. 995/2010 specifies that the seizure of timber is only optional; it does not oblige Member States to provide for it in their national legislation.

All Member States clarified that the type and level of sanctions depend on whether the EUTR infractions concern: (i) the ban on placing illegal timber on the internal market for the first time, (ii) the development/maintenance of DDS or (iii) the traceability of timber and timber products. In general, the range of fines and other penalties applied for placing illegal timber on the market is much higher than those applied for breaches of the due diligence and traceability obligations. In terms of the level of sanctions, of the Member States, Germany, Finland, Sweden and Denmark apply fines but do not define a maximum limit. On the other hand, Belgium²⁵ applied the highest fines (for placing illegal timber on the internal market) of up to 24 million EUR, while Italy and Spain applied fines of up to one million EUR in the case of infractions in DDS development. In contrast, Bulgaria applied a fine of only of 2,500 EUR for placing illegal timber on the internal market (Figure 6).

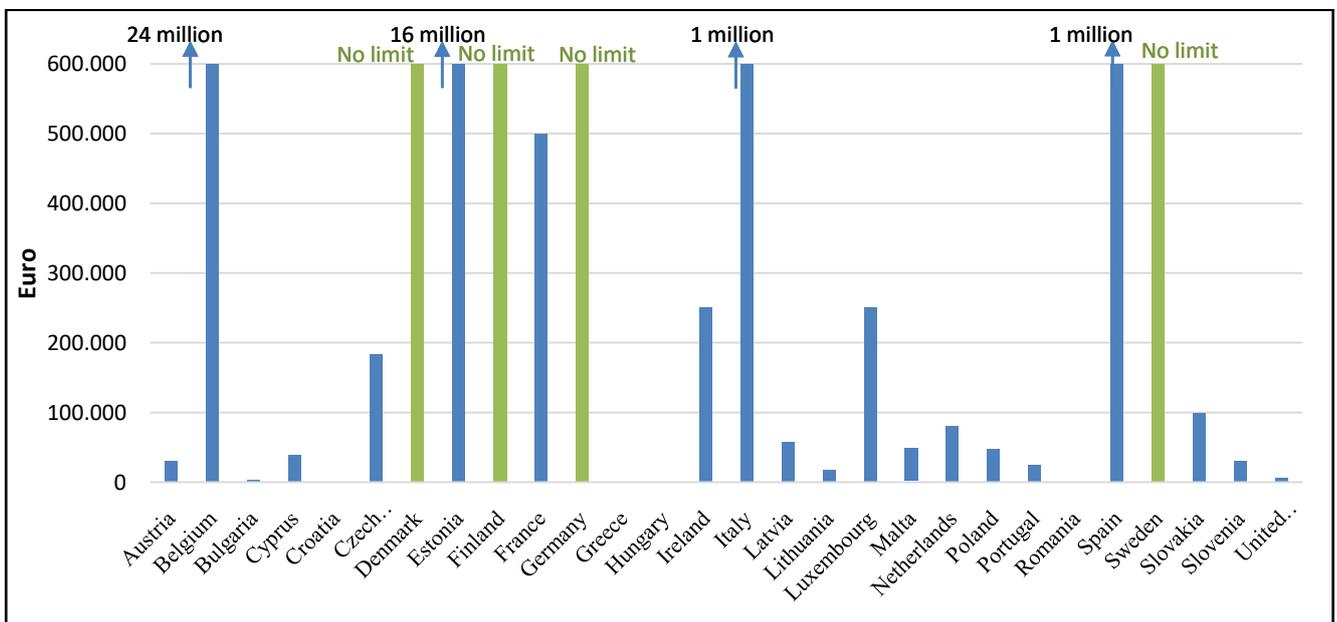


Figure 6. Different level of fee foreseen by each Member States in the context of EUTR

However, it's import to precise that, in addition to the fines, which can potentially be applied to operators, numerous Member States applies imprisonment as a potential sanction, in combination

²⁵ According to the clarification given by the Competent Authority, the broad range of fines in Belgium comes from the fact that the general law defining the extent of fines is used for a wide range of environmental regulations.

with a fines. Prison sentences ranged from a minimum of 8 days in Luxembourg up to 6 years in Sweden.

So, in conclusion, in first two years, in general, the implementation of the EUTR has been quite slow in most Member States. Anyway, between the end of 2104 and the beginning of 2015, most Member States have progressed in fulfilling the obligations imposed by the EUTR. However, until April 2015, the EUTR implementation remains totally insufficient in Greece, Romania, Hungary and Spain. Furthermore, the evidence collected in the biennial reports analysis suggests that insufficient resources allocated to CAs are a important challenge for an effective and uniform EUTR enforcement across Member States.

4.1.3 EUTR enforcement in Italy

In Italy almost 100000 Italian enterprises are subjected to the Regulation (EU) No. 995/2010. More in detail, 25000 of them should qualify as operators, and the remaining ones as traders. Around 40% of operators are included in the Italian timber sector, and about 5000 companies are classified as operators because they harvest and then first place on the European market domestic wood, the rest because they import wood from abroad (Federlegno Arredo, 2014).

In Italy, as many other EU Member States, the full implementation of Regulation (EU) 995/2010, that came into force on 3rd March 2013, was delayed (Jonhson *et al.*, 2015). At Italian context, this poor EUTR implementation mostly derives from the late designation of the Ministry of Agricultural, Food and Forestry Policies as the national Competent Authority and the State Forestry Corps (*Corpo Forestale dello Stato*, CFS) as the body in charge of performing controls. Indeed, final designations were formalized just in December 2012, two months before the full force of Regulation 95/2010. Furthermore, the penalties and control procedures were defined only in December 2014, through the publication of the Decree No.178 of 30/10/2014, almost twenty months after 3rd March 2013. The table 14 summarizes the fines established by art.6 of Decree No. 178/2014.

Table 14. Sanctions foreseen in the Decree No. 178/2014

Actor interested	Type of EUTR infringement	Type of sanction (depending on the infractions gravity)
Operators	Placing on the market timber that was harvest not in compliance with the legislation of country of origin	- Fines (2000-50000 Euro) - Seizure of the timber - Imprisonment (from 1 month to 1 year)
Operators	Lack of procedures to maintain own Due Diligence System	Fines (up to 5000 Euro/100kg)
Operators	- Documents concerning Timber Reg. not maintained for five years. - Lack of specific register to record documents concerning Reg. (EU) No 995/2010	Fines (1.500 to 15.000Euro)
Traders	Information regarding suppliers and buyers not maintained	Fines (150-1500 Euro)
Operators	Lack of enrolment in national register of operators	Fines (500-1200 Euro)

Besides the Decree No. 178/2014, an additional decree is necessary to make the system fully operative. In fact, at May 2017, the decree with the rules to enrol to the Italian registry of operators, as requested by art.4. of the Decree No.178/2014, is not still published. The EUTR implementation in Italy is slow also because, according to Decree No. 178/2014, no additional specific resources are provided for EUTR enforcement, and the profits derived from EUTR fines will be allocated for carrying out checks and controls. Finally, on 1st January 2016, CFS has merged with the Carabinieri police corps. This could have an impact on decisional and organizational processes related to enforcement (Clientearth, 2016).

At the end of 2014, Italian Competent Authority had carry on a pilot audit/visit with Conlegno (an Italian Monitoring Organization) to three companies with potentially high-risk suppliers. In order to reduce the risk of importing illegal wood, one of the three companies audited reported a significant decrease in the number of wood species imported because it preferred to focus on fewer species and consolidate trade relationships with reliable suppliers (Pasqualotto, 2014). During the summer of 2015, Italian Competent authority, through CFS, carried out 20 checks on operators, that represent the first official controls in Italy in the context of EUTR (Clientearth, 2016). In 2016, the CAs checks carried by Italian CA continued and other sanctions were imposed²⁶. In 2015, at Italian level, the checks focused on big Italian companies, that regularly import industrial timber from Africa and South-East countries, whereas, in 2016 they focused on small-medium companies that import fuelwood from East European countries, as Bosnia Herzegovina and Serbia. In both campaign of controls most of Italian operators were sanctioned due to the lack of registry, as requested by secondary legislation related of Regulation (EU) No. 995/2010, in detail art.5 of Reg. (EU) No. 607/2012, and recalled in the art. 6 (Sanctions) of Italian Decree No.178 of 30/10/2014.

Anyway, the start of checks by Italian Competent Authority on operators has raised concerns among Italian operators. Indeed, most of Italian forest companies, that utilize domestic wood, are small, and although they represent the core of the Italian wood-energy sector, they appear isolated in view of EUTR implementation. On the one hand, many of them are very small without a strong and efficient management, and, at Italian level, there isn't a strong national association of that can represent their interests to the public authorities. On the other hand, the Italian monitoring organizations activities, until now, are focusing on supporting medium and big companies that deal mainly with imported wood. In addition to the small average size of forest enterprises that can represent an obstacle for the EUTR compliance, many questions concerning the EUTR implementation are emerging across Italian operators. In fact, based on dialogue with operators and empirical experience, the main uncertainties of Italian operators can be summarized in the following two questions:

- *At Italian level, what are the documents necessary to demonstrate the compliance of wood products with the applicable legislation?*
- *What are the real costs for the Italian operators?*

²⁶ **Source:** Ansa.com. Title of article: *Legno da Bosnia, sanzionate 4 ditte*. Date: 30/12/16

The documents necessary to demonstrate the compliance of wood products with the applicable legislation

Concerning the first point, as described in chapter 3, in order to comply with EUTR requirements, operators should collect information to demonstrate the compliance of wood products with the applicable legislation in the country of harvest. In particular, article 2 (point h) of Regulation (EU) No. 995/2010 specifies that applicable legislation includes laws and normative requirements covering the following aspects:

- *rights to harvest timber within legally gazetted boundaries,*
- *payments for harvest rights and timber including duties related to timber harvesting,*
- *timber harvesting, including environmental and forest legislation including forest management and biodiversity conservation, where directly related to timber harvesting,*
- *third parties' legal rights concerning use and tenure that are affected by timber harvesting, and trade and customs, in so far as the forest sector is concerned.*

With the aim to clarify some ambiguous aspects of the Regulation (EU) No. 995/2010, the European Commission has published a “*Guidance document for the EU timber regulation*” that provides examples of possible proofs for each matters considered in the applicable legislation (Table 15). However, in the case of Italy, the framework of forest legislation is not common in all Italian regions. In fact, since 1972 (Decree No. 11/1972) the forest legislation is defined at regional level and then Italian regions have full financial and technical responsibility in the forest management regulation activities within their territories (Vitariello, 2013). Therefore, in order to demonstrate the compliance with applicable legislation for products derived from Italian forests, operators shall take into account the national legislation for covering the matters n.1, 2 and 5 of art. 2 of Reg. (EU) No. 995/2010, whereas, for matters 3 and 4 they shall make reference to relevant regional legislation and address regional authorities.

Table 15. Examples of evidences necessary to demonstrate the compliance with the applicable legislation.

<i>Legislation matters to be covered</i>	<i>Examples of proof of legality</i>	<i>Legislative reference</i>
1. Documentation for rights to harvest timber within legally gazetted boundaries	<ul style="list-style-type: none"> • documentation of ownership/rights to land use • contracts • concession agreements 	National legislation
2. Payments for harvest rights and timber including duties related to timber harvesting	<ul style="list-style-type: none"> • contracts • bank notes • official receipts 	National legislation
3. Timber harvesting, including environmental and forest legislation including forest management and biodiversity conservation, where directly related to timber harvesting.	<ul style="list-style-type: none"> • official audit reports • environmental clearance certificates • approved harvest plans • official documents issued by competent authorities in a country of harvest etc. 	Regional legislation
4. Third parties' legal rights	<ul style="list-style-type: none"> • environmental impact assessments 	Regional legislation

concerning use and tenure that are affected by timber harvesting	<ul style="list-style-type: none"> • environmental management plans • environmental audit reports 	
5. Trade and customs, in so far as the forest sector is concerned	<ul style="list-style-type: none"> • contracts • bank notes • trade notes • import licenses, export licenses • official receipts for export duties 	National legislation

The devolution of forest management regulation at regional scale, however, has brought to a non-homogenous legal framework, with different requirements depending on the region, an increased number of normative requirements and the consequent risk of duplicating responsibilities and creating administrative conflicts (CNEL, 2000). This is emphasized by the fact that while forestry issues are under the responsibility of Regions, environmental ones are still managed at central level. In some cases, these overlapping and sometimes unclear roles have resulted in non-linear and costly procedures for the issuing of harvesting license (Rigon, 2012) discouraging operators from investing in forest management activities or, sometimes, pushing them to not authorized logging operations. For the future, it is recommendable that all regional authorities, jointly with Italian government, will supply clear indications about the evidences needed to demonstrate the legality of the wood products, as required by Regulation (EU) No. 995/2010. So far only two Italian Regions, i.e. Piedmont and Lombardy, have developed guidelines and informative/supporting materials for operators. The same regions have also implemented specific on-line procedures and systems for the issuing of harvesting licenses as well as a mutually valid system for qualifying forest enterprises and operators with regard to technical skills as well as health and safety requirements.

As regards the compliance of timber products with the applicable legislation in the country of origin, among Italian operators, other doubts are emerging. In particular, other concerns deal with the evidence to prove the legality of wood products derived from tree outside the forest. These include not only wood from agricultural activities (e.g. management and harvesting of linear forest systems, forest belts, hedges or small woodlots) that are mainly used for energy purposes, but also material deriving from poplar plantations and arboriculture systems for the production of high-quality wood assortments. These typology of plantations are normally not classified as forests, rather as temporary agricultural land-uses, therefore operators are not required to have any official authorization for logging these areas. As a result, the wood harvested without any permission can create troubles, in case checkers required to prove the legal origin of wood.

The real cost for meet EUTR requirement at Italian level

Concerning the real cost related to the EUTR implementation, the burden that European operators, and in particular small and medium enterprises, shall face in order to meet EUTR requirements is a debated issue, as already reported by many studies (Dudik, 2014 and Thriskin, 2015). Many and different factors, such as the number and kind of suppliers, can influence the costs for implementing a DDS. Although there are no specific data available yet, the implementation of an effective DDS is expected to require investments in internal organization and control systems that represent additional costs and might decrease economic competitiveness, especially for small-medium enterprises (Florian *et al.*, 2012). However, according to the national implementing

legislation (Decree No. 178/2014), operators are required to pay a fee in order to be included in the national register of operators. The entity of this fee at the moment remains unknown. Further uncertainty exists about whether there will be a connection between the register of operators, created for the purposes of complying with EUTR requirements, and the register of the qualified companies that the Italian Government commits to create in the next years to guarantee an appropriate professional level of the forest operators. In the case that two registers will be kept separated, operators will have to pay a double fee to register them in national official registers. While bringing extra costs for companies willing to operate in full compliance with legal requirements, these measures might not result effective for those companies operating informally, especially if controls will remain weak or totally absent. Many of these informal organizations operate in the production and trade of energy wood and related products.

In conclusion, a full and effective implementation of the Regulation (EU) No. 995/2010 would be an important tool to guarantee transparency and equal competition among companies in the Italian wood-energy sector, that is characterized by a significant proportion of biomass obtained from unclear sources. The modality and the delay of the Italian government to make operative the Regulation represents a negative starting point. This inactivity of the Italian public authorities can increase the concrete risk that the Regulation will not be effective to detect companies operating in total informal context. Moreover, this situation can contribute to create a market with two levels, on the hand the regular companies that have to pay extra cost for the DDS implementation, for the fee of national register of operators and for the possible voluntary certifications. On the other hand, illegal companies can carry on their activities, with indirect advantages of competitiveness respect legal companies. The lack of strategic planning and the coordination among public authorities can also favour a general increase of the bureaucratic and economic burden and decrease the general competitiveness of the Italian forest sector.

4.2 The Regulation (EC) No. 2173/2005 enforcement

As described in chapter 3, the FLEGT Action Plan led to the issuing of another important regulation besides the EUTR: Regulation (EC) No. 2173/2005 (also known as the FLEGT). This Regulation, adopted in 2005, aims to promote the legal timber trade through the development of bilateral Voluntary Partnership Agreements (VPA) between producing countries and the EU. In fact, VPAs aim to guarantee that the timber products exported to the EU come from legal sources and, at same time, to support partner countries in improving the regulation and governance of their forest sectors. Currently, six countries have become VPA partners through signing a VPA, and are in the process of developing systems to control, verify and license legal timber. Nine more countries are in negotiations with the EU. From 15 November 2016, the Regulation (EC) No. 2173/2005 entered fully into force in Indonesia. This means that from 15 November 2016, timber products exported from Indonesia to the EU must have a FLEGT license to enter the EU market. If timber products from Indonesia do not have a FLEGT license, authorities in EU Member States will not allow the products to be placed on the market. The FLEGT license acts as a guarantee of legality, meaning that products with this license will be considered automatically legal by the EUTR.

As set out by Art. 7 of Regulation (EC) No. 2173/2005, each Member State shall appoint its own Competent Authorities, which are responsible for verifying the validity of FLEGT licenses and maintaining their relationship with the European Commission. Table 16 contains a list of the Competent Authorities responsible for implementing the FLEGT in each Member State. Most of the Member States have appointed the same entity to monitor both the EU Timber Regulation and the FLEGT Regulation. Seven Member States, including Bulgaria and the Czech Republic, have divided the responsibility for implementing the EUTR and the FLEGT Regulation between two Competent Authorities. Specifically, Member States that use separate entities to implement the FLEGT and the EUTR have usually preferred to appoint their own national customs authorities to implement the FLEGT, rather than forestry or agricultural ministries.

Table 16. List of Competent Authorities appointed by single Member States for the Reg. (EC) No 2173/2005 enforcement.. Source: web-page of EU Commission, DG environment

MEMBER STATE	COMPETENT AUTHORITY (CA)
Austria	Federal Forest Office (FFO)
Belgium	Federal Public Service of Health, Safety of Foodchain & Environment (FPSHSFE)
Bulgaria	National Customs Agency
Cyprus	Department of Forests (DoF)
Croatia	Ministry of Agriculture- Directorate for Forestry, Hunting and Wood industry
Czech Republic	Customs Administration of the Czech Republic
Denmark	Danish Nature Agency (DNA)
Estonia	Environmental Inspectorate (EI)
Finland	Agency for Rural Affairs (ARA)
France	Ministry of Agriculture, Nutrition and Forestry (MAAF)
Germany	Federal Agency for Agriculture and Nutrition (BLE)
Greece	Ministry of Productive Reconstruction, Environment and Energy

Hungary	Department of Trade, Defence Industry, Export Control & Precious Metal Assay
Ireland	International Forestry Division (IFD), Department of Agriculture, Food & the Marine
Italy	Ministry of Agriculture (MoA)
Latvia	State Forest Service (SFS)
Lithuania	Customs Department under the Ministry of Finance of the Republic of Lithuania
Luxembourg	Nature and Forest Administration (NFA)
Malta	Agricultural Directorate (AD)
Netherlands	Food Safety Authority (FSA)
Poland	Ministry of Finance- Customs Department
Portugal	Ministry of Finance - Customs Department
Romania	National Environmental Guard (NEG)
Spain	Direccion General de Desarrollo Rural y Política Forestal (DGDRPF)
Sweden	Swedish Forest Agency
Slovakia	Financial Directorate of the Slovak Republic, Customs Section
Slovenia	Forestry Inspection (FI)
United Kingdom	National Measurement and Regulation Office (NMRO)

When importing timber products from Indonesia, EU importers should submit a hard copy of their FLEGT license to the national Competent Authority. To simplify the process, the EU Commission implemented a virtual platform (FLEGIT) in 2016 with the support of the EU FLEGT Facility, enabling EU operators to submit the details of their FLEGT license electronically to their national Competent Authority for verification. The implementation of this platform allows national Competent Authorities and Customs Authorities to check and verify the validity of FLEGT licenses, and thereby to rapidly release the shipment into free circulation.²⁷

The Regulation (EC) No 2173/2005 enforcement in Italy

Just like for EU Regulation No. 995/2010 (the EUTR), the "*Ministero delle Politiche Alimentari Agricole e Forestali*" (MiPAAF) was appointed as the Italian public authority responsible for implementing Regulation (EC) No. 2173/2005; Decree no. 178/2010 was the decree defining sanctions for infringements of the FLEGT Regulation (Table 17).

Table 17. Sanction foreseen by Decree No 178/2010 in the context of Reg. (EC) No2173/2005

Actor interested	Type of EUTR infringement	Type of sanction (depending on the infractions gravity)
Importers	Import timber without FLEGT licence from countries with a VPA in force	<ul style="list-style-type: none"> - Fines (2000-50000 Euro) - Seizure of the timber - Imprisonment (from 1 month to 1 year)

Besides sanctions, Art. 2, Paragraph 5 of Decree no. 179/2010 specifies that, in order to guarantee that charges relating to control procedures are fully covered, importers should pay a fee for each load of timber products covered by FLEGT licenses. The subsequent Decree of 15

²⁷All operative information regarding imports with FLEGT licenses into the EU is available at: www.flegtlicence.org

November 2016 clarifies that Italian importers must pay 50 EUR for each load of timber products covered by FLEGT licenses.

Italian importers' first impressions of FLEGT licenses

In June and July 2017, 22 stakeholders on the Italian timber market were interviewed as part of the IMM project,²⁸ which aims to provide an independent evaluation of the changes in EU timber imports and to monitor how the European market is recognizing and appreciating FLEGT-licensed timber. The interviewees completed a specific questionnaire with the aim of understanding their first impressions and possible operative problems brought about by the introduction of FLEGT licenses for Indonesian timber on the Italian timber market. Table 18 presents the characteristics of the actors interviewed.

Table 18. Stakeholders interviewed for assessing the first impressions of the introduction of FLEGT licenses in the Italian market

3 Associations	1 Furniture sector
	1 Woody biomass for energy
	1 Monitoring organization in the context of EUTR
19 Companies	4 Paper importers
	3 Big retailers
	12 Timber importers

With the exception of woody biomass for energy, which makes up a minimal share of the timber products imported from Indonesia (no more than 10,000 EUR annually), other interviewees representing other association declared that the introduction of FLEGT licenses was an important step in guaranteeing the legality of products; consequently, the introduction of FLEGT licenses is making it easier for importers to meet EUTR requirements.

Information on the private companies interviewed:

- *Large retailers:* all three of the large retailers interviewed usually import garden furniture from Indonesia, which is mainly made of teak. Among the stakeholders interviewed, large retailers represented the actors who were least interested in the introduction of FLEGT licenses. In fact, two of the three large retailers interviewed work as traders (in the context of the EUTR), as their European headquarters are responsible for introducing the products onto the EU market. On the other hand, the large retailer that imported directly from Indonesia appreciated the introduction of FLEGT licenses for Indonesian timber. This is due to the fact that, in the past, the company had experienced certain problems in 2015 concerning the validity of SVLK certificates in 2015. However, all three of the retailers interviewed were slightly worried about the risk of an overlap (in the view of final consumers) between the scope of the FLEGT license and the aims of voluntary forest certifications.
- *Paper and pulp importers:* of the four paper industries interviewed, only one is presently habitually importing directly from Indonesia. The other three companies preferred not to import

²⁸ All information on the IMM project is available at: <http://www.itto.int/imm/>

from Indonesia (or indeed any of the other VPA countries), because the prices of products from VPA countries are not competitive and most of the suppliers are not very reliable. However, the company that usually imports paper from Indonesia saw the introduction of the FLEGT license as an effective tool to ensure the legality of products and to avoid the implementation of the DDS requested by the EUTR. According to the CEO of this company, the FLEGT trace system worked rather well, with the exception of its first few months in operation, when the system was plagued by numerous bureaucratic problems.

- *Timber importers*: of the 12 timber importers interviewed, all of them import regularly from VPA countries, but only five import directly from Indonesia. The most frequently imported products from Indonesia are plywood, veneers and decking. Generally, all companies importing from Indonesia believed that the introduction of FLEGT licenses is a fundamental step in facilitating compliance with EUTR requirements. Some EUTR requirements, in fact, appear complex and unclear at the present time. In particular, many documents are required in order to demonstrate the legality of the products imported, with concomitant extra costs. In general, the companies interviewed did not consider the 50 EUR fee to be paid for each load of FLEGT-licensed products as an obstacle for future imports from Indonesia. However, no companies believed that their customers are able to pay more for products with FLEGT licenses. On an operative level, after some initial problems, they believed that the FLEGT system works quite well. It is interesting to note how significant Italian importers usually use specialized trade agencies for all operations related to customs clearance.

In conclusion, the findings to emerge from the interviews, which were carried out in the months following the issue of the first Indonesian FLEGT licenses, have demonstrated that Italian importers appreciate the introduction of FLEGT licenses. In fact, the enforcement of the EUTR in Italy has raised numerous doubts and concerns among Italian Operators. Since products with FLEGT licenses are automatically considered legal, thereby avoiding the obligation to implement DDS, all Italian importers see FLEGT licenses as fundamental tools for meeting EUTR requirements. Furthermore, Italian Operators are waiting for other important traditional trade partners, such as Cameroon and the Republic of the Congo, to begin issuing their first FLEGT licenses.

5. METHODOLOGY IN TRADE DATA PROCESSING

As has already been reported in the introduction, the main research objective was to understand the effects on the international timber trade of the driving forces that have recently been characterizing the international timber market. This objective has been reached also through an in-deep analysis of trade data available in the international databases. In order to maintain the consistency of data used in our analysis, the research has developed a methodology in order to:

- (i) Collect secondary data on the timber trade and
- (ii) Clean the secondary trade data collected.

5.1 The trade data collection

At the international level, there are numerous databases and tools containing international trade statistics; however, the following three databases supply the most complete and updated trade statistics:

- *United Nations Commodity Trade Statistics Database* (UN Comtrade), compiled by the United Nations Statistics Division (UNSD). Website: <http://comtrade.un.org/>
- *Eurostat Database*, developed by the European Commission's statistical office. Website: <http://ec.europa.eu/eurostat/data/database>
- *FAOSTAT*, developed by the Statistics Division of the FAO (Forestry - Food and Agriculture Organization of the United Nations) Website: <http://faostat.fao.org/>

To analyse the trade data, the research focused on Comtrade data, because:

- it covers the annual bilateral commercial trade flows of all main forest products and countries for all the years between 1962 and 2017;
- data included in the Comtrade database are classified by numerous and univocal codes, which are fully consistent with the classification of products according to the trade classifications of the Harmonized Commodity Description and Coding System 1996 (Harmonized System 1996, HS96) of the Customs Co-operation Council (CCC);
- Comtrade is the database generally utilized by major research organizations, such as CEPI (Research Centre for Statistics) and EFI (European Forest Institute), for similar research.

The classification of data supplied by Comtrade is based on the Harmonized Commodity Description and Coding System (HS) of the CCC. This classification is generally used worldwide as a reference for the classification of customs tariffs. Customs tariffs are divided into 97 chapters coded according to the Combined Nomenclature (CN). Every chapter is numbered (for example, 01 indicates Live Animals) and is broken down into headings and sub-headings. This subdivision creates a four- or six-digit code. For example, the meaning of the code 440110 is:

- 44 → *chapter* → wood and articles of wood
- 01 → *heading* → fuelwood

- 10 → *sub-heading* → fuelwood in logs, billets or twigs

In order to analyse the effects of driving forces on the international timber market, the study has primarily considered all products "*made of wood*" included in chapter 44 (*wood and articles of wood, wood charcoal*). In particular, this study has collected trade data (covering all countries) on the import and export flows of more than 80 sub-headings (product types) (see Appendix II for a full list) falling under 24 different headings corresponding to four-digit HS codes (H4) (see Table 19). Ideally, the analysis aimed to cover the period between 1995 and 2014; however, different time periods are considered depending on the availability of data, i.e., the year in which the product types were integrated into the Comtrade Database.

Table 19. List of headings included in chapter 44 (*wood and articles of wood, wood charcoal*)

CODE	SHORT DESCRIPTION	Period covered by the analysis
4401	Fuel wood in log, wood in chips or in agglomerated form as briquettes, pellets	1995-2014
4402	Wood charcoal (including shell or nut charcoal), whether or not agglomerated.	1995-2014
4403	Wood in the rough, whether or not stripped of bark or sapwood, or roughly squared.	1995-2014
4404	Hoopwood, split poles, pickets and stakes	1995-2014
4405	Wood wool; wood flour.	1995-2014
4406	Railway or tramway sleepers (cross-ties) of wood.	1995-2014
4407	Wood sawn or chipped length, sliced etc. with a thickness exceeding 6mm	1995-2014
4408	Wood sawn or chipped length, sliced etc. with a thickness not exceeding 6 mm	1995-2014
4409	Wood (including strips and friezes for parquet flooring, not assembled) continuously shaped along any of its edges, ends or faces.	1995-2014
4410	Particle board, oriented strand board (OSB) and similar board (for example, waferboard)	1995-2014
4411	Fiberboard of wood or other ligneous materials, whether or not bonded with resins or other organic substances.	1995-2014
4412	Plywood, veneered panels and similar laminated wood.	2007-2014
4413	Densified wood, in blocks, plates, strips or profile shapes.	1995-2014
4414	Wooden frames for paintings, photographs, mirrors or similar objects.	1995-2014
4415	Packing cases etc. of wood, pallets etc. of wood	1995-2014
4416	Casks, barrels, vats, etc.	1995-2014
4417	Tools, tool bodies, tool handles, broom or brush bodies and handles.	1995-2014
4418	Builders' joinery and carpentry of wood, including cellular wood panels, assembled flooring panels, shingles and shakes.	1995-2014
4419	Tableware and kitchenware, of wood.	1995-2014
4420	Wooden articles of furniture not falling in Chapter 94.	1995-2014
4421	Other articles of wood.	1995-2014
9401	Seats.	1995-2014
9402	Medical, surgical, dental or veterinary furniture	1995-2014
9403	Other furniture and parts thereof.	1995-2014

5.2 Possible data discrepancies in the trade data

Since the data supplied by international databases can present numerous and varying shortcomings (Kravis and Lipsey, 1971), they should be quality checked through a process of cleaning and adjusting before being analysed. The most frequent problems that can arise when working with international trade databases are:

- **Shortcomings in double flow reporting:** a comparison of the quantities of imported and exported commodities often reveals data discrepancies. In fact, in some cases the same trade flows have reported as different amounts by the importing and exporting countries. The scientific literature identifies a large number of factors that can contribute to discrepancies in trade statistics between two countries (Table 20). These factors include different transportation or insurance costs, as well as the lack of homogeneity in the units of measurement utilized by the exporting and importing countries (Chen, 2010; Eastin and Perez-Garcia, 2004).

Table 20 Example of shortcoming in a double flow reporting. Sub-heading: 440399. Source: Comtrade Database

YEAR	Type of flow	Quantity (kg)	Values (USD)	Price
2010	China import from Argentina	7,537.11	2,758.28	0.36
2010	Argentina export to China	10,469.69	2,057.50	0.19

- **Missing data:** in some cases, one of the two reporting countries does not supply any data on the value or quantity of a specific trade flow. In other cases, one of the two reporting countries supplies data neither on quantities nor values (Table 21 and 22).

Table 21 Example of missing quantity. Sub-heading: 440320. Source: Comtrade Database

YEAR	Type of flow	Quantity (kg)	Values (USD)	Price
2000	Italia import from Albania	9000	2017	0.22
2000	Albania export to Italy	NO DATA	10759	NO DATA

Table 22 Example of missing quantity (both partner). Sub-heading: 440399. Source: Comtrade Database

YEAR	Type of flow	Quantity (kg)	Values (USD)	Price
2000	India export to Italy	NO DATA	81,014	NO DATA
2000	Italy import from India	NO DATA	NO DATA	NO DATA

- **Evident outliers:** an outlier is defined by Johnson (1992) as: "*an observation in a dataset which appears to be inconsistent with the remainder of that set of data*". As described below, the methodology will focus on identifying and eliminating the most evident outliers, which Hellerstein (2008) has termed "*additive outliers*". These come from technical errors during database compilation. For example, the following table reports a case of an evident outlier, where one of the two values for the same trade flow is 14,000 higher than the other, where in theory they should be the same (table 23)

Table 23 Example of evident outlier. Sub-heading: 440399. Source: Comtrade Database

Year	Type of flow	Quantity (kg)	Values (USD)	Price
2003	Export from Papua New Guinea to Australia	1440000000	1010477	0.000704
2003	Import to Australia from Papua New Guinea	101303	38303	0.38

5.3 Steps to clean trade data

The research methodology uses a series of steps to clean the trade data, which have been adapted from a data-cleaning tool developed by the StarTree project (Pettenella *et al.*, 2014) and have already been successfully tested for the analysis of tropical timber flows (Masiero *et al.*, 2015). The steps utilized are as follows:

- Removal of data shortcomings in double flow reporting
- Removal of outliers
- Estimation of missing data
- Estimation of data with inconsistent units

Removal and re-estimation of data shortcomings in double flow reporting

As mentioned previously, sometimes both trade partners report the same trade flow, but their quantities and/or values do not coincide. Although many research centres, such as the "*Centre d'études prospectives et d'informations internationales*" (Gaulier and Zignago, 2010), consider import data to be more reliable because tariffs and taxes are usually imposed on imports and therefore countries should generally have a strong interest in reporting imports as accurately as possible, this study has chosen to select the higher of the two records; this allows the standard deviation for values and the standard error for estimated quantities to be reduced (Pettenella *et al.*, 2014). (Table 24).

Table 24 The trade flow chosen (underlined) in case of shortcomings in double flow reporting. Sub-heading: 440399. Source: Comtrade Database

YEAR	Type of flow	Quantity	Values (USD)	Price
2010	China import from Argentina	7537110	2758280	0.36
<u>2010</u>	<u>Argentina export to China</u>	<u>10469691</u>	<u>2057506</u>	<u>0.19</u>

Removal and of outliers and re-estimation of the most evident outlier

The methodology implemented in the research aims to identify and eliminate "additive outliers" only, which are also called "hiccups". These anomalous values derive mainly from errors in entering the data, and appear to be largely isolated in a given time-series; after the deletion of this outlier, the time-series returns immediately to normal behaviour (Hellerstein, 2008). In accordance with the research methodology, time-series for annual quantities or values imported by single country are plotted. Then, a visual identification of the most evident outliers is performed (Figure

7). Once a country presenting an anomalous quantity (or value) in a specific year has been identified, the research uses empirical analysis to identify which single trade flow has had the biggest influence on the total quantity of the product type imported. The graph below presents a commodity classified with the code 440799, where the data shows the quantity of a product imported by a single country over the period 1995-2014.

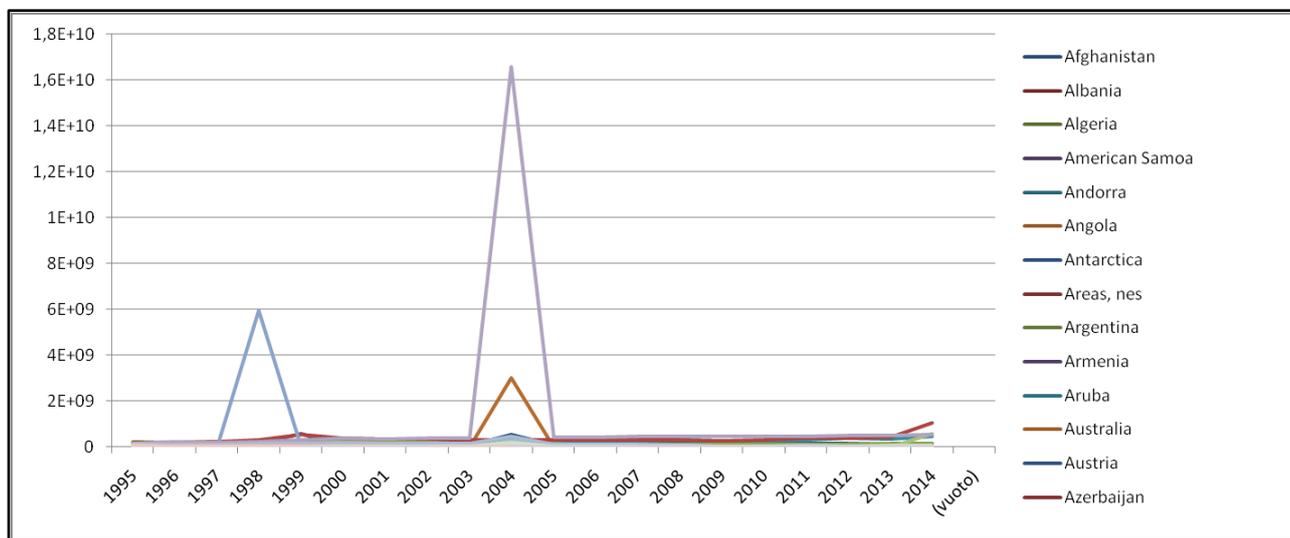


Figure 7. Example of evident outliers (products type 440799) in a time-series concerning the quantity imported by single country. Source: Comtrade Database

In addition to the abovementioned visual identification, the anomalous values are classified as outliers through the application of a specific procedure. Firstly, the trade flow that takes into account the two countries and the product type of the anomalous value is isolated for the period between 1995 and 2014. If the values available are higher than 8 over the period considered, the Chebyshev theorem is utilized, according to which a quantity or a unit value (x) is classified as an outlier if:

$$x \leq q_1 - p(q_3 - q_1) \text{ or } x \geq q_3 + p(q_3 - q_1)$$

where Q_1 and Q_3 are the first and third quartiles. Based on empirical tests, the research has assigned a value of 10 to P . If over the period between 1995 and 2014 the available values belonging to the trade flow containing the anomalous value are less than 8, all flows coming from exporter countries of the product type under consideration are isolated. The Chebyshev theorem is also used here, but a value of 20 is assigned to P . The two abovementioned formulae are applied to detecting anomalies in the data related to quantities and economic values. In the case of the identification (and relative classification) of evident outliers, the first step is to assess whether there is a reasonable explanation behind the anomalous value, such as an increase in timber production due to an extreme natural event. If no valid reason can be found, the following approach is taken to recalculate the value:

- If an outlier belongs to a “double flow record”, it is replaced with the value reported in the opposite flow;
- If the outlier was not part of a "double flow record", the value (price or weight) is recalculated using the available price of the most recent year;

- Alternative data sources (such as FAOSTAT or the country's statistical trade agency) are sought.

Estimation of missing data

In the case of missing quantities, it is assumed that a trade flow exists, and the missed quantities are estimated based on annual average prices per unit of weight. Specifically, the data are split into three categories for each year:

1. Category containing the top third of values;
2. Category containing values between the top and bottom thirds;
3. Category containing the bottom third of values (which are not reliable price estimates).

The missing quantities are then re-estimated in consideration the average price per unit of weight given by the records included in the second category.

5.4 Headings and indicators considered to estimate impacts of different driving forces

Among the driving forces considered, the impacts in the international trade of technological drivers and the growing role of forest certifications have not been assessed because in the first case technological drivers are very recent issues, whereas, in the second case trade data of certified forest products are not available. Furthermore, since the time period considered is not so long (ten years) and, during this time period, big and rapid changes, with an increasing role of new players, have strongly affected the traditional trade patterns, it has been decided to not opt to divide the period in specific time series, and neither to develop related models as Autoregressive Integrated Moving Average (ARIMA). Therefore, the research opted for more elementary indicators, focusing on a qualitative description of the changes of trade patterns identified. Frequently, within indicators considered, the research has utilized the cumulative share of main of exporters in the international market. This indicators, already utilized by OECD-FAO (2016) in its "*Agricultural Outlook 2016-2025*", aims to assess the level of concentration of market, in terms of import and export. However, the research has utilized the network analysis in order to describe the growth of the incidence, with the related impacts, of emerging economies in the international timber market. According to Hildegerd (1943) the network analysis "*testifies as the complex network is suitable to represent the image of the structure of international trade*".

Generally speaking, the research was mainly based on logs (heading 4403), since:

- In the context of Chapter 44 (*wood and articles of wood, wood charcoal*) logs were the most imported commodity into the EU-28 in terms of weight in 2014.
- Logs are included within the scope of the EUTR, as well as in all VPAs in the context of EU Regulation No. 2173/2005.
- Logs, according to the Comtrade classification, include sub-categories that enables the differentiation of roundwood into tropical, coniferous and temperate species.
- Logs are primary products, meaning that they can be easily compared with the other types of raw materials utilized in the study as points of comparison.

As reported in the table below, each of the following chapters have focused on specific headings and sub-headings, within a specific time period. In some cases, to add more detail to the analysis, it was also necessary to analyse:

- The two types of log most frequently imported into the EU-28 in 2014 (sub-categories 440320 and 440399).
- The tropical log sub-commodity most frequently imported into the EU-28 in 2014 (sub-category 440349).

Table 25. Heading, subheadings and period considered in each chapter of thesis

Chapter	Heading and sub-heading considered		Period considered	
The impacts of economic crisis on international timber trade	General	44 = wood and articles of wood	General	2005-2014
	Focus	4403 = roundwood	Focus	2007-2009
Role of emerging economies on international timber market	General	4403 = roundwood		2005-2014
	Focus	440320 = logs, poles, coniferous not treated or painted, 440349 = logs, tropical woods nes 440399 = logs, non-coniferous nes		
The direct impacts of Reg. (EU) No. 995/2010 on the European import	General	4403 = roundwood	General	2005-2014
	Focus	440320 = logs, poles, coniferous not treated or painted, 440349 = logs, tropical woods nes 440399 = logs, non-coniferous nes	Focus	2010-2014
The narrowness of the EUTR's current scope	General	44 = wood and articles of wood	General	2005-2014
	Focus	Headings not included in the EUTR's scope.	Focus	2010-2014
Effects of the lack of uniformity in the Reg. (EU) No. 995/2010 enforcement across Member States	General	44 = wood and articles of wood	General	2005-2014
	Focus	4403 = roundwood 440320 = logs, poles, coniferous not treated or painted	Focus	2012-2014
The impacts of Reg. (EU) No. 995/2010 and the Reg. (EC) 2173/2005		44 = wood and articles of wood		2005-2014
The EU-28 import of woody biomass for energy	General	4401 = fuelwood		2005-2014
	Focus ²⁹	440110 = fuelwood in logs 440121 = woodchips (coniferous) 440122 = woodchips (not coniferous)		
Discussions (an attempt to delineate the recent trend of illegal timber trade flow)	General	44 = wood and articles of wood		2005-2014
	Focus =	4403 = roundwood 4407 = sawnwood		

²⁹ Among subheadings included in the heading 4401 it was not possible to consider wood pellet (sub-heading 440131) because trade data concerning this sub-heading was available only since 2012 in the UN COMTRADE database

6. RESULTS

This chapter is mainly dedicated to present the impacts on international timber trade of the each driving forces, already presented and analysed in chapter.

6.1 The impacts of economic crisis on international timber market

In 2014, the global trading value of the timber products included in Chapter 44 (wood and articles of wood, wood charcoal) reached 183.5 billion USD for a total weight of 450.7 million tons. Between 2005 and 2014, the trade of timber products increased by 82.1% in terms value and by 56.2% in terms of weight. This increase is mainly due to a general growth of income, the expansion of the global population and the globalization of trade (Kleinschmidt *et al.*, 2016). However, the impact of the 2008 economic crisis was very significant for the international timber trade. Between 2007 and 2009, the trade of timber products decreased by 22.9% in weight and 25.4% in value. Among the three major headings included in Chapter 44 (roundwood, sawnwood and fuelwood) logs suffered the worst from the effects of the economic crisis. In fact, between 2007 and 2009, the total weight of logs traded decreased by 32.6% (and by 33.6% in terms of value). In contrast, the economic downturn reduced the global weight of sawnwood traded by 29.0% (and by 31.2% in terms of value). On the other hand, the global value of fuelwood increased by 5.9% between 2007 and 2009 (Figure 8). The strong reduction in the trade of logs was mainly due to the collapse of demand for roundwood in the USA and Europe, which led to the lowest level of industrial log production since 1964 (UNECE/FAO, 2009). After the downturn, between 2010 and 2014, the value and quantities of the main timber categories being traded have gradually recovered. Between 2010 and 2014, the value of sawnwood traded globally increased by 44.1% (and by 19.6% in terms of weight), whereas the value of roundwood increased by 44.4% (and by 33.1 % in terms of weight). Countries in Asia-Pacific (and Latin American countries) were the main drivers of this recovery, with China and India emerging as the main importers of roundwood. They also became the most relevant exporters of finished and semi-finished products (UNECE/FAO, 2013). During the economic crisis, between 2007 and 2009, the role of different types of wood products traded at the international level was also changed drastically. In particular, the incidence of fuelwood increased by 4% in terms of weight, whereas the role of sawnwood and roundwood decreased, by 4% and by 2%, respectively. Contrastingly, the role of plywood and fibreboard in the international timber market also continued to grow during the economic crisis.

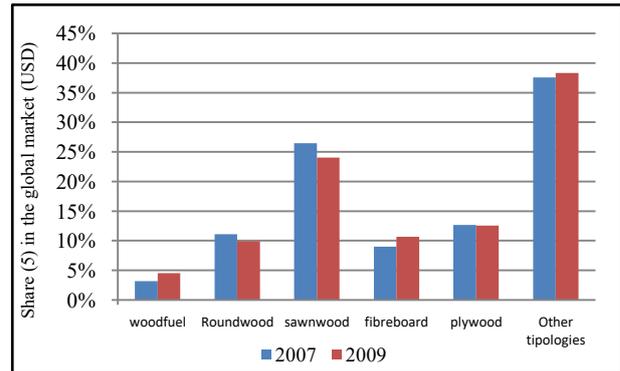
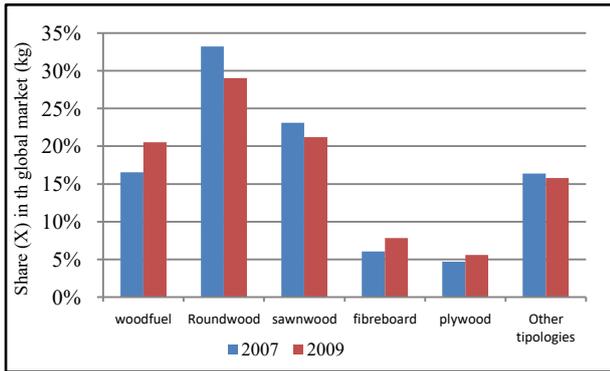


Figure 8. The trend of the role of different headings during economic crisis (in weight and in value). Source: own elaboration from Comtrade database

Focusing on logs, the economic crisis did not significantly alter the incidence of different species traded at the international level. In fact, the role of coniferous, tropical and temperate species remained more or less stable between 2007 and 2009. However, following the economic crisis, the recovery of tropical roundwood was slower than that observed for other categories of roundwood between 2010 and 2014. Indeed, in 2014, the trade in softwood logs increased by 35.5% with respect to 2010, which was a return to the pre-crisis levels; on the other hand, tropical logs only increased by 13.6%. Considering the values of the logs traded, however, the trends are quite different. The value of tropical logs traded increased continually until 2007, when it reached 2.3 billion USD (a 38.0% increase compared to 2000); it then dropped to 1.5 billion USD in 2009 (a reduction of 35% compared to 2007), before finally recovering back to pre-crisis values again in 2014 (2.3 billion USD). One of the reasons behind the weak recovery of tropical roundwood in terms of the weight traded was the fact that the effects of economic crisis hit the small and medium-sized enterprises in producer countries very hard, and these enterprises have traditionally constituted the core of tropical wood processing industries (ITTO, 2013). The second major reason for the weak recovery of tropical species is the increased domestic demand in many important producer countries (such as Brazil and Indonesia) that reduced the quantity of logs exported (ITTO, 2012). Furthermore, log export bans, introduced by several African and South-Asian countries as a policy tool to promote domestic processing, could be seen as another factor that has reduced tropical log exports.

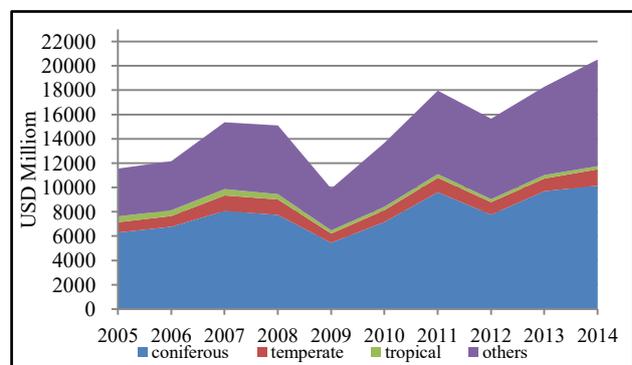
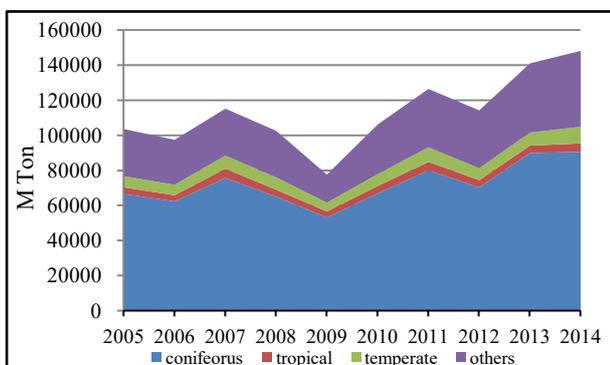


Figure 9. Trend of roundwood species traded at international level between 2005 and 2014 (in weight and value). Source: own elaboration from Comtrade database

As we have already seen, the total value of timber products (those included in Chapter 44) was reduced almost by a quarter and the total weight by 22.9% between 2007 and 2009. However, the economic crisis deeply transformed the role of different countries in the international timber market in terms of imports. In absolute terms, Chinese log imports increased by 15.9% in terms of weight (and by almost 40% in terms of value) between 2007 and 2009, whereas the weight of EU roundwood imports decreased by 23.8% (and by 28.3% in value). Both the Chinese and Indian share in the international logs market increased by around 4% in terms of weight (Figure 10) and by 3% in terms of value. Conversely, the EU's role decreased by 6.7% in terms of weight and by 5.2% in terms of value. The economic crisis also halved the value of Japan's share in the international timber market.

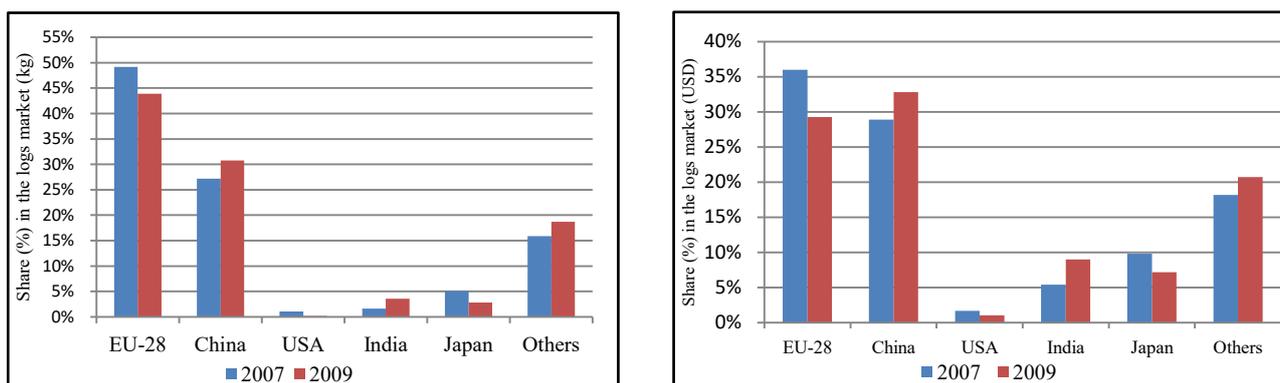


Figure 10. The trend of the role of main roundwood importer during the economic crisis (in weight and value). Source: own elaboration from Comtrade database

During the period of economic crisis (2007-2009), logs suppliers of Europe and their roles have also undergone a profound transformation (Figure 11). Between 2007 and 2009, despite the fact that the intraregional log trade decreased in absolute terms by 26.1% in terms of weight (and by 34.6% in terms of value), its role in global EU imports has increased. The increase in Europe's intraregional log trade has probably partially been dedicated to replace logs imported from Russia, which sharply decreased when the export tax on Russian roundwood was introduced in 2007. According to Simenone and Eastin (2012), the introduction of this tax halved Russia's total roundwood exports (from 49.3 Mm³ in 2007 to 21.9 Mm³ in 2010). According to our analysis, between 2007 and 2009, Russian logs exported to the EU-28 decreased by 78.7% in value and 78.1% in weight. However, during the recovery period between 2010 and 2014, the relative incidence of intraregional trade within the EU-28 has remained very significant: around 70% in terms of weight and about 75% in terms of value out of the total of EU-28 imports. Imports from many African countries fell sharply during the 2008 economic crisis. For most countries, this downward trend continued between 2009 and 2013. The growing role of trade flows between EU countries is mainly motivated by certain previously mentioned factors, such as the imposition of wood export bans or specific taxes in numerous exporting countries, as well as the rising domestic demand for logs in producing countries. Furthermore, other factors, such as the improved competitiveness and efficiency of European wood manufacturing and the reduced availability of timber in extra-EU regions due to past over-exploitation, have also contributed to increasing the role of intra-EU-28 trade (Oliver, 2015).

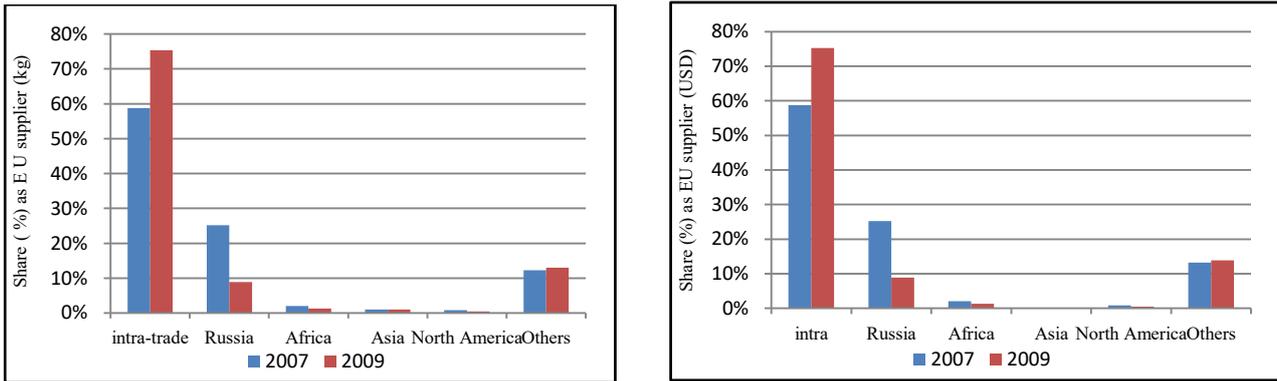


Figure 11. The trend of main suppliers of logs of EU-28 during the economic crisis (in weight and value). Source: own elaboration from Comtrade database

6.2 The impacts on timber trade of the increasing role of emerging economies

6.2.1 The predominant role of new major importers

Historically, the trade of wood products primarily took place between consumer countries in the developed world and producer countries mostly located in the developing world. Between 2005 and 2014, this trade pattern dramatically changed. In fact, China became by far the biggest global processing hub of timber products and, at same time, the demand for wood products in other emerging economies began to rise (Figure 12).

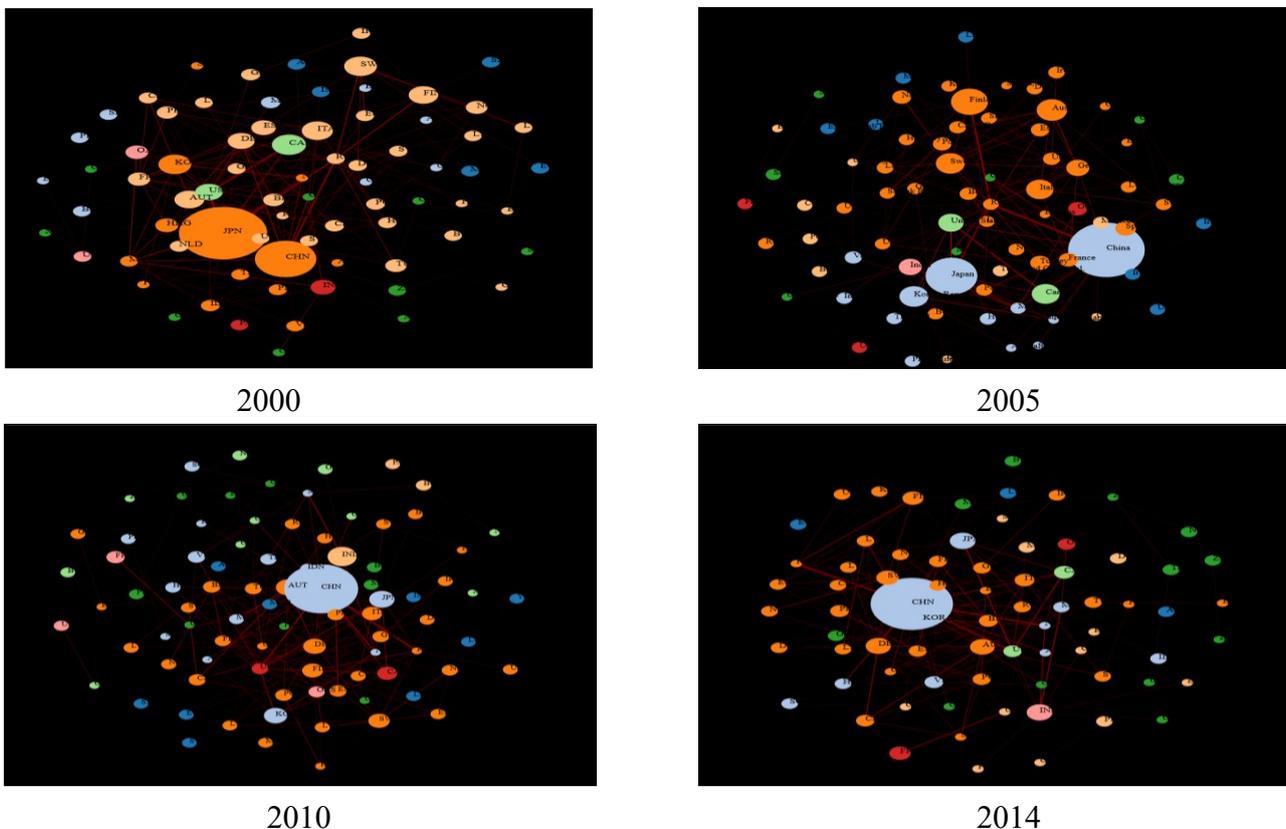


Figure 12. Global trade network of logs from the supplier's point of view (with node size proportional to export market share). Source: World Integrated Trade Solutions (WITS), developed by World Bank

Since 2000, the increase in China’s demand for wood can be defined as dramatic. Between 2000 and 2015, China’s consumption of logs and sawnwood grew threefold (Indufor, 2016), while, between 2005 and 2014, Chinese imports of roundwood increased by 150% in terms of weight and threefold in terms of value. In the same period, the EU-28 countries decreased their imports of roundwood by 7.1% in terms of weight and by 10.5% in terms of value, while the USA and Japan almost halved their imports of roundwood both in terms of weight and value.

The international timber import trade appeared to undergo a process of concentration between 2005 and 2014. Indeed, in 2005, the cumulative role of the main international roundwood importers had increased both in terms of weight and value (Figure 13). China certainly played a fundamental role in contributing to this process. Indeed, China’s role as a global importer doubled in terms of weight (from 19.2% to 40.0%) and more than doubled in terms of value (from 22.2% to 51.3%) between 2005 and 2014. In addition to China, India’s rise to become a strong player in the international timber trade, in terms of the value of the logs imported, has also had a strong impact. Between 2005 and 2014, this country increased its imports of roundwood by 150% in terms of value; by 2014 it accounted for almost 10% of the global value of international roundwood imports. The reason that India’s role in the international roundwood trade has increased in terms of value rather than weight is linked to India’s role in the trade of tropical wood species, which involves products with a higher added value than those made from coniferous and temperate species.

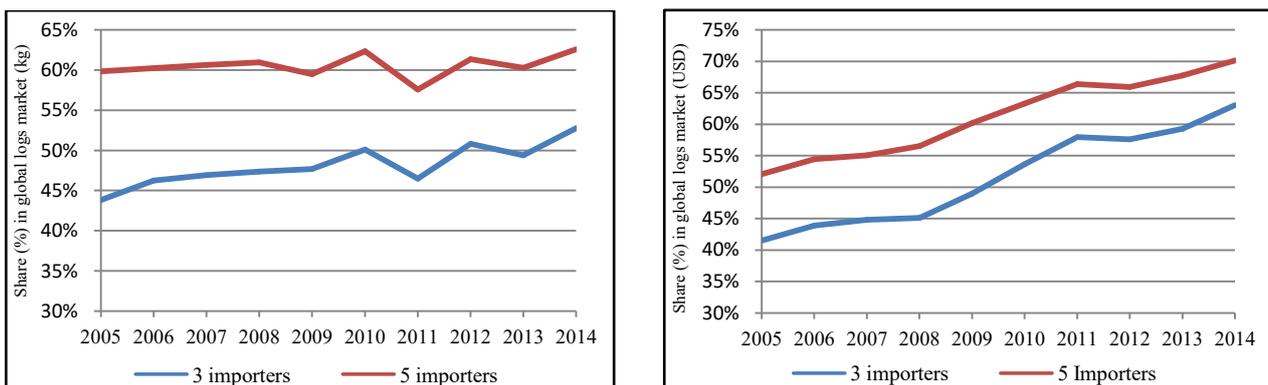


Figure 13. The trend of the cumulative share, in terms of weight and value, of main international roundwood importers (period 2005-2014). Source: own elaboration from Comtrade database

Like the whole of heading 4403, all three sub-headings considered in the research (440320, 440349 and 440399) showed a positive trend regarding the cumulative share of the top five importers. In all three of the sub-headings considered, China was by far the largest global importer in 2014, both in terms of weight and value. The growth of China’s imports in all of the sub-headings was impressive, especially for imports of coniferous species, for which imports have doubled (from 20% to 40%). Concerning log species included in sub-heading 440349 (such as Sapelli and Okoume), the growing role of China has run parallel with the growing role of India. In 2014, these two countries imported more than 70% of the products classified under the code 440349 at a global level. An analysis of all the years included in the period between 2005 and 2014 shows that China overtook Japan as the top importer of coniferous species (in weight) in 2007; in the same year, China overtook Finland as the top importer of products included under sub-heading 440399.

As we have just seen, the increasing role of India and China in the international timber market was much more evident for tropical species (sub-headings 440349 and 440341). In 2014, China and India combined accounted for about 72% of global tropical log imports, whereas in 2000 they had only accounted for 28.2%. During the same period, the role of the EU-28 in the international tropical log trade strongly decreased (from 27.7% to 5.2%), and while the role of the USA and Australia has remained limited (Figure 14). In the Chinese and Indian timber sectors, wood imports are needed to address growing domestic demand stemming from high economic growth, (ITTO, 2013 Lawson, 2014), as well as to feed industrial production whose exports are (mostly) targeted at Northern markets (Manoharan, 2013).

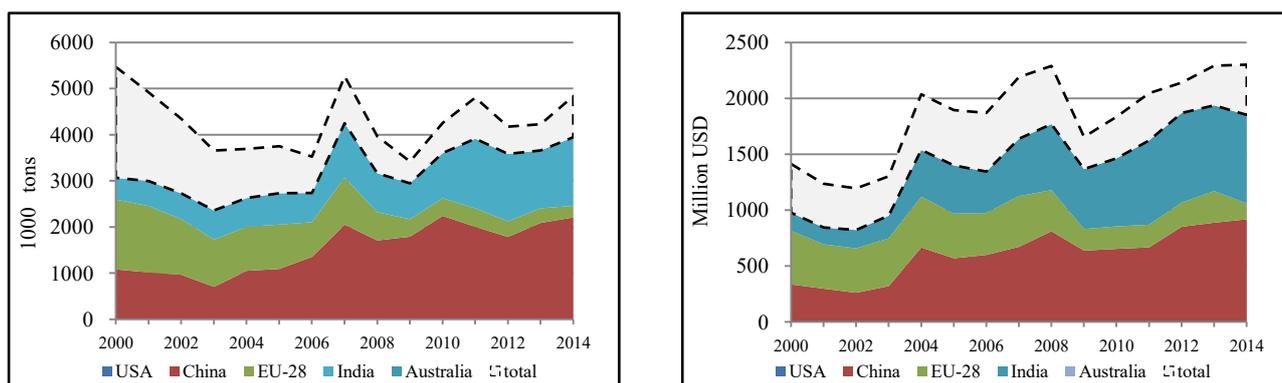


Figure 14. Tropical roundwood imports by selected countries, in quantity and value, period: 2000 - 2014. Source: own elaboration from Comtrade database

As can be noticed from Figure 15, 70.1% and 67.2% of the tropical logs exported from Africa and South-East Asia, respectively, have China and India as destinations (Figures 15 and 16). In 2000 these figures were about 25% for African log exports and 34% for South-East Asian ones. As observed by Giurca *et al.* (2013), the growth of South-South trade could be driven by the trading choices and strategies of Southern exporter countries, who might prefer to export timber to markets with less stringent regulatory frameworks (e.g., China), since legality requirements set by other market destinations (e.g., the EU) are often associated with the extra costs involved in providing certifications and/or required documentation. The decline of the EU's role in the tropical timber trade can be explained by the choice of EU importers, particularly those from the United Kingdom, to import oak products instead of tropical ones. This reflects the fact that oak has consolidated its dominant market position in the European flooring and joinery sectors over the last few years, while tropical hardwoods have continued to lose market share (UNECE/FAO, 2012 and 2014; ITTO, 2012)

Furthermore, many studies and reports have highlighted the fact that the growing role of China in the forest sectors of many African and Asian countries is raising concerns. Illegal forest activities carried out by Chinese companies have been observed (among other countries) in Madagascar (EIA, 2014a), Mozambique (EIA, 2014b), Myanmar (EIA, 2015a) and Cambodia (Global Witness, 2014).

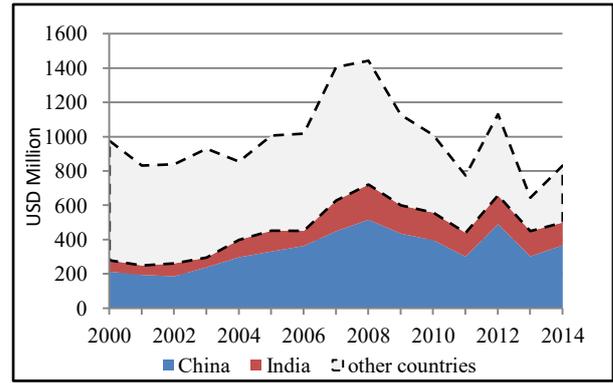
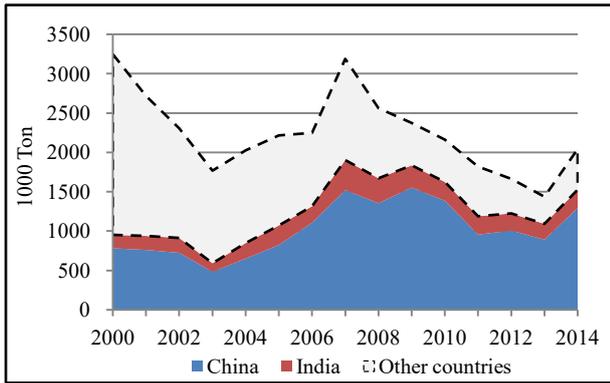


Figure 15. Tropical roundwood imports by China and India from Africa, in weight and value (2000 - 2014). Source: own elaboration from Comtrade database

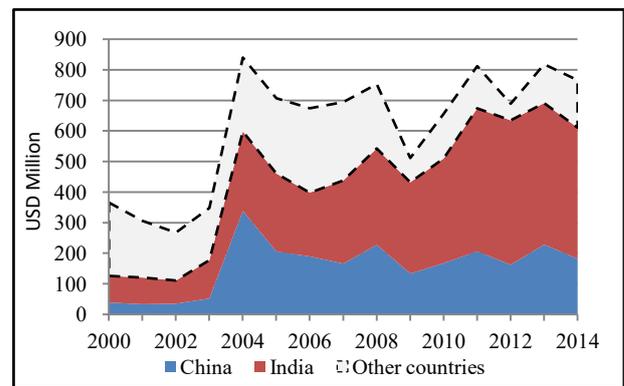
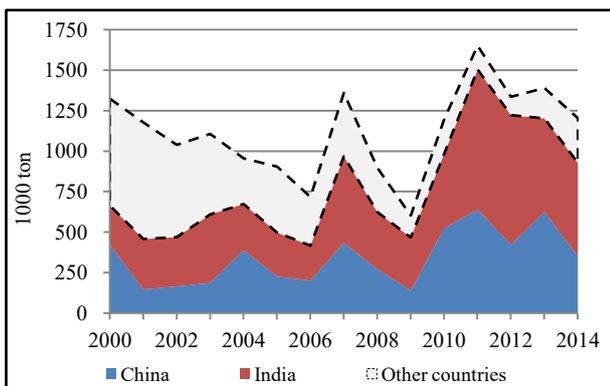


Figure 16. Tropical roundwood imports by China and India from Africa, in weight and value (2000 - 2014). Source: own elaboration from Comtrade database

6.2.2 An increasing number of exporters

As we have just seen, the international logs trade, at import terms, between 2005-2014, has been characterized by a process of concentration, mainly driven by the predominant role of China and India, especially for tropical logs. On the other hand, at export terms, the international roundwood trade appears less and less concentrated. The first element to support this assumption is the increasing number of countries that have a role, albeit limited (at least 0.1% in terms of value of market share), in terms of export, in international roundwood market. In the period 2005-2014, the three sub-headings considered in the research (440399, 440349, 440320) reported a growth of number of countries that covered at least 0.1% of the international roundwood trade (Figure 17)

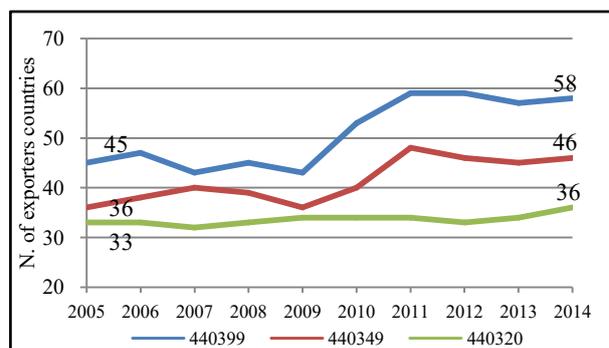


Figure 17. Trend of number of exporters countries (that covered 0,1% of global export) for sub-heading: 440399, 440349, 440320. Source: own elaboration from Comtrade database

Another sign of that the roundwood trade is less and less concentrated is the reduction of the global role of top roundwood exporters (Figure 18) in the period 2005-2014. For example, in 2014, the cumulative share of the top five exporters³⁰ of roundwood accounted for 44.2 % in weight and for 39.9% in value. This figure, in 2005, was 60.0% in weight and 54.2% in value.

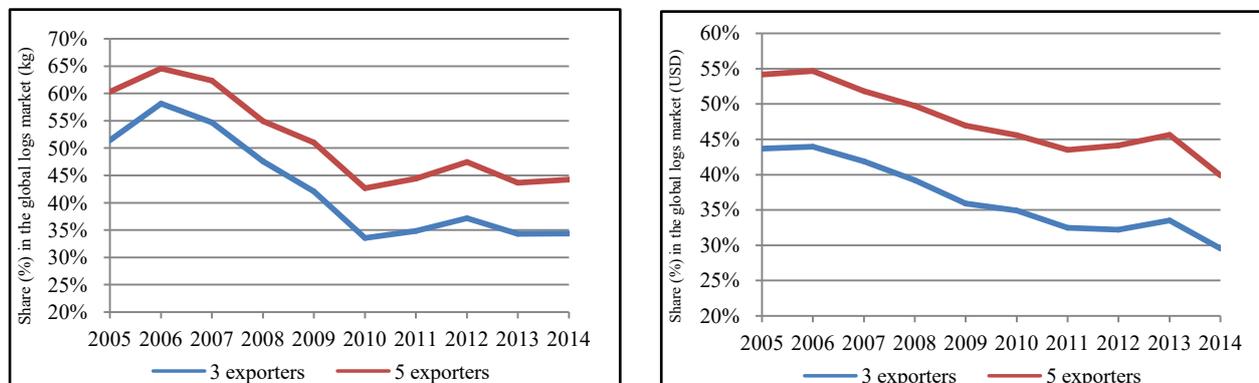


Figure 18. The trend of cumulative share of major logs exporters (in weight and value) in the global market (period 2005-2014). Source: own elaboration from Comtrade database

Like the whole category of logs, also all the three sub-headings considered (440349, 440302, 440399) have reported a reduction regarding the role of the main exporters, and this reduction was more evident since 2010. Concerning coniferous species (sub-heading 440320), the decrease of the cumulative share is linked to the decreasing role, as exporter, of Russia, that historically represents the major global coniferous logs exporter, due to the introduction in 2007 of export tax on Russian roundwood. Russia, in 2005, covered 42.2% in weight (36.0% in value) of total logs of coniferous species traded, while, in 2014, this value has decreased to 13.3% (17.3% in value). Simultaneously, New Zealand benefited from the high prices of Russian logs, and its total softwood (mainly originated from plantations), in terms of value, log exports increased by more than 80%. However, New Zealand wasn't able to reach the role, that Russia covered in the global timber trade in 2005 (Chang and Gaston, 2015) At the same time, the drastic reduction of cumulative share of the top exporters of logs included in the sub-heading 440349 (that include species as Okoumè and Sapelli), might be explained by the logs ban implemented in some African countries, that were the dominant exporters of tropical logs. For instance Gabon, that in 2005 exported 38.6% (in terms of weight) of all logs included in the sub-headings 440399, was subjected to roundwood export ban since 2010.

The sub-headings 440399 (*Logs, non-coniferous nes*), at global level appears the least concentrated among the three sub-heading considered. The single major exporter countries (as Russia and Uruguay), in 2014, didn't cover not more 15% of logs traded at international level. The reason of this low level concentration is mainly due to the variety of species included in this sub-headings, such as poplar, aspen, maple, ash and logs for pulpwood, that can be originated in numerous countries. Like other sub-headings considered, also the role of main international exporters of products included in this sub-heading, in the period 2005-2014, has reported a

reduction. Also in this case, the reasons behind the reduction of the role of the main exporters are probably linked to the tax imposed by Russia on roundwood export. In fact, the Russian export, between 2005 and 2010, at absolute terms, of logs included in the sub-heading 440349 has decreased by more than 75% (in weight and in value).

In conclusion, the international roundwood timber trade, in terms of import, is dominated by new emerging economies, such as China and India, that are becoming the world hub of timber process. Whereas, in terms of exporter, the international market appears less and less concentrated, with an increasing number of actors, where the incidence, in terms of export, of main producer countries is decreasing. The main reason behind this decreasing role would be mainly linked to the implementation ban in the major producer country, as Russia for coniferous logs and Gabon, for tropical logs, as Okoumè.

6.3 The direct impacts of Reg. (EU) No. 995/2010 on the European import

This chapter is dedicated to identifying the impact that Regulation (EU) No. 995/2010 might have had on the timber trade, with particular attention to EU import trends. In detail, this chapter primarily aims to analyse EU import trends during the period from 2005 to 2014. Later, it seeks to identify any variation in European import patterns that could be connected to the enforcement of Regulation (EU) No. 995/2010 in the period from 2010 (the year the EUTR was published) to 2014. According to Giurca *et al.* (2013) and Pepke (2015), the application of Regulation (EU) No. 995/2010 could lead European operators to modify their supply chain, turning away from species and countries of origin at high risk of having been supplied through illegal logging activities, to those where this risk is negligible.

In general terms, the global EU import of products included in chapter 44 (*wood and articles of wood*), both intra- and extra-EU-28, reached 175.5 million tons and 66.15 billion USD in value in 2014. Compared to 2005, EU imports had risen by 57% in value and 28% in weight. Imports of roundwood logs, from countries both inside and outside of the EU-28, reached 50 million tons in weight and 5.2 billion USD in value (figure 19) in 2014. Compared to 2005, the global value of logs imported into the EU-28 had increased by 14.4%, whereas the weight of the logs imported had decreased by 6.3%. Between 2010 and 2012, after the 2008 economic crisis, the recovery of log imports into the EU-28 was weaker compared to the recovery of the global log trade, due to the decreasing role of the EU-28 on the international scene. In 2014, in fact, the EU-28 accounted for 34% of the weight (and 23% of the value) of logs imported globally, while it had accounted for 52% of the weight (and 35% of the value) in 2005. The EU-28's diminished role in the international log trade has mainly been due to the emergence of other countries, such as China and India; since 2009, they have been overtaking the EU, the USA and Japan as the main log importers worldwide. As described in Figure 20, the proportion of different species in global roundwood imports (both intra- and extra-EU-28) drastically changed between 2005 and 2014, particularly in terms of value. The proportion of coniferous species imported by EU-28 countries increased from 51% in value to 59.9% between 2005 and 2014, whereas the proportion of tropical species diminished from 8.8% to 2.7%.

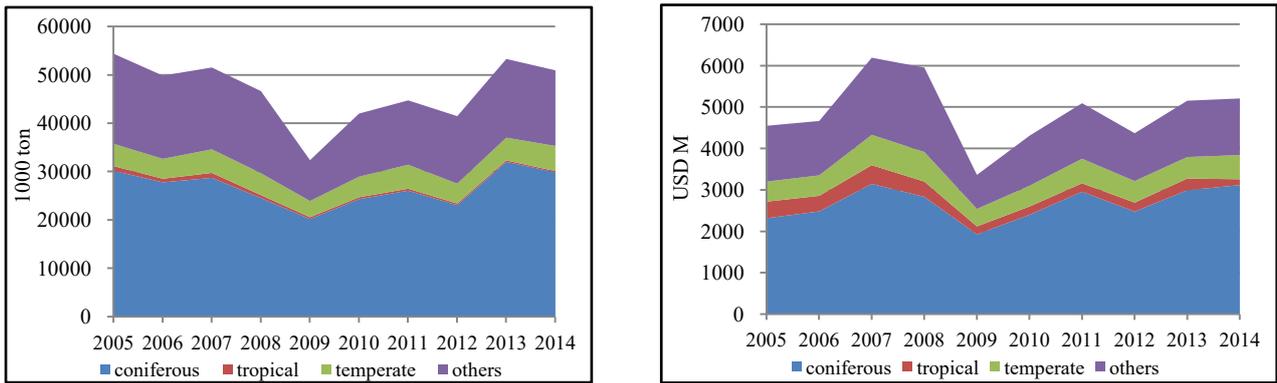


Figure 19. The trend of EU (intra and extra trade) logs import and the role of different species in weight and value. Period: 2005-2014. Source: own elaboration from Comtrade database

An analysis of recent imports from non-EU-28 countries should be important in understanding whether the EUTR could have had an impact on the timber species imported by European importers. The entry into force of the EUTR would favour the increasing proportion of coniferous and temperate species. This is because countries from which they originate can ensure a higher level of legality than countries exporting tropical species. Between 2010 and 2014, the proportion of coniferous log species imported from non-EU-28 countries drastically increased (Figure 20). In fact, the proportion of coniferous species grew from 42.1% to 52.1% in terms of weight, and from 35.9% to 52.8% in value. On the other hand, in the same period, the proportion of tropical species imported into the EU from non-EU countries diminished around by two thirds (in both value and in weight).

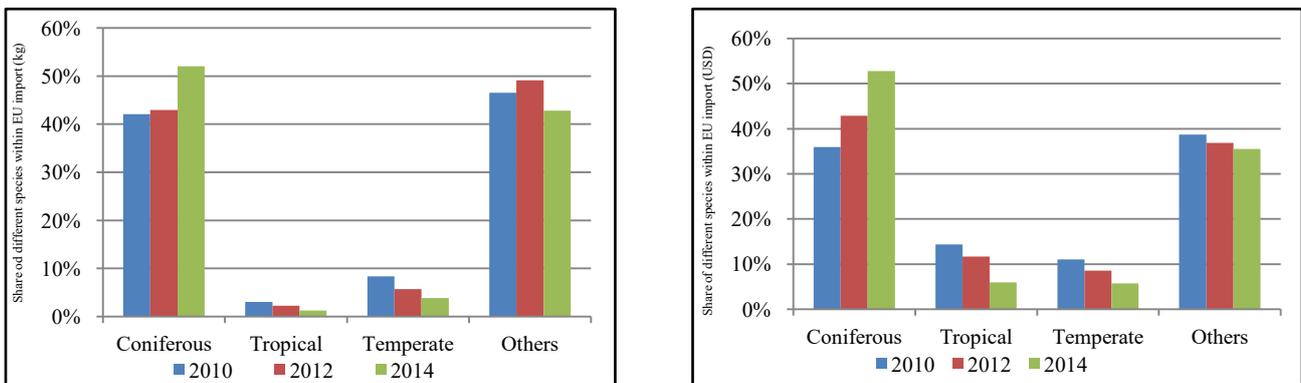


Figure 20. The share of different species in extra-EU import (in terms of weight and value) between 2010-2014. Source: own elaboration from Comtrade database

So, as we have seen, since the entry into force of EU Regulation No. 995/2010, the proportion of tropical roundwood into EU-28 countries declined drastically. Oliver (2015), in the first report published as part of the ITTO FLEGT Independent Market Monitoring (IMM), only partially connected the reduction of tropical log imports into the EU-28 to concerns that have emerged among European importers over meeting EUTR requirements. In fact, the same author highlighted that, in addition to the new export measures and increased domestic demand in developing countries, the decline in EU-28 tropical log imports (particularly in terms of weight) is probably linked to the trend of European operators, that recently had started replaced tropical roundwood

with softwood and temperate species for technical reasons. Furthermore, many European companies have shifted their processing capacities from Europe to tropical countries in which they own logging concessions, largely in order to profit from lower labour costs.

In order to meet EUTR requirements, EU operators would tend to import less from countries in which there is a high risk of illegal logging practices (such as African countries) and, consequently, they would increase imports from countries in which the risk of illegal logging activities is lower. As previously demonstrated, during the 2008 economic crisis, intra-European trade saw a significant growth, while EU-28 imports from African and Asian countries declined drastically. The process of trade regionalization, which emerged during the economic crisis, remained highly relevant over the period between 2010 and 2014, when the trade of logs between European countries reached more than 70% in terms of both weight and value (Figure 21). This strong growth in trade flows between EU countries began between 2007 and 2009, before the enforcement of the EUTR. The reasons behind this growth were the imposition of wood export bans or specific taxes in numerous exporting countries (Russia, for example) and the rising domestic demand for logs in emerging economies. There were other contributing factors besides, such as the improved competitiveness and efficiency of European wood manufacturing and the concentration dynamics of the European sawmill industry in Europe, in which a few countries and companies are occupying an increasing proportion of the market, controlling most of it (Oliver, 2015).

The trend of European import from non EU-28 countries

In spite of the fact that the roundwood trade is now being dominated by an increasing number of actors, with traditional exporters simultaneously having lost their predominant role in the last few years, EU imports from countries outside of Europe seem not to have been affected by this international trade pattern, especially since 2009. In fact, between 2005 and 2014, in relative terms, the cumulative share of the top five non-EU roundwood suppliers increased by 6.5% in terms of value and decreased by 2% in terms of weight. However, since 2009, the cumulative share of the top five suppliers has strongly increased in terms of value (increasing by 17% in terms of relative incidence) and has slightly increased in terms of weight (increasing by 1.5% in terms of relative incidence) (Figure 21).

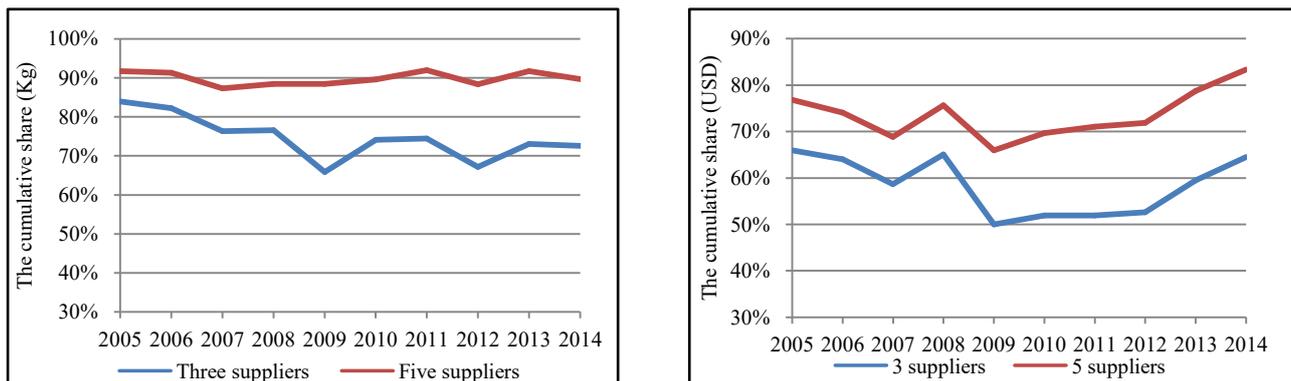


Figure 21. The cumulative share of the main extra-EU log suppliers (in terms of weight and value) to the EU-28 (period: 2005-2014). Source: own elaboration from Comtrade database

Concerning the specific sub-heading considered by the study, since 2007, imports of coniferous logs into the EU-28 from non-EU countries has been strongly affected by the imposition of taxes when exporting roundwood in Russia. In 2005, Russian logs accounted for 71.1% of the value (and 73.1% of the weight) of logs imported from non-EU-28 countries, while this value had decreased to 19.4% (17% of the weight) in 2014. Despite this, since 2009, the cumulative share of the top three and top five suppliers of coniferous logs from non-EU-28 countries has gradually increased (the share of the top three suppliers has increased by 7.3% in weight and by 4.4% in value). In fact, since 2009, European importers have begun to replace Russian roundwood with logs sourced from a limited number of countries, such as Norway and Belarus (Table 26). In 2014, Norway accounted for 33% of European logs imported by non-EU countries in terms of value (and 37% in terms of weight), while it had accounted no more than 5% in terms of weight and value back in 2005. In 2014, Norway, Belarus and Russia accounted for 65% of total roundwood imports from non-EU countries in terms of value. Since 2010, in the light of the possible impact of the EUTR, it is interesting to note the increased role of Norway, which traditionally has not presented any risk of illegality, to the detriment of other countries, in which numerous cases of illegal logging have recently come to light, such as Russia and Ukraine (Smirnov *et al.* 2013; EIA 2015b)

Table 26. Main EU suppliers (and their role in the context of Extra-EU import in terms of weight) of logs of coniferous logs (440320). Source: elaboration from Comtrade Database

Top EU-28 supplier	2010	Top EU-28 supplier	2012	Top EU-28 supplier	2014
Russian Federation	22.8%	Norway	32,8 %	Norway	37.6%
Belarus	20.3%	Ukraine	18,4%	Russian Federation	17%
Ukraine	20.0%	Belarus	15,4%	Ukraine	15.2%

Just as with coniferous species, EU imports of products included in sub-heading 440349 were also strongly affected by the enforcement of a ban on roundwood exports in one of the main producing countries. In Gabon, which has historically been one of the main international producers of Okoume, a ban on roundwood exports was enforced in 2010³¹. In 2009, Gabon had accounted for almost half of EU imports of products included in sub-heading 440349, both in terms of weight and value. After 2010, EU importers were forced to focus on other countries, which have gradually seen

³¹ The reason and the history of Gabon logs ban are summarized in the following link: <https://news.mongabay.com/2010/06/gabon-bans-log-exports/>

their role as EU suppliers increase. For instance, between 2010 and 2014, the Central African Republic increased the proportion of its exports to the EU-28 of products falling under sub-heading 440349 by 20% (in terms of weight). Additionally, the Republic of the Congo doubled its exports to the EU-28. In 2014, the top three suppliers (the Central African Republic, the Republic of the Congo and Cameroon) accounted for 72% of extra-EU-28 imports of products in sub-heading 440349 (Table 27).

Table 27. Main EU suppliers (and their role in the context of Extra-EU import in terms of weight) of logs of logs included sub-heading 440349. Source: elaboration from Comtrade Database

Top EU-28 supplier	2010	Top EU-28 supplier	2012	Top EU-28 supplier	2014
Central African Rep.	24.7%	Central African Rep.	35.8%	Central African Rep.	31.9%
Cameroon	20.7%	Dem. Rep. of the Congo	15.2%	Republic of Congo	27.3%
Dem. Rep. of the Congo	19.6%	Cameroon	13.3%	Dem. Rep. of the Congo	13.2%

However, since 2010 (the year that EU Regulation No. 995/2010 entered into force), the composition of the three top suppliers of products falling under sub-heading 440349 did not vary significantly. All of the top three EU suppliers are countries which have made VPAs, and which are therefore implementing activities to improve the governance of their forest sectors. Between 2010 and 2014, the Central African Republic became a main supplier, accounting for one third of EU-28 imports, while the Republic of Congo came to account for more than a quarter.

During the period between 2005 and 2014, Russia remained the main EU-28 partner for products included in sub-heading 440349. In 2005, it accounted for 78.5% in terms of weight (and 57.3% in terms of value). Due to the implementation of a tax on roundwood exports in 2010, Russian exports decreased to 57.7% in terms of weight (and 48.5% in terms of value). In parallel with the decreased role of Russia, the role of Belarus as an EU-28 supplier increased from 6.55 to 22.9% in terms of weight between 2005 and 2010 (Table 28). Between 2010 and 2014, Russian exports of products included under sub-heading 440399 seemed to recover, with the proportion of these exports increasing from 57.8% to 67.4%.

Table 28. Main EU suppliers (and their role in the context of Extra-EU import in terms of weight) of logs of logs included sub-heading 440399. Source: elaboration from Comtrade Database

Top EU-28 supplier	2010	Top EU-28 supplier	2012	Top EU-28 supplier	2014
Russian Federation	57.8%	Russian Federation	54.7%	Russian Federation	67.4%
Belarus	22.6%	Belarus	27.6%	Belarus	17.1%
Ukraine	6.2%	USA	8.8%	USA	9.1%

It may be of some interest to analyse the roundwood import trends of the four main European importers (Italy, France, Germany and the United Kingdom). Just as with global imports of EU logs, all four countries (except the UK) reported an increased role of intra-EU-28 trade (in terms of value) between 2005 and 2014 (Figure 22 and 23). When considering the possible impact of the EUTR, it is necessary to highlight that the average growth of intra-European trade has reported the most significant increase during the period 2007-2009, some years before EUTR enforcement. In fact, between 2007 and 2009, it increased from 62.2% to 73.9% in terms of weight and 52.9% to 61.5% in terms of value (Figure 22).

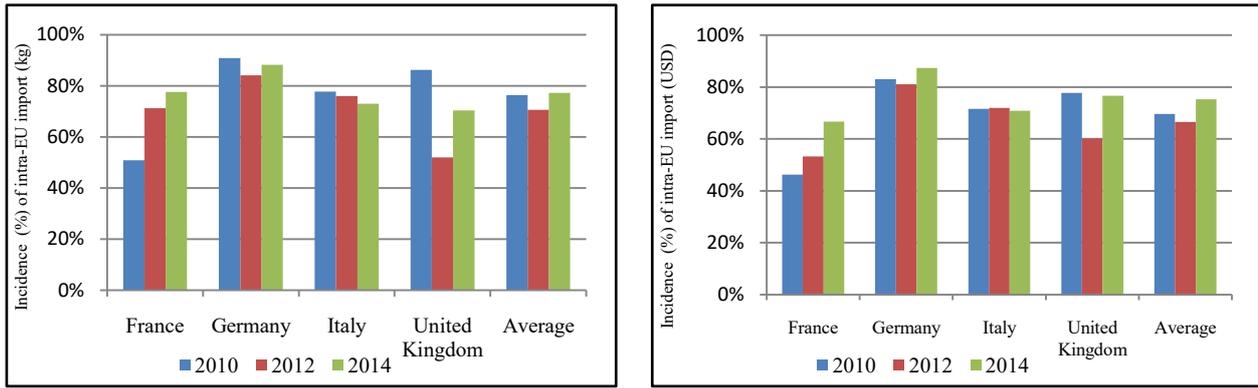


Figure 23. Trends for the incidence of intra-EU-28 imports of the four major EU importers, in terms of weight and value. Period: 2010-2014. Source: own elaboration from Comtrade Database

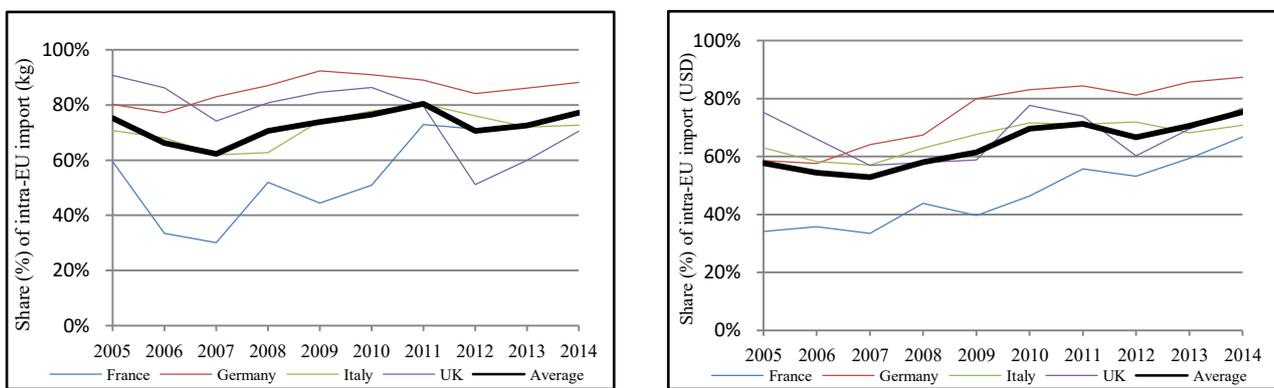


Figure 22. Trend of incidence of intra-EU-28 import of the four major EU importers. Period: 2005-2014. Source: own elaboration from Comtrade Database

For all of the three sub-headings considered, the average cumulative incidence trend (in four countries) of the top three suppliers is similar both in terms of value and weight. Indeed, between 2005 and 2009, the trend is more or less negative. This is a sign that, before and during the 2008 economic crisis, Italian, French, English and German importers enlarged and diversified their possible suppliers. On top of the economic crisis, barriers on the export of coniferous species used to make products under sub-heading 440349, which have been implemented in important producer countries such as Russia and Gabon, are certainly important factors that have limited imports from traditional exporters and have consequently forced European importers to find valid alternatives. For instance, Russian roundwood exports accounted for 20% of Germany's total imports (in terms of weight and value) in 2005. This value was around 2.5% in terms of value and 1.5% in terms of weight in 2010. Concerning products included in sub-heading 440349, Gabon was France and Italy's main supplier in 2005, accounting for around 60% and 50% of their total imports, respectively (Table 29).

After 2010, the average cumulative incidence trends of the top three suppliers started to become positive for all three of the sub-headings considered, both in terms of value and weight. For instance, between 2010 and 2014, Cameroon became by far Italy's main supplier of products included under sub-heading 443049 (its share grew from 32.9% to 53.9%), while the Congo and the Central African Republic supplied 58.2% of the products included under sub-heading 440349 in 2014, while this value was 50.9% in 2010 (Table 30).

Table 29. Main suppliers (and their role in weight) of the four major EU importers of logs included in the sub-heading 440320. Source: elaboration from Comtrade Database

440320	2010			2012			2014		
	<i>1st supplier</i>	<i>2nd supplier</i>	<i>3rd supplier</i>	<i>1st supplier</i>	<i>2nd supplier</i>	<i>3rd supplier</i>	<i>1st supplier</i>	<i>2nd supplier</i>	<i>3rd suppliers</i>
Italy	France (32.6%)	Austria (21.4%)	Switzerland (18.7%)	France (33.3%)	Austria (20.2%)	Switzerland (19.5%)	USA (24.7%)	France (20.6%)	Slovenia (16.5%)
France	Switzerland (38.4%)	Germany (28.8%)	Belgium (8%)	Switzerland (38.4%)	Belgium (20.5%)	Spain (18.5%)	Spain (37.1%)	Germany (20%)	Belgium (19.9%)
UK	Ireland (44.9%)	USA (15.7%)	Ukraine (8.4%)	Ireland (47.3%)	USA (17.6%)	Ukraine (8.7%)	Ireland (41.9%)	Ukraine (14.6%)	USA (12.3%)
Germany	Czech Rep. (18.9%)	Poland (17%)	France (17%)	Czech Rep. (22.4%)	Poland (20.6%)	Belgium (7.6%)	Cz Rep. (24.3%)	Poland (22.5%)	Norway (8.2%)

Table 30. Main suppliers (and their role in weight) of the four major EU importers of logs included in the sub-heading 440349. elaboration from Comtrade Database

440349	2010			2012			2014		
	<i>1st supplier</i>	<i>2nd supplier</i>	<i>3rd supplier</i>	<i>1st supplier</i>	<i>2nd supplier</i>	<i>3rd supplier</i>	<i>1st supplier</i>	<i>2nd supplier</i>	<i>3rd suppliers</i>
Italy	Cameroon (32.9%)	Gabon (15.3%)	Congo (15.2%)	Cameroon (43%)	Liberia (13%)	Congo (10.7%)	Cameroon (53.9%)	Congo (12.2%)	Myanmar (11.9%)
France	Congo (27.2%)	DRC (23.7%)	Cameroon (16.6%)	CAR (40.3%)	DRC (18.6%)	Congo (15.4%)	Congo (39.1%)	CAR (19.1%)	DRC (18%)
UK	Cameroon (22.2%)	Congo (11.2%)	Ivory Coast (10.6%)	Cameroon (32.2%)	Congo (20.8%)	Cote d'Iv (15.8%)	Congo (24.3%)	Cameroon (20.6%)	Ivory Coast (12.7%)
Germany	CAR (54.4%)	Cameroon (18.4%)	Gabon (6.1%)	CAR (68.6%)	Cameroon (9.4%)	Gabon (7.5%)	CAR (64.3%)	Cameroon (12.3%)	Gabon (8.6%)

Table 31. Main suppliers (and their role in weight) of the four major EU importers of logs included in the sub-heading 440349. elaboration from Comtrade Database

440399	2010			2012			2014		
	<i>1st supplier</i>	<i>2nd supplier</i>	<i>3rd suppliers</i>	<i>1st supplier</i>	<i>2nd supplier</i>	<i>3rd suppliers</i>	<i>1st supplier</i>	<i>2nd supplier</i>	<i>3rd suppliers</i>
Italy	Croatia (27.9%)	France (26.5%)	Bosnia (11.7%)	France (24.9%)	USA (24.7%)	Bosnia (11.9%)	USA (28.4%)	France (23.3%)	Slovenia (15.6%)
France	Spain (59.4%)	USA (30.4%)	Belgium (5.8%)	Spain (35.1%)	USA (30.4%)	Belgium (16.6%)	Spain (51.9%)	Belgium (3.14%)	USA (5.7%)
UK	France (51.3%)	Estonia (10.2%)	USA (5.6%)	USA (74%)	France (8.4%)	Canada (2.5%)	Russia (80.5%)	Latvia (15.8%)	Lithuania (1.1%)
Germany	Latvia (35.7%)	Poland (11.5%)	USA (10.5%)	USA (36.1%)	Latvia (22%)	France (8.7%)	USA (18.5%)	France (17.9%)	Latvia (15.6%)

6.4 The indirect impacts of EUTR enforcement

The present chapter aims to explore the potential effects on international trade of those factors, identified by this research in paragraph 4.1, that may have led to inconsistencies during the first two years of the EUTR being in force. In particular, the main concerns, emerged in analysis by scientific papers, and which can have indirect impacts on the European import trade, are:

- The scope of the EUTR, in terms of the timber products included under Regulation (EU) No. 995/2010, is too limited.

- There exists a lack of homogeneity in how the EUTR has been enforced across European Member States.

As a result, EU import trends should be monitored in order to identify any anomalous values, as these could be hiding the fraudulent use of TARIC codes not included within the scope of the EUTR, as well as the risk that European operators might be switching the countries in which they are entering timber imported from Member States onto the market from those with “strong” sanctions regimes to those with “weak” ones.

6.4.1 The narrowness of the EUTR's current scope

Since 2010, numerous studies carried out by NGOs (WWF, 2015) and research centres (Weimar, 2015) have analysed the role played by EUTR-exempt headings and sub-headings in the international timber trade. There are no precise reasons or criteria to explain the omission of specific codes from the scope of the EUTR. In general, most of the products not covered by the EUTR are finished articles rather than raw or semi-processed wood-based materials (WWF, 2015). At a general level, according to combined nomenclature (CN) codes, there are 934 CN headings and sub-headings that could contain wood. In particular, the classification of products that could contain wood, as proposed by the WWF (2015), is as follows:

- *made of wood*: products totally or predominantly made of wood, such as heading 44 (*wood and articles of wood*) and sub-heading 4902 (*newspapers and journals*);
- *contains wood*: products for which there is a high level of certainty that its components contain wood, such as sub-heading 9401 (*seats*) and sub-heading 3920 (*cellulose sheets*);
- *may be made of wood*: products that are potentially wholly or predominantly made of wood, such as sub-heading 9503 (*toys*) and sub-heading 9201 (*pianos*);
- *may contain wood*: products that are likely to contain wood components, depending on their design specification, such as sub-heading 8901 (*ships*) and sub-heading 6601 (*umbrellas*).

Around a third of the sub-headings covering products that may contain wood, as well as 10% of the sub-headings covering products that are made of wood, are not included within the scope of the EUTR (WWF, 2015). Products not included within its scope include matches (3605), printed materials (chapter 49), other articles of wood (4421), seats (9401), charcoal (4402) and musical instruments (9202 and 9207). In terms of value, about a quarter of all products that can contain wood imported into the EU-28 are not covered by the EUTR. Excepting products included under chapter 44 (which will be assessed later), the most significant heading containing products not included within the scope of the EUTR, in terms of value, is "printed products". The EU import value of these products was around 3 billion USD in 2014. The non-inclusion of important sub-headings under the EUTR, such as printed products, could lead to a circumvention process. Indeed, there is a risk that illegally logged wood could be traded to countries with less stringent rules on legality, where they would be transformed into finished products, as printed materials, before being traded back to the EU (Cepi and Intergraf, 2016). At present, of the 67 sub-headings included under chapter 44, 11 of them are not included within the scope of the EUTR (Table 32). As already described in the methodology in chapter 5, the following trade analysis will focus on recent trends in the trade of these 11 sub-headings in order to identify any anomalous variations in their import

into the EU-28. Indeed, any anomalous changes in EU-28 imports of products under these sub-headings could be hiding the fraudulent utilization of these codes or part of a growing "circumvention" process before they are imported into the EU, thereby favouring the introduction of illegal products into the European market (Drewe and Barker, 2016).

Table 32. Headings and sub-headings included in the chapter 44 not included in the Annex I of Reg. (EU) 995/2010

4402	Wood charcoal (including shell or nut charcoal), whether or not agglomerated.
<i>440210</i>	<i>Charcoal of bamboo</i>
<i>440290</i>	<i>Charcoal of wood other than bamboo</i>
4404	Hoopwood, pickets, stakes etc
<i>440410</i>	<i>Hoopwood; Split Poles; Pickets, Etc. - Coniferous</i>
<i>440490</i>	<i>Hoopwood; Split Poles; Pickets, Etc. - Not Coniferous</i>
4405	Wood wool and wood flour
<i>440500</i>	<i>Wool and wood flour</i>
4417	Tools, tool bodies, tool handles etc
<i>441700</i>	<i>Tools, tool bodies, tool handles etc</i>
4419	Tableware and kitchenware, of wood.
<i>441900</i>	<i>Tableware and kitchenware</i>
4420	Wooden articles of furniture not falling in Chapter 94.
<i>442010</i>	<i>Statuettes and other ornaments</i>
<i>442090</i>	<i>Wood marquetry and inlaid wood</i>
4421	Other articles of wood.
<i>442110</i>	<i>Clothes hangers</i>
<i>442190</i>	<i>Other articles of wood</i>

Of the sub-headings not covered by the EUTR, code 442190 (*Other articles of wood*) was the most imported into the EU-28 in 2014, both in terms of weight and value (68% of total weight and 64% of total value). Category 442190 (*Other articles of wood*) includes a wide range of products, such as beehives, animal housing, hen coops, kennels, bird houses, feeders, fencing panels and trellises. In general, sub-headings not included within the scope of the EUTR are typically high-value products, since they are more highly processed. For this reason, their share is more relevant in terms of value than in terms of weight. The trade analysis demonstrates how EU imports (from extra-EU countries) of headings included under chapter 44, but not covered by the EUTR, rose from 43.6 million tons (or a value of 13.6 billion USD) to 47.8 million tons (or a value of 18.06 billion USD) in the period between 2005 and 2014. However, in relative terms, the share of headings not covered by the EUTR decreased between 2005 and 2014. In 2005, the headings not included represented 3.2% of the weight (and 13% of the value) of total EU imports from extra-EU countries, whereas these figures were 1.9% of the weight (and 12.9% of the value) in 2014. In more detail, during the EUTR enforcement period, i.e., between 2012 and 2014, the proportion of headings not covered by the EUTR out of total European imports also decreased slightly, from 2.4% to 1.9% of the total weight and from 13.5% to 12.4% of the total value.

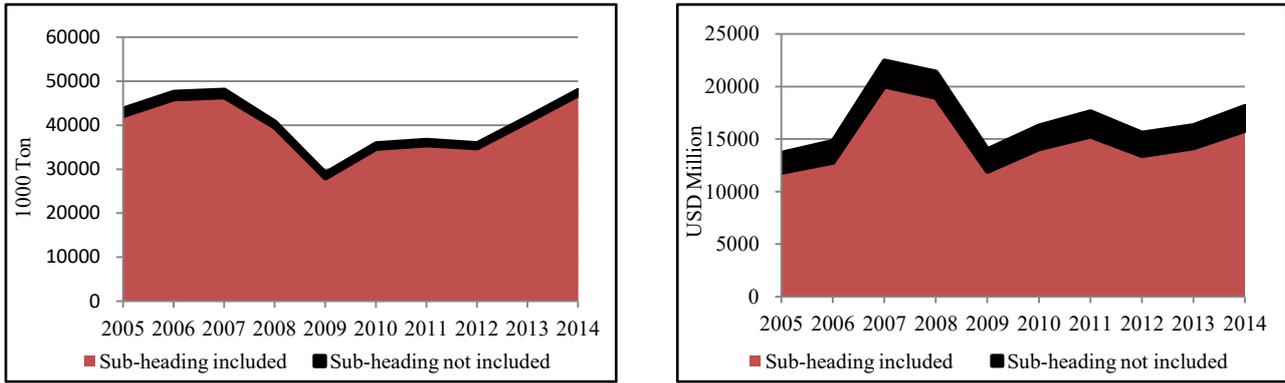


Figure 24. Trend of EU import of sub-headings included and not included in the annex I of EUTR (period: 2005-2014). Source:: own elaboration from Comtrade database

However, as warned by Cepi and Intergraf (2016), in order to gain a general overview and to understand if there is a risk of EUTR-exempt headings being fraudulently used in the future, it is necessary to monitor the trade patterns of countries that specialize in the processing of these products (primarily China). Our trade analysis has shown that the share of headings not covered by the EUTR in the international timber trade remained stable between 2012 and 2014, covering 1.6% of the weight and 6.5% of the value of the total international timber trade. Nevertheless, the incidence of Chinese imports of products not covered by the EUTR has increased from 6.8% to 9.6% of the total value. In particular, the share of sub-heading 442190 (*Other products*) almost doubled between 2012 and 2014 in terms of value. This issue should be seriously monitored in the near future since, as Drewe and Barker (2016) have warned, sub-heading 442190 could be used as a “dumping code” for numerous products that should be classified using other codes.

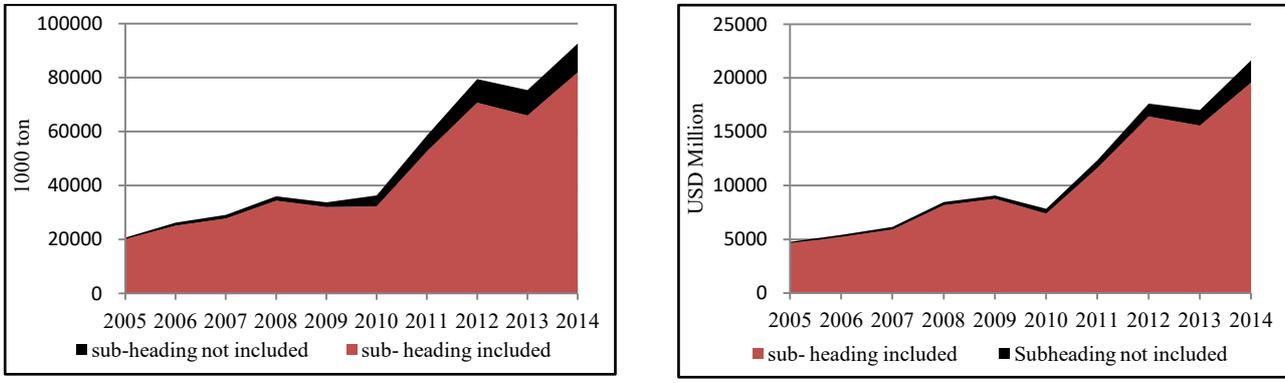


Figure 25. Trend of Chinese import of sub-headings included and not included in the annex I of EUTR (period: 2005-2014). Source: own elaboration from Comtrade database

6.4.2 Effects of the lack of uniformity in the EUTR enforcement across Member States

The second major concern to emerge during the analysis of scientific papers (paragraph 4.1.1) was the potential impact on trade of the lack of uniformity of EUTR enforcement across Member States. Therefore, this chapter aims to analyse the import trends of Member States with the weakest levels of enforcement within the first two years of the EUTR’s implementation. As demonstrated in chapter 4.1.2, Romania, Spain, Hungary and Greece all reported numerous problems and delays in implementing the EUTR in April 2015. A poorly implemented EUTR could incentivize certain European operators to move the country in which they enter imported timber onto the EU market

from Member States with “strong” sanctions regimes to those with “weak” ones (Oliver, 2015; Greenpeace International, 2014). Between 2012 and 2014, all four of these countries (Greece, Romania, Hungary and Spain) increased their imports of products made of wood (heading 44) in terms of value, although they did so at different rates. Precisely, Romania is the country that increased its imports the most between 2012 and 2014. More specifically, Romania increased its imports of timber products by 22.4%, Hungary by 17.4%, Spain by 12.9% and Greece by 6.9% between 2012 and 2014. However, if we analyse Romanian import trends in detail, it becomes evident that increased imports of heading 4403 (roundwood) by Romania is the element that principally contributed to this significant increase between 2012 and 2014. In particular, Romanian roundwood imports coming from non-EU-28 countries was characterized by an anomalous trend. In fact, in absolute terms, Romanian roundwood imports from non-EU countries increased by 58% in weight and 78% in value between 2012 and 2014. By contrast, in the same period, Greece and Spain’s imports of roundwood from non-EU countries decreased, while there was no significant variation in Hungary. Romania’s share of total EU roundwood imports from non-EU countries increased from 4.4% to 5.3% in terms of weight and from 2.4% to 4.3% in terms of value (Figure 26) between 2012 and 2014. (Figure 26).

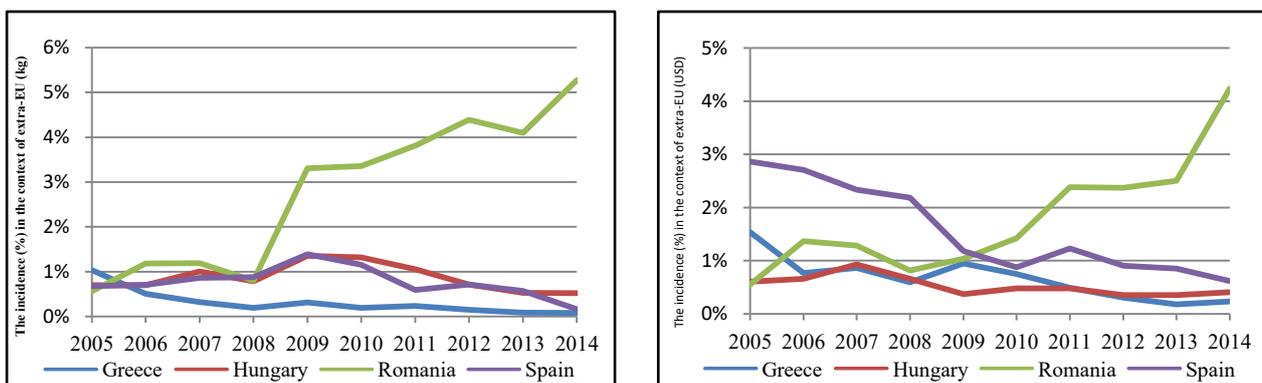


Figure 26. The role, in the context of EU roundwood import from extra-EU countries, of the four Member States with the weakest EUTR enforcement. Source: own elaboration from Comtrade database

In 2014, coniferous species (sub-heading 440320) had the predominant share of total Romanian roundwood imports, accounting for more than 90% of roundwood imports both in terms of weight and value. In detail, between 2012 and 2014, Romanian imports of coniferous species of roundwood increased by 50.3% in terms of weight and 67% in terms of value. In the same period, EU imports of coniferous logs increased at a lower rate: by 28.2% in terms of weight and 31.4% in terms of value.

One reason for this anomalous variation in Romanian coniferous log imports is probably the trading behaviour of a major Austrian timber company (Schweighofer), which owns an important production site in Romania near the Ukrainian border. Schweighofer purchases timber from a huge number of suppliers (over 1,000) in Romania and Ukraine, and usually sells its products to many European and non-European suppliers in Germany, Italy, Spain and Japan. Its total annual sales come to about 450 million EURO. In 2015, Ukrainian forests supplied over a million cubic metres of pine and spruce logs to Schweighofer’s Romanian factories, accounting for more than 80% of all Ukrainian roundwood exported to Romania. A two-year investigation (between 2012 and 2014) carried out by the Environmental Investigation Agency (EIA) demonstrated how Schweighofer has

been the region's biggest driver of illegal logging over the last decade. In fact, the EIA showed in its investigation how the Austrian company Schweighofer accepted illegal wood on many occasions and even offered bonuses to suppliers of illicit timber (EIA, 2015c).

According to the EUTR requirements, when importing timber from Ukraine (around 800,000 m³ every year), Schweighofer should be considered an operator ("first placer"), with full responsibility for ensuring that the raw material is legally source. Given that timber from illegal sources has been found by Romanian officials many times since the EIA's investigation, the EUTR has given the Romanian Competent Authority the authority to seize timber and any products made from it. Likewise, other EU member states have the authority to request information about Schweighofer's purchases and sales. On a practical level, the weak enforcement of the EUTR in Romania and the lack of communication between European CAs are factors that have allowed Schweighofer to sell this timber after only paying a fee (EIA, 2015c).

6.5 The impacts of Reg. (EC) 2173/2005 on EU-28 import

The first FLEGT licenses from Indonesia were issued on 15 November 2016, after more than 10 years of negotiation. Another five countries have ratified VPA agreements with Europe and currently, numerous activities are being carried out to improve forest governance in these producing countries so that they can be issued their first FLEGT licenses in the next few years. As reported by FERN (2013), and other authors such as Jonsson *et al.* (2015), these activities have favoured a general improvement of forest governance in VPA countries. In Indonesia, for example, a study carried out by Hoare and Wellesley (2014) has demonstrated that the local population is now more aware of the problem of illegal logging, mostly thanks to increased media coverage of the problem.

This chapter aims to understand the possible effects that the implementation of Regulation (EC) No. 2173/2005 has had on EU imports. Of the total exports from the six countries that have agreed VPAs with EU-28 countries regarding products included under chapter 44, Indonesia supplied 64.7% of these products in terms of weight and 76.7% of them in terms value in 2014. In 2014, the Central African Republic was the main supplier of roundwood (heading 4403) to the EU-28 in terms of weight (40.3%) and the Republic of the Congo was the main supplier to the EU-28 in terms of value (44.6%). Of the EU-28's total imports from the six countries that have agreed VPAs, Indonesia was by far the EU-28's main supplier of plywood (heading 4412), wood flooring (4409) and builders' joinery and wood carpentry (heading 4418) in 2014. For all three sub-headings, Indonesia accounted for more than 95% of exports both in terms of weight and value in 2014.

Overall, between 2005 and 2014, total exports of timber products from countries that have agreed a VPA with the EU-28 have more than doubled in weight and have increased by 71.2% in value. (Figure 27). In particular, with the exception of the Central African Republic, exports from the other five countries have at least doubled in weight. In terms of value, only Indonesia reported a very significant increase (+106.2%) in the same period, while the other countries did not report any growth greater than 30%. However, between 2005 and 2014, the trade partners and the role of VPA countries have changed profoundly. In 2014, China, India and Vietnam imported 46.1% in of the weight (and 32.2% of the value) of timber products coming from VPA countries. In 2005, the share of China, India and Vietnam was less than 20% of the weight and 15% of the value of total exports. For instance, Cameroon and Ghana have reported a tenfold increase in the weight of their roundwood exports to China, India and Vietnam. In contrast, imports of timber products exported by VPA countries to countries in the EU-28 decreased from 33.3% in weight (44.0% in value) to 11.1% in weight (17.6% in value).

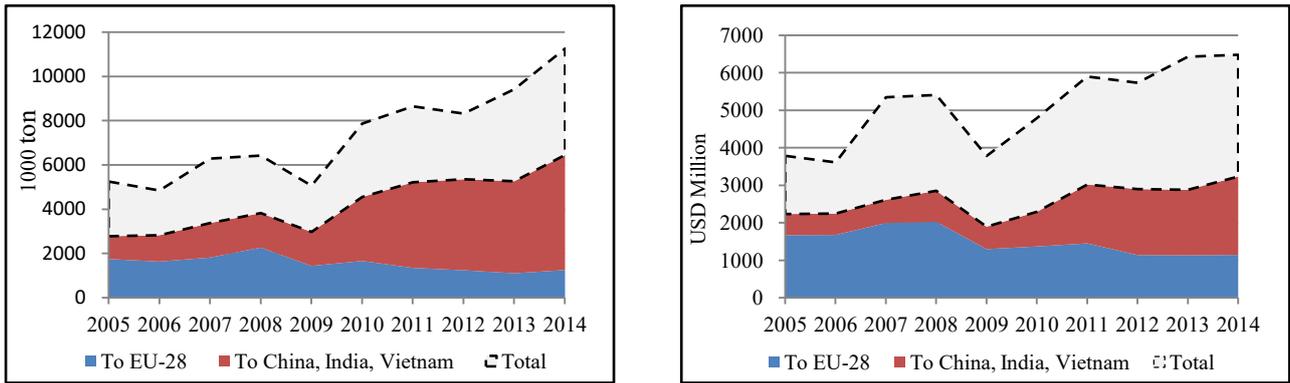


Figure 27. Export trends of timber products (chapter 44), in weight and value, from VPA countries (period: 2005-2014). Source: own elaboration from Comtrade database

Exports of timber from Indonesia, as the first country permitted to issue FLEGT licenses, grew significantly between 2005 and 2014. In fact, in terms of both weight and value, Indonesia’s exports doubled. However, in the same period, Indonesia’s exports of timber products to the EU-28 decreased by 40% in weight and 10% in value, while its exports to China, India and Vietnam tripled in weight and quadrupled in value. During the economic crisis (between 2007 and 2009) the trade flow of timber products from Indonesia to the EU-28 significantly decreased (-35% in terms of both value and weight); contrastingly, in the same period, Indonesia’s exports to China, India and Vietnam remained more or less stable. Between 2010 and 2014, exports from Indonesia to China, India and Vietnam of some headings, such as 4418 and 4421, grew dramatically both in terms of weight and value. This trend, particularly for heading 4421 (*Other articles of wood*) should be monitored, as already mentioned in chapter 6.4.1, since it constitutes a sort of “dumping code” for numerous products (Figure 28).

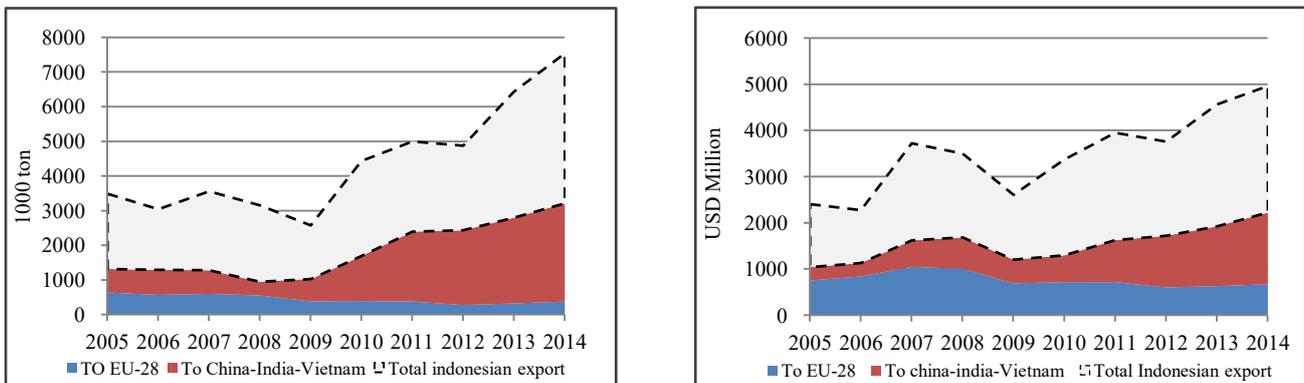


Figure 28. Trend of Indonesian exports of timber products (in weight and value) to selected countries (period: 2004-2014). Source: own elaboration from Comtrade database

As underlined by Fishman and Ozbinsky (2015), if Indonesia’s legality verification system is to continue to be effective, the Indonesian government will need to provide additional economic resources in order to increase the number of qualified auditors and to finance Indonesian small operators to facilitate their access to the market. At same, time, due to the fact that a significant percentage of Indonesia’s timber reaches Europe through third countries such as China and India, the EUTR will play a fundamental role in screening out illegal products exported from these countries, but with Indonesian origins.

6.6 The EU-28 import of woody biomass for energy

As already explained in paragraph 3.2, the total level of woody biomass for energy purposes and its relevance has substantially increased in the past decade. In 2014, the primary energy used worldwide from forest biomass was estimated at about 56 EJ, which means that woody biomass was the source of over 10% of the total primary energy produced annually. Since 1990, the EU-28 has been the global region to have experienced the highest increase in the share of its primary energy supplied from solid biomass. This increase of the proportion of renewable energy in the European Union is mainly due to the implementation of numerous national policies, developed in the context of Renewable Energy Directive, aiming to support the spread of renewable energy (IEA, 2016). As a result, woody biomass has become by far the largest source of renewable energy in the EU, accounting for almost 50% of the EU-28's renewable energy consumption (Pelkonen *et al.*, 2014). Projections included in the "*European Forest Sector Outlook Study II*" (UN, 2011) have assumed that, if woody biomass for energy has to play the role laid out for it in each nation's energy plans in order to reach their renewable energy targets, the supply of woody biomass to the EU-28 will have to increase by around 50%. Given this expected increase in demand and this potential gap, an important issue to consider is whether this increase in demand for woody biomass for energy purposes could be met without strongly affecting roundwood prices (Bodstedt *et al.*, 2015)

According to the "*Solid Biomass Barometer 2014*" (Euroobserver, 2015), the EU-28's consumption of solid biomass for energy increased by 39.3% (from 64.1 to 89.1 Mtoe) between 2010 and 2014, while forest removals for energy purposes in the EU-28 have increased at a lower rate, according to Eurostat³². More precisely, the removal of European forests increased by 8.4% in the same period, from 88 million m³ to 96.6 million m³. In any case, the share of wood removals for energy out of the total wood removals has seen a significant increase at the EU level, particularly in the four main EU economies (France, Germany, Italy and the United Kingdom). Among the four largest EU economies, France is by far the country which has carried out the largest quantity of removals for energy in absolute terms, while Italy³³ has the largest ratio between removals for energy and total removals (Figure 29).

³² Source: Eurostat 2017. Forestry Statistics. Eurostat Statistics Explained. Data available at following link: http://ec.europa.eu/eurostat/statistics-explained/index.php/Forestry_statistics. Last access: 11 September 2017

³³ Italy has not presented any data on forest removals since 2012. As has already been done by Eurostat statistics for 2013 and 2014, the research has maintained the same data on forest removals for 2012, 2013 and 2014.

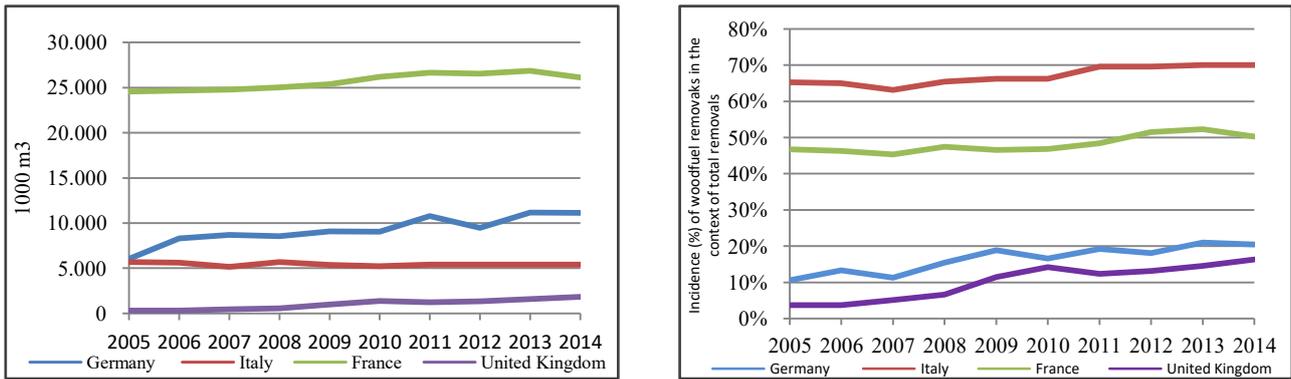


Figure 29. Total fuelwood removals and their incidence respect the total removals. Source: Eurostat database (last access, 10th June 2017)

Despite the high level of informality characterizing the woody biomass for energy market also in developed countries (Mantau *et al.* 2010), and the fact that woody biomass has historically been used in the same geographical region in which it is produced, the woody biomass trade has recently become more and more relevant in order to meeting the growing demand for renewable sources for energy in developed countries (Heinimo and Juninger, 2009). In fact, at the international level in 2014, the role of woody biomass for energy (heading 4401³⁴) accounted for 19.1% of the weight and 5.5% of the value of the international trade of timber products included under heading 44. The same figure was 16.8% in terms of weight (3.5% in terms of value) in 2005 and 14.8% (3.3% in terms of value) in 2000. Concerning EU imports of products under heading 4401 (both intra- and extra-regional), these doubled in terms of weight and tripled in terms of value between 2000 and 2014. In weight, the share of these products out of total European imports grew from 9.4% in 2000 to 22.6% in 2014. In terms of value, the role of products under heading 4401 increased from 1.4% in 2000 to 7.1% in 2014. EU imports from non-EU countries grew very significantly between 2000 and 2014: sevenfold in weight and tenfold in value. As a result, the trend of the share of extra-EU woody biomass for energy imports (heading 4401) appears very different compared to extra-EU imports of other important primary wood products, such as roundwood (heading 4403) and sawnwood (heading 4407) (Figure 30).

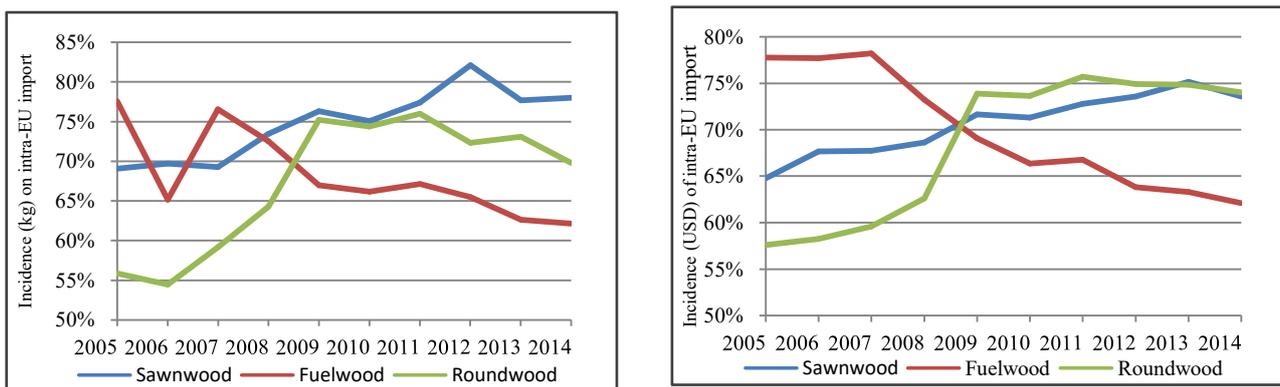


Figure 30 The incidence of EU-28 intra import for roundwood, sawnwood and fuelwood (period 2005-2014) in weight and value. Source: own elaboration from Comtrade database

³⁴ Heading 4401 includes logs for energy, woodchips and pellets.

As observed in the chapter 6.3 the EU import of roundwood from non-EU countries appears characterized by a process of slight concentration. In contrast, the EU import of fuelwood (sub-heading 440110)³⁵ and woodchips (sub-heading 440121-22) appears subjected to an opposed trend. In fact, between 2005-2014, the number of non EU suppliers of chipwood and fuelwood that covered at least 0,1% (in terms of weight) has increased for woodchips and it doesn't change for firewood. (Figure 31)

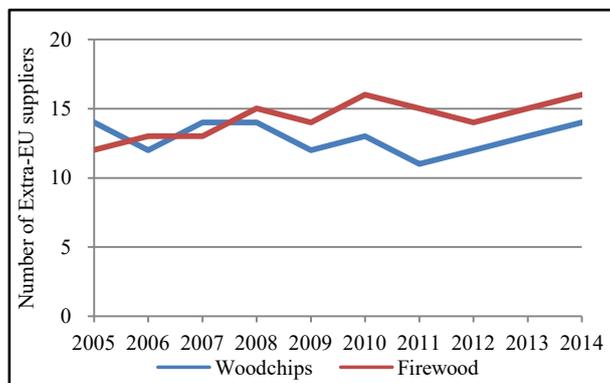


Figure 31. Number of extra EU-partners (at least 0,1% of total Extra EU import) for woodchips and firewood. Source: own elaboration from Comtrade database

Moreover, at the same time, the role of the top five and top three non-EU suppliers of woodchips and fuelwood to the EU-28 has gradually decreased (Figure 32), in contrast with roundwood suppliers.

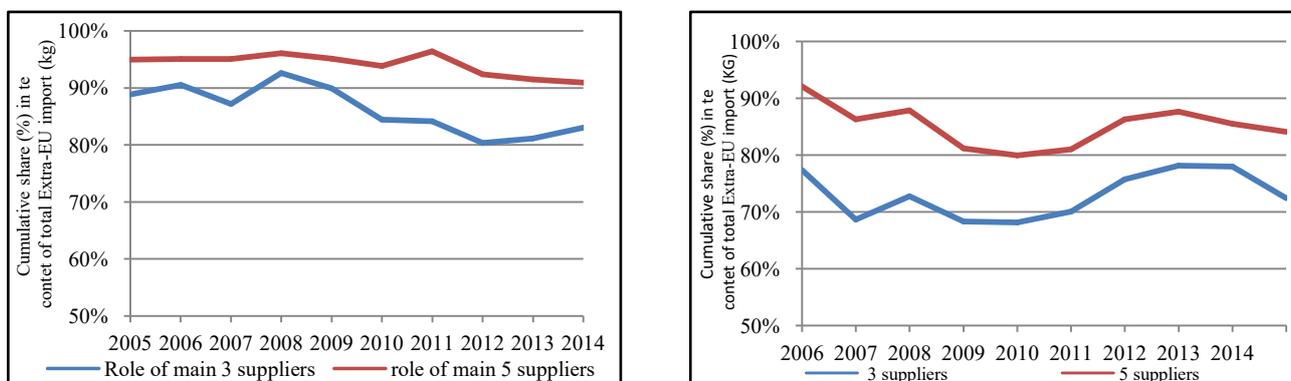


Figure 32. The incidence of the main extra-EU suppliers of firewood (left) and woodchips (right) to the EU-28 (in weight). Source: own elaboration from Comtrade database

In the context of sub-heading 440110 (fuelwood), Ukraine, Bosnia and Russia (in that order) remained the top suppliers to the EU-28 between 2005 and 2014, while countries such as Switzerland (fourth biggest supplier in 2005), the USA and Canada saw their role as European suppliers decrease significantly in the same period. In absolute terms, Switzerland, the USA and Canada decreased their fuelwood exports to the EU-28 by a third, while exports from Albania, Russia and Belarus more than doubled.

³⁵ Fuelwood in logs

Over the period from 2005 to 2014, Russia remained the EU-28's top woodchip supplier. In 2014, Belarus replaced Uruguay as the EU-28's second biggest supplier of woodchips. Between 2005 and 2014, Belarus increased its exports of woodchips to the EU-28 by almost a million tons.

7. DISCUSSION

From the data analysis of the previous chapter, the economic driving forces, more than other factors as the regulative policies, emerge as the elements that, in the period 2005-2014, had the most significant impacts on the international logs trade and on the EU-28 logs import.

In detail, focusing on economic driving forces and their impact on the international log trade, chapter 6.1 has demonstrated how the 2008 economic crisis hit log imports to Western countries hardest, significantly reducing the share of tropical species in the international timber trade. This is consistent with the findings of other studies (Masiero *et al.*, 2015 and ITTO, 2013). The main reasons behind these trends are the collapse of log demand in the EU-28 and the USA during the crisis, as well as the fact that tropical countries were more exposed to the effects of the crisis, dominated as they were by small and medium-sized enterprises that had limited ability to respond quickly to the market's recovery (ITTO, 2013).

The crisis accelerated the growth process of emerging countries on the international log market, which started in the 1990s (Sun and Heshmati, 2010). Between 2007 and 2009, Chinese log imports increased by 15.9% in terms of weight (and almost 40% in terms of value), whereas the weight of timber products imported into the EU decreased by 23.8% (-28.3% in value). After the economic crisis, the role of China continued to grow, albeit at a slower rate. In 2014, China accounted for around 40% of total logs imported at the international level (in terms of weight) and 50% (in terms of value). The role of China in the international roundwood market is much higher compared to the roles of the most significant importers in other markets, such as beef, cotton, wheat, rice and maize (OECD-FAO, 2016). China's predominance in the international roundwood trade will probably increase further due to the economic growth perspective of both China and India, especially in the building sector (OECD, 2017).

Economic crisis and the emergence of developing countries are doubtless factors that have tended to lessen measures intended to fight against the trade of illegal timber. In fact, although some of the trade patterns that emerged in the period between 2005 and 2014 can be attributed to the Regulation (EU) 995/2010 enforcement, paragraph 6.3 of present research has demonstrated how these trade patterns have been mainly motivated by factors unrelated to the EUTR's introduction. In fact, one of the most interesting trade pattern emerged in the research, the increased role of intra-regional trade within the EU-28, was more evident before the EUTR enforcement (March 2013) and this trade pattern was motivated primarily by the rising demand for logs in emerging economies, as China and India (Oliver, 2015). These recent trade patterns can represent a risk not only for reducing the effectiveness of EUTR (and in part also of the Reg. No 2173/2005) but also for undermining the main scope of both European Regulations. In fact, as demonstrated in chapter 6.2.1 of present research, the growth of role covered by China in the African and South-East Asian countries was dramatic but, currently, at the same time, China represents by far the EU-28's top trade partner for finished timber products (Indufor, 2016). The risk that the effectiveness of legality measurements can be strongly compromised, at least in part, by the emergence of other international actors was already underlined by Giurca *et al.* (2013) and Masiero *et al.* (2015). The first author, in fact, reported the concrete risk that some suppliers might prefer to export raw materials to markets

characterized by less stringent regulatory frameworks, rather than other market destinations with higher legality requirements. Whereas, Masiero *et al.* (2015) indicates that there is a risk of development of a dual market, a channel of legal tropical timber exports oriented towards Northern countries versus a channel of non-legally qualified timber export towards emerging economies.

In addition to being the main logs importer and the main exporter of finished timber products, China is also by far the leader among top illegal wood importers, importing more than 50% of the total illegal trade value from the main four producer regions, as demonstrate by Table 33 and Figure 35. The methodology utilized to estimate data included in Table 33 and Figure 35 is reported in Box 1.

Table 33. Trade data (in USD Million) of roundwood and sawnwood with an illegal origin

		Source regions (exporters)					Total import value
		Russian Federation	South America	Congo Basin	Southeast Asia	Oceania	
Importers	<i>Illegal logging rates (%)</i>	20	<i>Brazil: 49; Colombia 72.5; Peru: 75</i>	<i>Cameroon: 33; DRC: 87; Republic of the Congo: 72.5</i>	<i>Laos 87; Indonesia: 30; Malaysia: 18.5; Myanmar: 72</i>	<i>Papua New Guinea: 70</i>	
	China	619.9	76.0	302.0	1498.9	564.7	3061.5
	India		10.2	1.4	509.3	75.5	596.4
	EU	239.4	51.0	113.7	45.6		449.7
	USA		70.4	12.6			83.0
	Vietnam		0.8	18.3			19.1
	Other	406.1	156.5	73.5	944.4	45.0	1625.5
	<i>Thailand</i>				97.8		97.8
	<i>South Korea</i>	9.4				13.0	22.4
	<i>Japan</i>			0.7	14.4		15.1
	<i>Malaysia</i>				12.1		12.1
<i>Australia</i>					1.1	1.1	

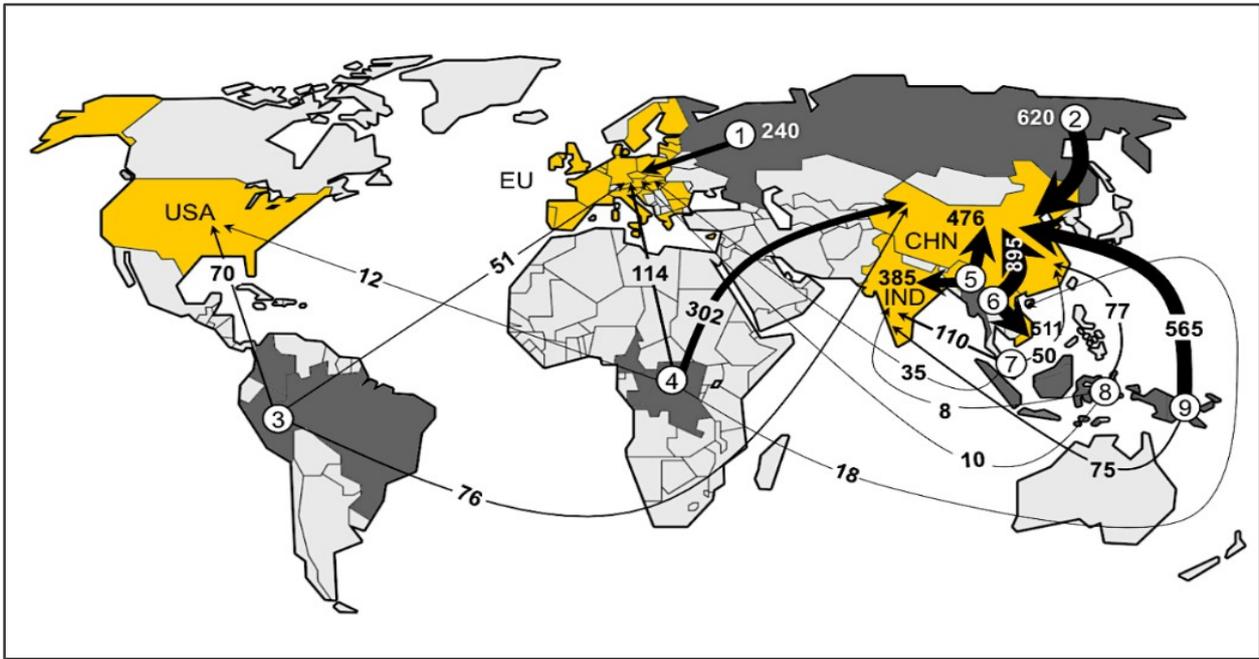


Figure 33. Main illegal trade flows of roundwood and sawnwood at global level 2014³⁶

If China represents the main importer of illegal timber, main exporters of illegal timber, in terms of region, are: Southeast Asia, that accounts for more than 50% of illegal roundwood and sawnwood exports globally (with Myanmar and Laos playing a major role), followed by the Russian Federation (22%) and Oceania (i.e. PNG) (12 %). Overall, considering the illegal rate for each country and their sawnwood and roundwood export, the total value of illegally traded roundwood and sawnwood is estimated to be around USD 5.8 billion, that represents 40% of total roundwood and sawnwood exports from the producer countries. The vast majority of illegal primary wood products from tropical forests are produced in Brazil, Indonesia, and Malaysia. Although illegal logging practices are quite differentiated, “conversion timber”, such as forest conversion for forest plantations or crop and livestock production, is becoming the predominant source of illegal timber in the tropics (Barney and Canby, 2011). Whereas, Russia has emerged as the largest single source of illegal timber from temperate and boreal forests and China covers almost all Russian timber exports by far the major importer of Russian hardwood timber: 96% of hardwood roundwood is exported to China to be processed into furniture and flooring.

³⁶ 1. Russian Federation; 2. Russian Federation Far East; 3. South America (Brazil, Colombia, and Peru); 4. Congo Basin (Cameroon, Democratic Republic of Congo, and Republic of the Congo); 5. Myanmar; 6. Laos; 7. Malaysia; 8. Indonesia; 9. Papua New Guinea.. Numbers in narrow represents the estimated value of illegal logging exported from selected regions

Box 1. The methodology to estimate trade flows of illegal timber

In order to define data included in Table 33 and delineate trade flows included in Figure 33 trade data and illegal logging rates in the main producer countries were connected. In detail, it has been considered illegal trade flows (in terms of value of timber products exported) for roundwood and sawnwood, for 4 key producer countries/regions, i.e. the Russian Federation, South America (Brazil, Colombia, and Peru), the Congo Basin (Cameroon, Democratic Republic of Congo, and the Republic of the Congo), Southeast Asia (Indonesia, Laos, Malaysia, and Myanmar), and Oceania (Papua New Guinea). Concerning illegal logging rates, the following different bibliography sources, were identified and used for the trade analysis:

- Myanmar = EIA, (2013). **Data corruption. Exposing the true scale of logging in Myanmar.** London: Environmental Investigation Agency.
- Papua New Guinea = Lawson S., (2014b). **Illegal logging in Papua New Guinea.** Energy. Environment and Resources EER PP 2014/04. Chatham House, London
- Indonesia = Forest Trend, (2015). **Indonesia's Legal Timber Supply Gap and Implications for Expansion of Milling Capacity: A Review of the Road Map for the Revitalization of the Forest Industry, Phase.** Forest Trend. London, UK
- Malaysia = Hoare A. (2015b). **Illegal Logging and Related Trade. The Response in Malaysia.** Research paper. Energy, Environment and Resources. Chatham House. London
- Cameroon = Hoare A. (2015c). **Illegal Logging and Related Trade The Response in Cameroon.** Reserach paper. Energy, Environment and Resources. Chatham House. London
- Democratic Republic of the Congo = Lawson S. (2014c). **Illegal logging in Democratic Republic of Congo.** Energy. Environment and Resources EER PP 2014/04. Chatham House, London
- Republic of the Congo = Lawson S., 2014d. **Illegal logging in Congo.** Energy. Environment and Resources EER PP 2014/04. Chatham House, London
- Colombia = Estimation reported in a news of WWF Colombia website (12th June 2015)
- Perú = Finer, M., Jenkins, C.N., Blue Sky, M.A. & Pine, J., 2014 **Logging Concessions Enable Illegal Logging Crisis in the Peruvian Amazon.** Sci. Rep. 4.
- Brazil = Chatham House, 2010. **Brazil - illegal logging indicators country report card.** Chatham House, London
- Russia = FAO, 2012. **The Russian Federation forest sector. Outlook study to 2030.** Food and Agriculture of the United Nations. Rome

Once collected the rate of illegal logging of main important producing countries, the trade data, in terms of weight and value, were collected from United Nations Commodity Trade Statistics Database (COMTRADE) and cleaned followed the methodology presented in chapter 5. For all the major timber producer and exporters, the three top trade partners (i.e. countries to which wood is exported) are identified and considered in our analysis. Consequently, in Table 33, it has been estimated the total amount, in terms of value, of roundwood and sawnwood with an illegal origin exported from single exporters region and the total amount, in terms of value, of roundwood and sawnwood imported by major importers.

Besides the significant increasing in international timber market of emerging economies, other factors, such as the imposition of tariff barriers in exporting countries have favoured the decline of European import from non-EU countries and the increase on intra-EU import. In fact, the imposition of taxes on Russian roundwood exports and the introduction of a log export ban in Gabon have caused the collapse of EU log imports from its two major traditional partners for coniferous species and tropical species, respectively. In 2005, Russia accounted for nearly 70% (in terms of both weight and value) of all coniferous logs imported into the EU from extra-EU. In the same year, Gabon accounted for half (in terms of both weight and value) of all logs imported into the EU from non-EU countries included under sub-heading 440349. Due to the taxes imposed to the logs export by Russian government, in 2014 Russian coniferous logs covered not more than 20% of EU import of coniferous species from non-EU countries, whereas, due to the ban, EU logs import from Gabon was obviously zero.

The imposition of tariff barriers in important producing countries has contributed also to make the international log export less and less concentrated, with minor traditional producing countries taking an increasing role on the international scene. In 2005, the top five log exporters accounted together for 60% of the weight (and 54.2% of the value) of log exports, while the same value was 44.2 % of the weight (and 39.9% of the value) in 2014. In detail, Russia, which had been the main global exporter of coniferous logs introduced an export tax on logs in 2007, leading to the collapse of Russian roundwood exports. In fact, Russia's share in the international trade of coniferous logs was 42.2% in terms of weight and 36% in terms of value in 2010. In 2014, this value decreased to 13.3% in terms of weight (and 17.3% in terms of value). Contrarily, New Zealand's role in the international coniferous log trade increased from 7.7% in terms of weight (and 4.9% in terms of value) to 18.3% in terms of weight (and 18.6% in terms of value) between 2005 and 2014. These recent trade patterns mean that the international log trade has become much less concentrated compared to international trade in other primary products, such as iron, steel and building stones³⁷.

Doubtless, until now, also the modality of EUTR enforcement in many EU Member States doesn't favour the effectiveness of such Regulation. In fact, despite the fact that most Member States, between 2013 and 2015, progressed in their fulfilment of the obligations imposed by Regulation (EU) No. 995/2010, sub-paragraph 4.1.2 and 4.1.3 of this study have demonstrated how the enforcement of the EUTR was quite slow and non-uniform across EU Member States in its first two years. These factors contributed to the rise of operative doubts among EU operators, as well as concerns on the part of civil society. Probably for this reason, the analysis of the most recent EU import data (2012-2014) showed a slight increase of EU logs imported from the major trade partners. In fact, in order to reduce any kind of risk of importing illegal timber, EU operators are probably preferring to opt for traditional and reliable suppliers.

Furthermore, also the other main regulation issued in the context of the EU FLEGT Action Plan, i.e., Regulation (EC) No. 2173/2005, was enforced slowly due to the long process necessary to ensure that producing countries had an effective system in place and were only exporting legal

³⁷ Data derived from our analysis of Comtrade data (last access: December 2015). As with the headings concerning timber, data regarding other primary products were cleaned according to the steps elaborated in chapter 5.

timber. Despite the fact that FLEGT licenses were only introduced into the market very recently and, for this reason, have not yet had any impact on trade, EU importers see FLEGT licenses as an effective tool to reduce concerns surrounding the legal origin of timber and to increase the transparency of the international timber market (paragraph 4.2). This tool dedicated to reducing the concerns and doubts of EU importers about EUTR requirements, had not until now been covered by private forest certifications like the FSC and PEFC certifications. In fact, although the spread of forest certifications has increased, they are not seen by EU importers as effective tools to drastically reduce the effort that EU importers must make in order to comply with EUTR requirements, particularly in terms of costs. In fact, the role of forest certifications remains unclear in the context of the Due Diligence System (DDS) requested by the EUTR. Therefore, as already highlighted by Giessen *et al.* (2016), there is a concrete risk that the spread of voluntary market-based schemes developed by civil society actors such as the FSC and PEFC certifications will be threatened by the spread of control schemes enforced by public institutions. For this reason there is the risk, in the medium-long run, that the wood-based enterprises around the world will make more use of less demanding standards and more bureaucratic procedures.

Within political driving forces, those dedicated to support the diffusion of renewable energies seems to be more effective compared to the policies aimed to fight illegal logging. In fact, unlike the current uncertainty surrounding the effectiveness of EU measures to fight against illegal timber, sub-paragraphs 3.2.1 and 3.2.2 have demonstrated how the national policies developed in the wake of the EU Renewable Energy Directive 2020 have really supported the rapid diffusion of woody biomass used for energy, contributing, between 2000 and 2014, to double EU imports (both intra- and extra trade) of heading 4401 (chapter 6.6). Renewable energy policies seem to be more effective than EU Regulations aimed to contrast illegal logging in influencing not only the trade patterns, but also the domestic wood harvesting activities. In fact, the growing of demand of biomass for energy has contributed, in many EU countries, to the diffusion of formal and informal activities for the harvesting of wood for energy (paragraph 3.2) as well as to increase by three times EU import of fuelwood from extra-EU countries. Most of this uncontrolled import of woody biomass for energy is destined to feed big plants dedicated to electricity production (Pearce, 2015).

8. CONCLUSIONS AND FUTURE RESEARCH NEEDS

In the period between 2005-2014, the traditional trade patterns that have characterized the international timber market in the second part of the 20th century have been subjected to drastic changes. Driving forces connected to the economic crisis and the recent recovery period had more relevant role in influencing traditional trade patterns than policies and related regulative tools. Firstly, the 2008 economic crisis has caused unprecedented collapse in the logs trade, with a reduction of one third of global roundwood traded. In addition to contributing in reducing the timber trade, the economic crisis worked as an accelerator of the growth of emerging economies. In particular, between 2005-2014, Chinese growth, in terms of value of logs imported, was dramatic, and, in 2014, China accounted for more than 50% of global tropical log imports. Chinese logs demand is expected to grow further in the coming years, mainly driven by the domestic market and demand from Western countries for wood products manufactured in China. The large predominance of China is more evident in some African and South-East Asian countries, for which China, in 2014, alone covered more than 90% of logs exported. This strong dependence upon a single destination makes the producing countries extremely vulnerable to commercial or political choices of China.

The booming of China, together with India, in the international timber market, has contributed to the development of a new and potentially predominant South-South trade flow for logs, especially for tropical ones. This trade flow includes, very frequently, timber originated in illegal and informal context, mainly in African countries. This growing proportion of logs imported by China and India from tropical countries, processed and then re-exported to the EU and the USA, risks also to undermining the effectiveness of EU Regulations, such as Reg. (EU) No 995/2010 and Reg. (EC) No 2173/2005, which aim to contrast EU import of illegal timber. In fact, Southern exporters might prefer to export timber to markets with less stringent regulatory frameworks (e.g., China and Vietnam), since legality requirements set by other market destinations (e.g., the EU) are often associated with extra production and export costs. The growing complexity of international supply chains based on the inter-action of many agents and companies, that include outsourcing and trade via third countries, also makes very problematic the identification of the real trade impacts of such regulations. In fact, the collapse of EU-28 import from African countries can be connected to a circumvention process rather than to a real choice of EU importers in favour. Trade diversion can result in an effective tool to shadow supply chains clearly linked to illegal activities in the country of origin.

In addition to the economic crisis and the growth of some emerging countries as key players in the international trade, it is necessary to take account of other factors to understand some recent trade patterns, such as the impacts of recently introduced legality requirements. Firstly, the Reg. (EU) No 995/2010 initial enforcement was quite slow (or extremely slow in some cases) and non-uniform across EU Member States. This contributed to the rise of doubts among EU operators, as well as concerns on the part of civil society, related to the real effectiveness of the entire FLEGT Action Plan. A weak enforcement of the EUTR in some EU countries and the lack of communication between EU Competent Authorities can, in fact, constitute a sort of limiting factor

in contrasting trade of illegal timber. Whereas, the doubts of importers related to EUTR requirements are contributing to importers' appreciation of the introduction of FLEGT licenses, despite the issue of first licenses occurred after eleven years of the approval of Reg. (EC) No. 2173/2005. In fact, currently, EU importers consider FLEGT license the best option to try to reduce costs and complexity at the source of the supply chain. The doubts of European importers on the operational rules to implement the Regulation can also be the reason of the slight recent increase of EU logs imported from the traditional, more reliable, major trade partners. Probably, after EUTR enforcement, EU operators have begun to prefer to opt for customary and responsible suppliers in order to reduce any kind of risk of importing illegal timber. Secondly, other factors, such as the introduction of tariff barriers in some exporting countries, have favoured the decrease of European imports from non-EU countries and, consequently, have hidden the potential impacts of legal measures implemented in the European context. In fact, two of the most important logs suppliers, Russia, for coniferous species, and Gabon species, for tropical species, has introduced tariff measures after the publication of FLEGT Action Plan. Actually, the tariff measures implemented in important producing countries have also overlapped and, sometimes, driven the overestimation of the impacts of economic crisis, in terms of European import from non-EU countries.

In the context of EU import of timber products, the recent trend of import of woody biomass for energy purposes seems to follow a very different scheme compared to the rest of timber products. Indeed, between 2005-2014, the import of fuelwood from non-EU countries, had more than doubled and, currently, woody biomass represents by far the largest source of renewable energy in the EU, accounting for almost 50% of the EU-28's renewable energy consumption. This increase in the level of consumption is more connected to an increase of import than to an increase of domestic supply and is mainly motivated by economic incentives made available by national authorities for the diffusion of renewable energies. On the one hand, this new trade pattern can be considered, in part, as another signal of the weakness of measures to contrast illegal timber since the increasing role, especially for woodfuel, of suppliers, such as Ukraine and Bosnia, with a relevant rate of illegal logging. On other hand, the environmental impacts linked to the long transport distances would contrast the potential positive environmental impacts of main EU environmental policies and strategies. As a matter of fact, in 2013, in the context of the EU Renewable Energy Directive (RED), the European Commission has only proposed recommendations for Member States regarding sustainability requirements on the use of solid biomass in the energy sector, similar those already applied for biofuel.

The rapid increase in the use of woody biomass for energy in European countries is associated to a larger trend of expansion of the bio-economy, with an increase use of low-quality wood biomass not only to produce power and bio-fuel, but also bio-plastic, textile products, new chemicals to be used in the food, livestock feed, health and pharmaceutical industries. These development should be supported by a well-coordinated, intersectorial policy strategy. Until now, in some important EU countries such as Italy, one of the main limiting factors for implementing an effective strategy is the lack of data and statistics on woody biomass supply. In addition to informal removals that historically represent sources not easily caught by official statistics, other important woody biomass sources, such as wood residues and recycled wood, are not still covered by reliable statistics. Since the role of the circular economy in the wood energy sector will significantly

increase in the next years, with an increased implementation of the “cascade approach” as suggested by the EU Forest Strategy, recycled wood and wood residues monitoring should become one of the main concern of national and international institutes for statistics. In regard to data and statistics currently available at the international level, it would be desirable that the main institutions responsible for collecting and disseminating trade and production data will develop a common methodology to improve data quality while removing the most evident outliers. In fact, as verified in this study in its methodological part, outliers can strongly affect the analysis, especially those based on sub-headings characterized by six-digit codes (product types). These sub-headings should constitute the basis for a complete and detailed analysis that addresses a commodity such as timber and includes a multitude of different products with own trade trends.

Regarding possible future research needs, while this thesis sheds some light on the recent trends in global trade with a specific focus on the EU context, more research is needed to analyze the driving forces (technological, political, and economic) in detail that have led to China achieving this predominant role in the international timber market. In fact, in this research, it has not been evaluated whether specific policies or commercial measures, implemented by the Chinese government, have supported Chinese companies in their expansion in foreign trade. Furthermore, while the present research has focused mainly on logs, more research is needed to analyze the trend of European import of semi- finished and finished products from emerging countries. In fact, in the near future, a very significant increase of European import of more added-value tropical timber products from emerging countries can be considered as a sign that circumvention process to try to avoid European legality measurements is becoming very frequent. Whereas, in order to understand the real effectiveness of the measures foreseen by the FLEGT Action Plan, it would be interesting to investigate the recent trade patterns of other goods, having features similar to wooden products, in order to understand whether the recent trends of timber products trade are similar to other products or whether the recent trade patterns of timber products are due, in part, to the changes in the regulative frameworks. At the same time, it would be interesting to compare impacts on international trade of legality measurements foreseen by FLEGT Action Plan with the impacts of other similar legislative initiatives, such as the European Biofuel Directive, which has begun to require, since 2013, sustainability criteria for all biofuels and bioliquid imported in EU-28.

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Ministero delle politiche agricole alimentari e forestali (2016). Decreto 15 novembre 2016 . "Entita' e modalita' di versamento dei contributi FLEGT, ai sensi dell'articolo 3, comma 6, del decreto legislativo 30 ottobre 2014, n. 178". Roma

Ministero delle politiche agricole alimentari e forestali (2014). Decreto n.178 del 30 Ottobre 2014. "Attuazione del regolamento (CE) n. 2173/2005 relativo all'istituzione di un sistema di licenze FLEGT per le importazioni di legnami nella Comunità europea e del regolamento (UE) n. 995/2010 che stabilisce gli obblighi degli operatori che commercializzano legno e prodotti da esso derivati"

Ministero delle politiche agricole alimentari e forestali (2016). Decreto del 15 novembre 2016 : "Entita' e modalita' di versamento dei contributi FLEGT, ai sensi dell'articolo 3, comma 6, del decreto legislativo 30 ottobre 2014, n. 178".

Presidenza della Repubblica (1972). Decreto presidenziale n.11 del 15 Gennaio 1972, n. 11."Trasferimento alle regioni a statuto ordinario delle funzioni amministrative statali in materia di agricoltura e foreste

European Level

European Commission (2010). Regulation (EU) No 995/2010 of the European Parliament and of the European Council of 20 October 2010 laying down the obligations of operators who place timber and timber products on the market. Strasbourg, France

European Commission (2012). Delegated Regulation of 23.2.2012 on the procedural rules for the recognition and withdrawal of recognition of monitoring organisations as provided for in Regulation (EU) No 995/2010 of the European Parliament and of the Council laying down the obligations of operators who place timber and timber products on the market. Strasbourg, France

European Commission (2012). Implementing Regulation (EU) No 607/2012 of 6 July 2012 on the detailed rules concerning the due diligence system and the frequency and nature of the checks on monitoring organisations as provided for in Regulation (EU) No 995/2010 of the European Parliament and of the Council laying down the obligations of operators who place timber and timber products on the market. Strasbourg, France

European Council. (2005). Regulation (EC) No 2173/2005 of 20 December 2005 on the establishment of a FLEGT licensing scheme for imports of timber into the European Community. Bruxelles, Belgium

European Commission (2012). Innovating for Sustainable Growth: A Bioeconomy for Europe. Communication from the commission to the european parliament, the council, the european economic and social committee and the committee of the regions com (2012) 60

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Communication from the commission to the European parliament, the council, the European economic and
social committee and the committee of the regions.

European Commission (2013). A new EU Forest Strategy: for forests and the forest-based sector.
Communication from the Commission to the European Parliament, the Council, the European Economic and
Social Committee and the Committee of the Regions. Brussels,.Belgium

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April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently
repealing Directives 2001/77/EC and 200330/EC.

Appendixes

Appendix 1 - Main findings of papers concerning EUTR

1	Market coverage of wood imports by the EU Timber Regulation	<ul style="list-style-type: none"> • In 2013, within category 44 (products made of wood), 90% of the EU-28 import (in terms of quantities) and 75% of EU-28 import (in terms of values) are included in the scope of EUTR. • In the category 44, the main products not covered by EUTR included in the are "wood charcoal" (4402) and "articles of wood" (4421). • The highest volume of imports of wood and wood-based products not covered by the EUTR can be attributed to Eastern and South-Eastern Asia.
2	Import of secondary timber products by the EU28. The Netherlands in focus	<ul style="list-style-type: none"> • EU Imports of secondary timber products from non-EU countries have substantially increased during the last decades due the shift of wood processing from EU-28 to countries characterized by low cost of labour (e.g. China, South East Asia and South America), • In 2013, within the total extra-EU secondary wood product import total, 47% was EUTR exempt. The main secondary timber products imported by the EU28 were books followed by other seats with wooden frames. Both these products are exempted from the EUTR • The bulk of 'out of scope' products entering the EU are imported from China
3	The WTO consistency of the European Union Timber Regulation (EUTR)	<ul style="list-style-type: none"> • Since the Regulation (EU) 995/2010 makes simply a distinction between legally and illegally timber, there isn't competitive relationship between these two groups of products. As such, the Regulation appears to be consistent with Articles I and III of the <i>General Agreement on Tariffs and Trade (GATT)</i>. However, the Regulation makes the trade of illegal timber a criminal offence and therefore creates a sort of restriction on the importation of timber. For this reason it would constitute a violation of Article XI GATT (<i>prohibitions or restrictions other than duties, taxes or other charges, whether made effective through quotas, import or export licences or other measures</i>). However, this violation can be justified by Article XX of GATT, that allow to impose restrictive measure for preserving exhaustible natural resources
4	European Union Timber Regulation: Is It Legal?	<ul style="list-style-type: none"> • The EUTR aims to contrast timber that is considered illegal under the legislation of the country of origin. Then, imported timber by European importers must respect legality standards imposed by other countries, rather than legality requirements developed by EU. The Appellate Body of WTO has never discuss a claim involving restriction related to a regulation based on foreign legality definitions. Probably the Reg. 995/2010 didn't infringe the Technical Barriers to Trade Agreement (TBT) because its exclusive concern is legality, and not any particular physical or related qualities. • Concerning the consistency of EUTR with GATT (<i>General Agreement on Tariffs and Trade</i>), trade restrictions are permissible if environmentally motivated. But article XX of GATT allow the exception for trade measures for resources found within the regulating country's jurisdiction. Therefore, there is plausible argument that the EUTR approach could constitute an impermissible restriction on trade, which, if borne out, could put the EU's illegal logging policy at risk.
5	The EU Timber Regulation and CITES.	<ul style="list-style-type: none"> • Since CITES trade controls have a many inconsistencies and weaknesses, the exemption from EUTR requirements for CITES products could provide a new incentive for extra-EU exporters and EU importers to cheat, through a fake increase in export quotas or an illegal acquisition of export permits. • In general terms, objectives of CITES and EUTR appear not totally compatible. In fact, CITES aims to address broader governance to ensure the conservation of endangered species rather than contrasting legal infractions. Therefore, in the CITES mechanism, it' necessary a more rigorous assessment of legal compliance to meet EUTR requirements
6	Impact of European Union Timber Regulation on Forest Certification Strategies in the Finnish Wood Industry Value Chain	<ul style="list-style-type: none"> • Most of large Finnish companies, both domestic producers and large importers, are certified and they are only partially affected by EUTR impacts. Whereas, Finnish small wood importer companies, without any existing traceability or certification systems, suffer much more from the EUTR introduction. • At general terms, forest and CoC certifications represent the preferred options for Finnish companies to meet EUTR requirements. Other legality

		verification systems remain a secondary option.
7	The interaction between FSC certification and the implementation of the EU timber regulation in Romania	<ul style="list-style-type: none"> • In Romania many local companies seem unprepared to establish and develop own DDS. A lack of active Monitoring Organization in Romania is another factor that not facilitate the Romanian companies in the EUTR compliance; • In Romania EUTR's implementation was slow and poorly enforced without any concrete activities to disseminate the basic EUTR requirements; • No public entities have disseminate information about EUTR requirements, only FSC Romania has carried on specific activities to prepare companies to better deal with EUTR requirements.
8	Legal Harvesting, Sustainable Sourcing and Cascaded Use of wood for Bioenergy: their Coverage through Existing Certification Frameworks for Sustainable Forest Management	<ul style="list-style-type: none"> • FSC and PEFC represent the most suitable certification systems to meet EUTR obligations since the criteria included in their specific risk assessments, fulfill EUTR requirements. • SFI (Sustainable Forestry Initiative) certification system shows a not negligible risk for products that not derive from not certified forest. This risk is mainly due to the low level of detail in the tracing process of timber products, that ends up at state level, instead of at the forest management unit level.
9	Constructing a transnational timber legality assurance regime: Architecture, accomplishments, challenges	<ul style="list-style-type: none"> • The EUTR and the Reg. 2173/2005 were designed to be complementary, inducing countries to negotiate and implement VPA agreements in order to obtain a less onerous 'green lane' to export timber into the European market. But the general delay in FLEGT licenses issue may induce producers of VPA countries and European buyers to pursue private solutions, such as voluntary forest certification. to meet the due diligence requirements of the EUTR, while draining off support for the implementation of the national timber legality assurance regime.
10	Verified Legal? Ramifications of the EU Timber Regulation and Indonesia's Voluntary Partnership Agreement for the Legality of Indonesian Timber.	<ul style="list-style-type: none"> • In order to make SVLK successful and fully operative, it is necessary that the Indonesian government provides additional economic resources in order to increase the number of qualified auditors and finance Indonesian small operators to facilitate their access to the market. • A significant percentage of Indonesia's timber reach Europe through third countries, especially through countries in the Asia-Pacific region. The VPA does not cover this segment of the market, consequently the EUTR will play a fundamental role to screen out illegal products exported from these countries which originate in Indonesia. Consequently, it means that under these circumstances, the SVLK might downgrade from sure proof of legality to being one of a number of factors for determining the level of risk. As a result, operators may have to demonstrate proof of legality beyond that afforded by SVLK verification.
11	Survey among private forest owners on the European Union Timber Regulation (EUTR) implementation – Synthesis report.	<ul style="list-style-type: none"> • Most of European private forest owners believe that there is a risk that the main result of EUTR would be only an increase in bureaucracy and administrative costs. • The awareness of forest owners and their competence to comply with EUTR requirements constitute a key concern for all National Authorities. • An important concern of European private forest owners is the great level of incoherency and inconsistency of EUTR enforcement in single EU Member states.
12	The opinions of some stakeholders on the European union timber regulation (EUTR): An analysis of secondary sources	<ul style="list-style-type: none"> • Among European stakeholders there are still concerns whether the EUTR is the proper instrument to address the problem of illegal logging. • The bureaucracy burden (that is unwanted effect of EUTR) can be alleviated by clear indications, that should be supplied uniformly by the European Commission, EU Member State governments or Monitoring Organisations. • The EUTR obligations, in many cases, are not fully understood by European importers. For this reason, they would opt for more reliable timber sources within Europe and North America. Therefore, the general uncertainty of numerous EUTR requirements may become detrimental for tropical timber exports. • The implementation of EUTR and related costs for its compliance could encourage extra-EU producers to export their products to other, more weakly regulated, markets (as China)
13	Forestry professionals' awareness of the EU Timber Regulation in the federation of Bosnia - Herzegovina	<ul style="list-style-type: none"> • The actors of in Bosnia- Herzegovina have very different level of awareness and competences on EUTR requirements. • The harmonization of Bosnian forest policy with EUTR requirements would be a effective tool to support the timber Bosnia exports of Bosnia,

		since the relevant role of Bosnia in European timber market,
14	Annotation of European Union Timber Regulation and Its Influences on Chinese Forestry Industries.	<ul style="list-style-type: none"> • The actors of Chinese timber sector believe that and strengthening management power of European Union countries' timber associations. • The EUTR will increase the cost of wood products exported to EU, and decrease China's timber importing sources and undermine the capacity of negotiation with EU importers, • The EUTR will promote innovation in the Chinese forestry sector and open up new markets, cultivating core competitiveness of enterprises.
15	The impact of timber legality regulations on business practices in Vietnam	<ul style="list-style-type: none"> • The introduction of specific regulations to contrast the illegal timber in Europe and USA, such as EUTR and Lacey Act, may have push some wood Vietnamese manufacturers to shift their exports towards less-regulated markets. • In order to eliminate illegal products from their supply chain, numerous large Vietnamese companies, that usually sell their products to Europe and USA, have started to purchase raw materials from non-suspect sources or adopting forest CoC certification. • Small firms, that represent the core of Vietnamese timber sector, are generally unaware and unprepared about legal regulations, continues to source wood products from suspicious sources, and exporting to less environmentally sensitive markets, such as China,
16	Effects of the EU Timber Regulation and the demand for certified legal timber on business and industry in India	<ul style="list-style-type: none"> • Europe represents the main destination for India's semi-processed and value-added timber products, such as wooden handicrafts, pulp and paper, plywood and veneer, and wooden furniture. Therefore, India's timber industry was strongly affected by the EUTR introduction • The EUTR will induce companies, both Indian and foreign companies operating in India, to monitor their procurement policies and focus more on traceability systems, legality and certification. • At relative terms, the cost to meet EUTR requirements will be lower for big and foreign companies than for small and medium local Indian companies • The introduction of the EUTR will shift the procurement of Indian companies towards timber products with credible forest certification (in particular FSC products)
17	Placing Timber and Timber Products on the Market in the Czech Republic and Related Economic Impact	<ul style="list-style-type: none"> • The level of awareness among Czech forest owners are generally low. In fact, many small owners are not aware about the existence of the EUTR, some other are aware of this but don't know anything about EUTR requirements and finally some Czech owners (specially big ones) know the EUTR and its requirements, but they don't know if they will able to fulfil the EUTR requirements. • Costs due to the implementation of a Due Diligence System (DDS) have been calculated for two forest owners in Czech Republic: <ul style="list-style-type: none"> ◦ A small owner (10 ha) would pay about 15,000 Czech Republic Crown (CZK) (550 Euro) for implementing a DDS and additional 1,000 CZK for maintenance; ◦ A large owner (1,000 ha) with a chain of custody system in place would pay about 45,000 CZK (1,650 Euro) for implementing a DDS and additional 22,500 CZK for maintenance..
18	Exploratory Assessment of a Company's Due Diligence System against the EU Timber Regulation: A Case Study from Northwestern Russia..	<ul style="list-style-type: none"> • Most forestry companies in Russia do not have efficient systems to identify the origin of wood and most of them suffer from a lack of human and technical resources to collect data and information to track the origin of the raw material. • In Russia, sustainable forest management certification (such as FSC), could represent a tool to achieve in an easy way the compliance with the EUTR more efficiently than non-certified companies. • In the perspective of Russian exporters, the enforcement of EUTR measures (as the fine system or the role of third-party evidence) in each EU Member State is too heterogeneous, and sometimes unclear
19	Legality constraints: the emergence of a dual market for tropical timber products?	<ul style="list-style-type: none"> • The decline in imports by Australia, the EU and the USA had started before the global financial crisis in 2008 and increased after that. The impacts of crisis on consumption partly hide other factors that may be at play. The effects of legality measures on market trends are still unclear; nonetheless they might have encouraged uncertainty for traditional importers, favoring emerging ones.

		<ul style="list-style-type: none"> • Although not generalizable, some evidences of trade-effects of timber-legality regulations are reported in literature and include: market uncertainty and diminished imports, shifting to markets with less stringent legal requirements, increased imports short before regulations were implemented, decrease in volumes and increase in prices of imported tropical timber products, decrease in the number of imported species. • Timber markets in the EU are likely to be subject to leakage from the introduction of legality standards, resulting in increased timber production in Northern countries (EU, Eastern Europe and North America).
20	<p>Ambiguity in Timber Trade Regarding Efforts to Combat Illegal Logging: Potential Impacts on Trade between South-East Asia and Europe</p>	<ul style="list-style-type: none"> • The international wood market seems to have been affected by a sort of ambiguity, that starts from the uncertainty concerning FLEGT's interpretation. In fact, European importers, doubting about the legality of the wood they were about to purchase, and hence of its real value, tend to prefer to trade with countries with reliable regulations. • This ambiguity has the following consequences: <ul style="list-style-type: none"> ○ <i>Substitution</i>: importers are opting for temperate hardwoods to the detriment of tropical hardwoods in order to avoid risks. Furthermore, there is the evidence that oak lumber is a possible substitute for tropical hardwood lumber. ○ <i>Trade diversion</i>: since EU's legality requirements are often associated with extra costs necessary to provide certification and/or required documentation, extra-European exporters are choosing to export timber to other markets characterized by less stringent regulatory frameworks (e.g. China)..

Appendix 2 - List of headings and sub-headings considered in the research

CODE	SHORT DESCRIPTION
4401	Fuel wood, in logs, in billets, in twigs, in faggots or in similar forms; wood in chips or particles; sawdust and wood waste and scrap, whether or not agglomerated in logs, briquettes, pellets
440110	Fuel wood, in logs, in billets, in twigs, in faggots or in similar forms
440121	Wood in chips or particles - Coniferous
440122	Wood in chips or particles - Non-coniferous
440131	Wood pellets
440139	Other type of fuel wood
4402	Wood charcoal (including shell or nut charcoal), whether or not agglomerated.
440210	Wood charcoal of bamboo
440290	Wood charcoal from other species
4403	Wood in the rough, whether or not stripped of bark or sapwood, or roughly squared.
440310	Treated with paint, stains, creosote or other preservatives
440320	Other wood in the rough - coniferous
440341	Other wood in the rough - Dark Red Meranti, Light Red Meranti and Meranti Bakau
440349	Wood in the rough - other tropical species
440391	Wood in the rough - oak (Quercus spp.)
440392	Wood in the rough - beech (Fagus spp.)
440399	Wood in the rough - Other species
4404	Hoopwood, split poles, pickets and stakes
440410	Hoopwood, split poles, pickets and stakes -Coniferous
440420	Hoopwood, split poles, pickets and stakes - non coniferous
4405	Wood wool; wood flour.
440500	Wood wool; wood flour.
4406	Railway or tramway sleepers (cross-ties) of wood.
440610	Railway or tramway sleepers (cross-ties) of wood - Not impregnated wood
440690	Other typologies of railway or tramway sleepers (cross-ties) of wood
4407	wood sawn or chipped length, sliced etc with a thickness exceeding 6mm
440710	Wood sawn or chipped length, sliced etc with a thickness exceeding 6mm -Coniferous
440721	wood sawn or chipped length, sliced etc with a thickness exceeding 6mm - Mahogany (Swietenia spp.)
440722	wood sawn or chipped length, sliced etc with a thickness exceeding 6mm - Virola, Imbuia and Balsa
440725	wood sawn or chipped length, sliced etc with a thickness exceeding 6mm - Dark Red Meranti, Light Red Meranti and Meranti Bakau
440726	wood sawn or chipped length, sliced etc with a thickness exceeding 6mm - White Lauan, White Meranti, White Seraya, Yellow Meranti and Alan
440727	wood sawn or chipped length, sliced etc with a thickness exceeding 6mm - Sapelli
440728	wood sawn or chipped length, sliced etc with a thickness exceeding 6mm - Iroko
440729	wood sawn or chipped length, sliced etc with a thickness exceeding 6mm - Other tropical species
440791	wood sawn or chipped length, sliced etc with a thickness exceeding 6mm - oak (Quercus spp.)
440792	wood sawn or chipped length, sliced etc with a thickness exceeding 6mm - beech (Fagus spp.)
440793	wood sawn or chipped length, sliced etc with a thickness exceeding 6mm - maple (Acer spp.)
440794	wood sawn or chipped length, sliced etc with a thickness exceeding 6mm - cherry (Prunus spp.)
440795	wood sawn or chipped length, sliced etc with a thickness exceeding 6mm - ash (Fraxinus spp.)
440799	wood sawn or chipped length, sliced etc with a thickness exceeding 6mm - Other species
4408	Wood sawn or chipped length, sliced etc with a thickness not exceeding 6 mm
440810	Wood sawn or chipped length, sliced etc with a thickness not exceeding 6 mm -Coniferous
440831	Wood sawn or chipped length, sliced etc with a thickness not exceeding 6 mm.- Dark Red Meranti, Light Red Meranti and Meranti Bakau
440839	Wood sawn or chipped length, sliced etc with a thickness not exceeding 6 mm - Other tropical species
440890	Wood sawn or chipped length, sliced etc with a thickness not exceeding 6 mm -Other species
4409	Wood (including strips and friezes for parquet flooring, not assembled) continuously shaped along any of its edges, ends or faces,
440910	Wood (including strips and friezes for parquet flooring, not assembled) continuously shaped along any of its edges, ends or faces -Coniferous

440921	Wood (including strips and friezes for parquet flooring, not assembled) continuously shaped along any of its edges, ends or faces - bamboo
440929	Wood (including strips and friezes for parquet flooring, not assembled) continuously shaped along any of its edges, ends or faces - Non coniferous
4410	Particle board, oriented strand board (OSB) and similar board (for example, waferboard)
441011	Particle board
441012	Oriented strand board (OSB)
441019	Other particle board
441090	Other
4411	Fibreboard of wood or other ligneous materials, whether or not bonded with resins or other organic substances.
441112	Medium density fibreboard (MDF) of a thickness not exceeding 5 mm
441113	Medium density fibreboard (MDF) of a thickness exceeding 5 mm but not exceeding 9 mm
441114	Medium density fibreboard (MDF) of a thickness exceeding 9 mm
441192	Fibreboard of wood of a density exceeding 0.8 g/cm ³
441193	Fibreboard of wood of a density exceeding 0.5 g/cm ³ but not exceeding 0.8 g/cm ³
441194	Fibreboard of wood of a density not exceeding 0.5 g/cm ³
4412	Plywood, veneered panels and similar laminated wood.
441210	Plywood, veneered panels and similar laminated wood - bamboo
441231	Plywood, veneered panels and similar laminated wood, in which each ply not exceeding 6 mm thickness, with at least one outer ply of tropical wood
441232	Plywood, veneered panels and similar laminated wood, in which each ply not exceeding 6 mm thickness, with at least one outer ply of non coniferous wood
441239	Plywood, veneered panels and similar laminated wood, in which each ply not exceeding 6 mm thickness, with at least one outer ply of other species
441294	Blockboard, laminboard and battenboard
441299	Other plywood
4413	Densified wood, in blocks, plates, strips or profile shapes.
441300	Densified wood, in blocks, plates, strips or profile shapes.
4414	Wooden frames for paintings, photographs, mirrors or similar objects.
441400	Wooden frames for paintings, photographs, mirrors or similar objects.
4415	Packing cases etc of wood, pallets etc of wood
441510	Cases, boxes, crates, drums and similar packings; cable-drums
441520	Pallets, box pallets and other load boards; pallet collars
4416	Casks, barrels, vats, etc.
441600	Casks, barrels, vats, etc.
4417	Tools, tool bodies, tool handles, broom or brush bodies and handles.
441700	Tools, tool bodies, tool handles, broom or brush bodies and handles.
4418	Builders' joinery and carpentry of wood, including cellular wood panels, assembled flooring panels, shingles and shakes.
441810	Windows, French-windows and their frames
441820	Doors and their frames
441840	Shuttering for concrete constructional work
441850	Shingles and shakes
441860	Posts and beams
441871	Assembled flooring panels for mosaic composition
441872	Assembled flooring multilayer
441879	Other type of assembled flooring
441890	Other type of joinery and carpentry of wood
4419	Tableware and kitchenware, of wood.
441900	Tableware and kitchenware, of wood.
4420	Wooden articles of furniture not falling in Chapter 94.
442010	Statuettes and other ornaments, of wood
442090	Other statuettes and other ornaments, of wood
4421	Other articles of wood.
442110	Clothes hangers
442190	Other articles of wood

9401	Seats.
940110	Seats of a kind used for aircraft
940140	Seats other than garden seats or camping equipment, convertible into beds
940161	Upholstered
940169	Other seats, with wooden frames
940190	Parts of furniture
9402	Medical, surgical, dental or veterinary furniture
940210	Dentists', barbers' or similar chairs and parts thereof
940290	Other
9403	Other furniture and parts thereof.
940330	Wooden furniture of a kind used in offices
940340	Wooden furniture of a kind used in the kitchen
940350	Wooden furniture of a kind used in the bedroom
940360	Other wooden furniture

Annexes

Annex 1

PROJECT REPORT: Indufor Oy, Tesaf, Efeca (2016). *Review of the European Union's Timber Regulation*. Report commissioned by European Commission, Directorate-General for the Environment in the context of project "Support to the implementation of the EU Timber Regulation" - ANNEX 8

A SUMMARY OF SCIENTIFIC PAPERS RELATED TO EUTR

A. Scientific Publications and Their Main Results

1) Jonsson, R., Giurca, A., Masiero, M., Pepke, E., Pettenella, D., Prestemon, J., Winkel, G. **Assessment of the EU Timber Regulation and FLEGT Action Plan**. From Science to Policy 1. European Forest Institute, Joensuu (Finland).

Main outcomes:

- One of the main results of the FLEGT/VPA countries is the improvement in the forest governance in the partner country. However, many studies warn that the involvement of local communities in the VPA process is often weak. Furthermore, experiences demonstrate that for the success of VPA implementation it's necessary to consider also socio economic objectives, and not only factors about legality.
- The price of the "legal" import from the same source country tend to be higher compared to the case where there aren't any policy measures (as EUTR, FLEGT or Lacey Act).
- At European level the import of tropical timber, in the last ten years, has decreased. Also the sharing of tropical timber in the total timber import has declined. This decline started before FLEGT (VPA) and EUTR implementation. Then it's difficult to identify the impacts deriving from the policy measures and the role of the economic crisis in this negative trend.
- It is not possible to say that policy measures (as FLEGT and EUTR) has reduced illegal logging in suspected country. In fact, these producer country could have redirect their illegal timber export to countries with no (or weaker) legality measures or to the domestic market.
- The arising legality verification regime has strongly increased the awareness about illegal timber issue of different stakeholders in producer and consumer countries.
- UK has been a frontrunner in the development and implementation of measures against illegal timber. UK started to implement policy against illegal timber long before the EUTR was implemented. As a consequence, the EUTR was introduced in UK into a favorable regulatory framework. On the contrary, Italy has traditionally been reluctant in defining and implementing measures to contrast illegal logging, and consequently also the implementation of Timber Reg. in Italian context appears complex.

2) Florian, D., Masiero, M., Mavsar, R., Pettenella, D. (2012). **How to support the implementation of due diligence systems through the EU Rural Development Programme: problems and potentials**. *L'Italia Forestale e Montana*, 67 (2): 191-201.

Main outcomes:

- Timber producers have to do additional investments to introduce due diligence systems in their management system. In the case of small private holdings this investment could have a significant impact on their economic competitiveness.
- The European Rural Development Program could be an important tool to facilitate the implementation of different aspects of the EUTR in order to reduce the costs deriving of due diligence implementation.
- It is expected that the EUTR will offer some opportunities for establishing new service activities within the forest sector, in particular in the field of Monitoring Organization.

3) Kistenkas, F.H. (2013). **Concurring Regulation in European Forest Law; Forest Certification and the New EU Timber Regulation**. GAIA, 22 (3): 166-168.

Main outcomes:

- The EUTR and the two main international forest certification schemes (FSC and PEFC) have the same general final goal: promoting the sustainable forest management. The EUTR aims at sustainably produced timber by combatting trade in illegally harvested timber, whereas sustainable forestry is the core element of forest certification schemes. EUTR and the forest certification schemes have different origins: the EUTR is a public law from the EU, while forest certification schemes are private law given by forest certification organizations. The EUTR and the forest certification schemes might be called concurring, but they are not necessarily contradictory.
- Adopting dual or hybrid approaches relying on conventional “command-and-control” and on private regulation could lead easier to the accomplishment of sustainability goals. Then a hybrid public-private might well be superior to private or public regulations alone.

4) Buckrell, J., Hoare, A. (2011). **Controlling Illegal Logging: Implementation of the EU Timber Regulation**. Chatham House, London (UK)

Main outcomes:

- Additional efforts of the Commission and European Union (EU) Member States will be needed to clarify some unclear points under the EUTR. In particular, a more detailed guidance to clarify some key elements of EUTR would be needed, including (i) the definition of ‘placing on the market’; (ii) how to undertake risk assessments (due diligence); (iii) the role of the certification or third-party verification to assess and mitigate the risk.
- Clarifications about offences and penalties under the Regulation would be needed, as well as coordination between EU Member States to ensure that a uniform approach is adopted.
- There is a need for an effective program for information dissemination to facilitate compliance and minimize any negative impact of EUTR on small businesses.
- Competent authorities would need adequate resources to fulfil their enforcement role.

5) Giurca, A., Jonsson, R., Rinaldi F., Priyadi, H. (2013). **Ambiguity in Timber Trade Regarding Efforts to Combat Illegal Logging: Potential Impacts on Trade between South-East Asia and Europe**. (2013). *Forests*, 4(4): 730-750.

Main outcomes:

- The international wood market seems to have been affected by a sort of ambiguity, that starts from the uncertainty concerning FLEGT’s interpretation. In fact, European importers, doubting about the

legality of the wood they were about to purchase, and hence of its real value, tend to prefer to trade with countries with reliable regulations.

- This ambiguity has the following consequences:
 - *Substitution*: importers are opting for temperate hardwoods to the detriment of tropical hardwoods in order to avoid risks. Furthermore, there is the evidence that oak lumber is a possible substitute for tropical hardwood lumber.
 - *Trade diversion*: since EU's legality requirements are often associated with extra costs necessary to provide certification and/or required documentation, extra-European exporters are choosing to export timber to other markets characterized by less stringent regulatory frameworks (e.g. China).
- Trade data analysis indicates that tropical hardwood imports to the EU are decreasing, particularly in the case of the UK. International policy measures such as FLEGT and the EUTR can be, to some extent, associated with this trend
- Transparency and consistency in the interpretation and implementation of instruments (such as the EUTR) play a crucial role in decreasing ambiguity and consequently preventing possible unintentional detrimental effects on trade.

6) Overdevest, C., Zeitlin, J. (2014). **Constructing a transnational timber legality assurance regime: Architecture, accomplishments, challenges (2014)**. *Forest Policy and Economics*, 48: 6-15.

Main outcomes:

- the EUTR, like the FLEGT, is specifically designed to be WTO-compliant. Indeed it imposes identical due diligence requirements on all operators, without discriminating between domestic and imported wood.
- FLEGT VPAs have resulted in significant improvements in forest governance in signatory countries. In particular, the capacity of domestic civil society organizations to participate in forest governance has increased. The limited success in the creation of operational TLASs capable of meeting the EU's requirements for the issuing of FLEGT export licenses represents a serious threat to the sustainability of these governance improvements.
- the EUTR and the VPAs were designed to be complementary, inducing countries to negotiate and implement VPA agreements in order to obtain a less onerous 'green lane' to export timber into the European market. But with the delivery of FLEGT licenses, the incentives may flow in the reversedirection, inducing local producers and European buyers to pursue private solutions such as voluntary forest certification to meet the due diligence requirements of the EUTR, while draining off support for the implementation of the national timber legality assurance regime. Such developments are likely to penalize domestic forestry firms which participated actively in the VPA multi-stakeholder processes for creating agreed legality.

7) Oldenburger, J., van Benthem, M., de Groot, C., Boosten, M., Jansen, P. (2014) **Import of secondary timber products by the EU28. The Netherlands in focus (2014)**. Stichting Probos, Wageningen (The Netherlands).

Main outcomes:

- Secondary timber products include products derived from primary timber products (i.e. from roundwood, sawnwood, wood based panels, woodpulp, paper and paperboard in sheets or rolls).

- Secondary timber products are given limited attention in timber trade analysis. This is due to several reasons, including the variety of products and measuring units used. Most of studies rely on import value.
- EU Imports of secondary timber products from non-EU countries have substantially increased during the last decades. The main reasons behind this increase include the economic development in the countries of origin of the products (e.g. China, South East Asia and South America), a shift of processing outside of the EU to low-cost countries and export bans for roundwood.
- In the period 2008-2013, the average share (based on value) of the secondary wood products within EU28 total timber imports was 49.9%. In 2013 the main secondary timber products imported by the EU28 were books – with a total value of almost 1.7 billion Euro – followed by other seats with wooden frames. As for the imported quantity of secondary products, their average share within EU28 total timber imports was 18,6 %.
- Between 2008 and 2013, the five top EU28 importers of secondary timber were: UK, Germany, France, the Netherlands and Italy.
- In 2013, within the total extra-EU secondary wood product import total, 47% was EUTR exempt. Books and other seats with wooden frames are by far the two largest secondary timber products imported by the EU28 that are exempted from the EUTR.

8) Giurca, A., Jonsson, R. (2015). The opinions of some stakeholders on the European Union Timber Regulation (EUTR): an analysis of secondary sources. *iForest – Biogeosciences and Forestry*, doi: 10.3832/ifor1271-008.

Main outcomes:

- European stakeholders seem to be aware of the problem of illegal logging and its associated trade, but there are still concerns whether the EUTR is the proper instrument to address this issue.
- The implementation of the EUTR needs to be based on transparency, consistency and clear guidelines in order to diminish the degree of possible unwanted side-effects, such as trade diversion and substitution of temperate timber for tropical timber.
- The bureaucracy burden (that is unavoidable for a law that aims to contrast illegal logging) can be alleviated by means of clear indications supplied by the European Commission, EU Member State governments or Monitoring Organisations.
- If the requirements of the EUTR are not fully understood, European importers will opt for more reliable timber sources within Europe and North America. Then the general uncertainty around EUTR interpretation may become detrimental for tropical timber exports.
- Any ambiguity related to the EUTR, associated with costs for compliance, could encourage producers in developing countries to export timber to other, more weakly regulated, markets.

9) Trishkin, M., Lopatin, E., Karjalainen, T. (2015). Exploratory Assessment of a Company's Due Diligence System against the EU Timber Regulation: A Case Study from Northwestern Russia. *Forests* 6(4):1380-1396.

Main outcomes:

- Most forestry companies in Russia do not have complete systems to track the origin of wood. Promoting good practices of a functioning DDS among forestry companies in Russia could decrease the level of illegal logging in the country, increasing the transparency of supply chains and improving the image of Russian export-oriented companies.

- Small Russian companies might face a lack of human and technical resources to collect data and information to track the origin of the raw material.
- Russian companies that hold sustainable forest management certification (such as FSC), could achieve compliance with the EUTR more efficiently than non-certified companies.
- In order to meet the EUTR requirements, Russian companies have to improve the communication with their suppliers and perform field verifications during the logging period.
- In the perspective of Russian exporters, the enforcement of EUTR measures (as the fine system or the role of third-party evidence) in each EU Member State is too heterogeneous, and sometimes unclear.

10) Dong, J., Liu, J.I., Long, H. (2013). **Annotation of European Union Timber Regulation and Its Influences on Chinese Forestry Industries.** *Issues of Forestry Economics* 5:

Main outcomes:

- The EUTR aims to improve the international forest management, emphasizing the third-party certification, FLEGT/VPA agreement and strengthening management power of European Union countries' timber associations.
- The EUTR will increase the cost of wood products exported to EU, and decrease China's timber importing sources and undermine the capacity of negotiation with EU importers,
- The EUTR will promote innovation in the Chinese forestry sector and open up new markets, cultivating core competitiveness of enterprises.

11) Fishman, A., Obidzinski, K. (2015). **Verified Legal? Ramifications of the EU Timber Regulation and Indonesia's Voluntary Partnership Agreement for the Legality of Indonesian Timber.** *International Forestry Review* 17(1): 10-19.

Main outcomes:

- Concerns about the robustness of the Sistem Verifikasi Legalitas Kayu (SVLK), i.e. Timber Legality Assurance System, in Indonesia are serious. First of all the complexity of the Indonesian timber sector doesn't facilitate the effective legality verification. Furthermore there is a risk of conflict of interest within SVLK. Indeed the first round of timber legality verification is financed by the Ministry of Forestry, but future verification costs will be financed by auditees. Nowadays, there is also a lack of expert and qualified auditors. Then the auditors have much power in their hands, sometimes they may abuse of their power, and obstacle the small-scale timber enterprises to compete with larger operators;
- For the the SVLK to become successful it is necessary that the Indonesian government provides additional economic resources in order to increase the number of qualified auditors and finance Indonesian small operators to facilitate their access to the market;
- A significant percentage of Indonesia's timber reach Europe through third countries, especially through countries in the Asia-Pacific region. The VPA does not cover this segment of the market, consequently the EUTR will play a fundamental role to screen out illegal products exported from these countries which originate in Indonesia. Consequently, it means that under these circumstances, the SVLK might downgrade from sure proof of legality to being one of a number of factors for determining the level of risk. As a result, operators may have to demonstrate proof of legality beyond that afforded by SVLK verification.

Main outcomes:

- Some Czech forest owners (especially small ones) are not aware about the existence of the EUTR, some other are aware of this but don't know anything about EUTR requirements and finally some Czech owners (specially big ones) know the EUTR and its requirements, but they don't know if they will be able to fulfil the EUTR requirements.
- Costs due to the implementation of a Due Diligence System (DDS) have been calculated for two forest owners in Czech Republic:
 - A small owner (10 ha) would pay about 15,000 Czech Republic Crown (CZK) (550 Euro) for implementing a DDS and additional 1,000 CZK for maintenance;
 - A large owner (1,000 ha) with a chain of custody system in place would pay about 45,000 CZK (1,650 Euro) for implementing a DDS and additional 22,500 CZK for maintenance.
- Forest owners in the Czech Republic can readily meet requirements following out from the EUTR legal regulations if they operate according to their approved forest management plan and place on the EU market only timber harvested on their own property.
- The main task for them is likely to be the collection and assessment - in a suitable manner –of the required data.
- In the case that Czech enterprise obtain wood from other forest properties or non-forest land, the DDS is likely to become more complex and costly.

Main outcomes:

- The exemption from EUTR requirements for products traded under CITES could provide a new incentive for CITES Authorities, exporters and importers to cheat, for example through an increase in export quotas and in fake or illegally acquired export permits.
- There are a number of weaknesses within CITES trade controls which limit their ability to validate compliance with relevant legislation, and this could undermine effective implementation of the EUTR. These weaknesses mostly relate to the lack of criteria for Legal Acquisition Findings and absence of third-party oversight mechanisms.
- The definition of legality within CITES is derived from the convention's focus on the survival. To date, this provision in the convention text has been interpreted relatively narrowly: even where effective validation of compliance is undertaken as part of a legal acquisition finding, it does not cover the payment of royalties or legal rights concerning land use and tenure that are affected by timber harvesting.
- There is also some incompatibility between CITES compliance mechanisms and objectives of the EUTR. These include the fact that CITES is designed to address broader governance problems rather than individual legal infractions, its focus on species survival and the poor quality of data which can trigger non-compliance action.
- Recommendations are made to both CITES and EUTR decision-makers and stakeholders in order to develop potential compliance and enforcement synergies. These include the need for a more rigorous assessment of legal compliance and traceability in the supply chains of CITES species.

14) Masiero, M., Pettenella, D., Cerutti, P. (*in Press*). **Legality constraints: the emergence of a dual market for tropical timber products?** CIFOR, Bogor (Indonesia).

Main outcomes:

- Between 2000 and 2013 international trade in tropical primary timber products (logs, sawnwood, veneer and plywood) decreased by 16% in volume and 2.5% in value. Different countries show different trends: imports by Australia, the EU and the USA have declined (-50%) while those by emerging economies remained stable and then increased in recent years.
- Tropical timber has managed to uphold market shares in Northern markets better in value than in volume terms, which could be taken as an indication of more value-added tropical timber imports.
- Tropical timber imports by China, India and Vietnam in 2013 have been 1.1 million (M) CUM higher in volume and 240M USD higher in value than imports by Australia, the EU and the USA. Comparing import shares in 2000 and 2013, about 2.3M CUM tropical timber products – mostly under the form of logs and sawnwood – probably shifted from traditional Northern importers to China, India and Vietnam in 2013.
- The decline in imports by Australia, the EU and the USA had started before the global financial crisis in 2008 and increased after that. The impacts of crisis on consumption partly hide other factors that may be at play.
- The effects of legality measures on market trends are still unclear; nonetheless they might have encouraged uncertainty for traditional importers, favoring emerging ones.
- Although not generalizable, some evidences of trade-effects of timber-legality regulations are reported in literature and include: market uncertainty and diminished imports, shifting to markets with less stringent legal requirements, increased imports short before regulations were implemented, decrease in volumes and increase in prices of imported tropical timber products, decrease in the number of imported species.
- Timber markets in the EU are likely to be subject to leakage from the introduction of legality standards, resulting in increased timber production in Northern countries (EU, Eastern Europe and North America).
- Additional impacts might include: (i) enterprises concentration, i.e. displacing of medium-small trading companies with minor capacities and resources to be invested in complying with legality requirements, and (ii) trade-offs with voluntary tools like forest certification, i.e. since certified materials are not considered as automatically compliant with legality regulations, enterprises might decide to focus on compulsory legality requirements rather than investing on voluntary certification.
- The adoption of policies to tackle the trade of illegally sourced materials by major timber importers is quite recent: effects are more likely to be perceived in the medium- to long-term.

B Summary matrix:

The main outcomes from the 14 selected scientific papers have been reported in a summary matrix that highlights the links between the outcomes and the EC relevant evaluations issues. The matrix is reported below.

Issues	Selected scientific papers (numbers refer to the above-reported list)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Due diligence obligation</i>														
<i>Prohibition of import/trade in illegal timber</i>														
<i>Possible loopholes/weaknesses in the regulatory regime established by the EUTR</i>														
<i>Changes in trade flows, which can be attributed to the impact of the EUTR</i>														
<i>Product coverage within the EUTR</i>														
<i>Other</i>														
EFFICIENCY														
<i>Costs and benefits (monetary and non-monetary) associated with compliance with the EUTR. Can any costs be identified that are out of proportion with the benefits achieved?</i>														
<i>Consequences in particular for SMEs</i>														
<i>Other</i>														
COHERENCE														
<i>Extent to which the EUTR is satisfactorily integrated and coherent with other EU legislation with similar objectives</i>														
<i>Identification of possible gaps, overlaps, discrepancies or contradictions, which may have hampered and/or improved the implementation of the EUTR and/or other legal acts</i>														
<i>Contribution of the EUTR to the other measures of the FLEGT Action Plan</i>														
<i>Other</i>														
EU ADDED VALUE														
<i>Additional value resulting from the EU intervention (EUTR), compared to what could be achieved by Member States at national and/or regional levels without any EU action</i>														
<i>Extent to which the issues addressed by the intervention (EUTR) continue to require action at the EU level</i>														
<i>Most likely consequences of stopping or withdrawing the existing EU intervention (EUTR)</i>														
<i>Other</i>														
NEEDS FOR AMENDMENT														
<i>Product scope</i>														
<i>Other</i>														

Annex 2

CONFERENCE PROCEEDING: Andrighetto N., Pettenella D., Masiero M., (2015). **Illegal Activities in the Italian Wood-Energy Sector and Potential Impacts on Regulation (EU) 995/2010 (EU Timber Regulation)**. Proceedings of the 16th International Symposium, May 2015, Braşov, Romania, IUFRO division 9, Forest policy and economics (*research group 9.06.00: forest law and environmental legislation*); p. 94-106

Abstract

This paper, in the first part, aims to demonstrate that a significant proportion of woody biomass utilized in Italy for energy purposes is obtained from unclear sources, such as domestic wood irregularly harvested or wood illegally imported. Indeed, the official data about wood energy sources cover not even 50% of the total consumption of woody biomass utilized for energy. The second part of the paper aims to identify the main technical issues and the potentials impacts for the Italian forest sector deriving from the implementation of the Regulation (EU) 995/2010, which was issued by European Parliament in 2010 to contrast illegal activities related to harvesting and trading of wood products.

Introduction

The forest-wood sector represents a relevant component of Italian economy. It involves 80,000 companies, employs about 500,000 people (Romano, 2012) with a total annual turnover of €27 billion (Federlegnoarredo, 2014a). Even though the internal forest resources totalize 11M/ha, i.e. 36% of the national total area with (FAO, 2010), and 81% of them is potentially suitable for harvesting (IFCN, 2005) the Italian wood-working sector remains highly dependent on imported raw material. According to Oliver (2011) imported raw materials represent about 98% of the total wood used by the Italian wood processing industry. Imports are mostly intended as inputs for an export-oriented wood-furniture-industry.

High import levels mirror the lack of integration between domestic forest activities and the Italian wood processing industry. The domestic supply remains weak and not competitive due to some barriers connected mainly to the location of Italian forests (95% are in mountainous areas), environmental constraints, very fragmented forest-ownership and the low-productive silviculture sector. Most of Italian forest enterprises are small (on average 3 to 4 employees each) and present inadequate technological equipment: as a result their average productivity is limited compared to other European countries (Romano, 2012). Furthermore many forest owners are old, with a low attitude to introduce innovations, and to participate to associations and to any other business activities with other economic sectors (Pettenella *et al.*, 2004).

When considered altogether these factors strongly affect profitability of forest operations and largely contributed to reduce active management of Italian forest resources. Forest removals per hectare in Italy, for example, are among the lowest for all European countries (Eurostat, 2013)³⁸. Reduction in active forest management has favored a gradual forest expansion, forest cover has doubles during the last 50 years, but

³⁸ Eurostat: Wood Production 2000-2013 (1000m³). Data Available at: [http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/File:Wood_production,_2000%E2%80%9312_\(1_000_m%C2%B3\)_YB14.png](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/File:Wood_production,_2000%E2%80%9312_(1_000_m%C2%B3)_YB14.png)

also the ageing and degradation of some Italian forests. Degraded forests cannot normally deliver high quality wood assortments, rather they are increasingly used for removing low unit-quality products, as for example firewood: starting from the 70s more than 50% of domestic removals are intended for energy purposes (Pettenella and Favero, 2013).

1. The Italian wood-energy sector

The National Renewable Energy Action Plan, developed by the Italian Ministry of Economic Development (2010), in the context of the European Directive 2009/28/E, assigns a key role to the solid biomass for achieving targets set for 2020. Indeed, within 2020, solid biomass should become the largest renewable source in Italy, covering 8% of electricity production and 50% of heating and cooling production. According to the National Energy Balance (NEB) a total amount of 26.5 million (M) tons of wood have been used in 2013 for primary energy production (Italian Minister of Economic Development, 2014). As for domestic woody biomass consumption, the NEB considers 2014 data published by the Italian National Institute of Statistics (ISTAT). According to these figures, in 2013, more than 20% of Italian households used woody biomass for heating: as a result the total amount of woody biomass used for residential purposes was 19.2 M tons, i.e. 17.7 M tons of firewood and 1.5 M tons of wood pellets. These numbers would make wood biomass the second heating source for Italian households, just after methane. Since, as it was pointed out in the introduction, forest area is expanding and forest removals per hectare remain limited, the question about the origin of the biomasses used at national level remains open.

In order to answer this question, different potential biomass sources shall be analyzed, including: (i) domestic forest removals, (ii) removals from trees outside forests, (iii) imports, (iv) recycled wood (v) wood waste from processing wood industries. Due to the lack of clear and reliable data industrial, in our analysis wood waste and scraps have not been taken into account.

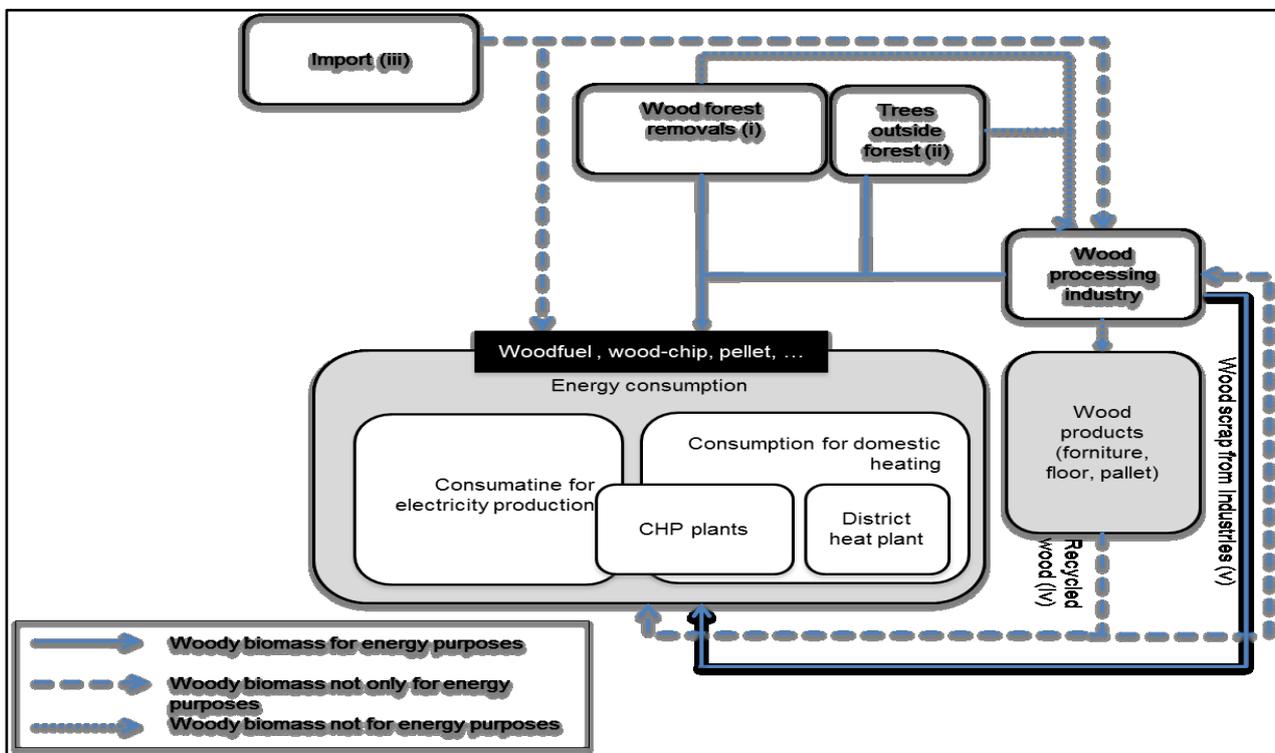


Figure 1. Different potential sources of wood for energy

As already reported, domestic forest removals largely consist of wood for energy: according to the most recent available data in 2012³⁹ forest removals for energy purposes in Italy totalized 5.4 Mm³ (2.7M tons⁴⁰), i.e. about 70% of total roundwood removals at national scale (Eurostat, 2014). There are not official statistics regarding domestic wood production from trees outside forests, however the Italian Federation of Renewable Energies Producer (FIPER) (2013) indicates that at least 3 to 4 M tons woody biomass are potentially available from these sources. In addition to domestic forest removals, wood imports for energy purposes shall be taken into consideration as well. In 2013 Italy imported 3.8 M tons⁴¹ of woody material that can be utilized for energy purposes⁴² (Comtrade, 2013).

Finally recycled wood wastes in 2013 have been estimated around 1.4 Mtons, 50% of which have been utilized for energy purposes (Fondazione per lo Sviluppo Sostenibile e FISE UNIRE, 2014). Table 1 below summarizes the estimated contribution of different sources to national woody biomass supplies, together with data on total and domestic consumption at national level.

Table 1. Supplies, sources and consumption of wood for energy in Italy

<i>Annual supplies (source, year of reference)</i>	Quantity (Mtons)
Forest removals for energy purposes (Eurostat, 2013)	2.7
Woody material from trees from outside the forest (FIPER, 2012)	3 to 4
Import (Comtrade, 2013)	3.8
Recycled wood utilized for energy purposes (CRA, 2012)	0.7
Total supplies	10,2 to 11,2
Total Consumption (Italian Minister of Economic development, 2013)	26.5
Household consumption (ISTAT, 2013)	19.2

Even though data presented in table 1 are not totally complete (there aren't data available about wood scrap from manufacturing industries), and they refer to a period (2009-2013) rather than a single year, the gap between biomass consumption and supplies is evident. Even if we assume that all available biomass is used for energy production (which is not a fully realistic scenario), the total amount would cover less than 60% of woody biomass household consumption and less than 45% of the total one.

These figures suggest that as already supposed by many studies (Tommasetti, 2010; Gasperini and Tabacchi, 2011) a significant proportion of biomass utilized for energy purposes is obtained from unclear sources, that might include wood from illegal activities such as domestic wood irregularly harvested/traded or illegally imported. Illegalities activities in Italian forests are not only administrative offences (such as insufficient number of stems left on coppice stands), but also criminal ones (Masiero *et al*). In 2012, in Italy, 823 cases of wood thefts were reported by State Forestry Corps (CFS, 2013). Although these thefts are limited to small amounts of wood (mainly firewood) environmental impacts may be quite relevant, especially when harvesting is done in protected areas. For example, in the first two months of 2015, more than 220 tons of firewood illegally harvested in the Cilento National Park and in the Regional Park of Matese were seized by CFS⁴³.

³⁹ It shall be noticed that the most recent figures on domestic removals for Italy date back to 2011 because 2012 figures are identical to 2011 ones.

⁴⁰ Assuming 1 m³ corresponds to 0,5 ton, as suggested by Mantau *et al.* (2010).

⁴¹ In detail: 0,78 Mtons of fuelwood, 1,75 Mtons of pellet, 0,63 Mtons of chipped-wood

⁴² Wood chips for example can be used not only for energy purposes, but also for paper and chipboard production

⁴³ News about these two facts are available at the CFS website. (<http://www.corpoforeale.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPpagina/1>)

In addition to the wood thefts, empirical experience indicates that Italian wood-energy sector is characterized by an informal market, with consequences in terms of Value Added Tax (VAT) frauds. These non-legal activities are a limiting factor for the development and implementation of effective strategies and measures to support the renewable energy sector, it might also turn problematic with reference to the implementation of other policy tools, such as European regulations aiming to contrast illegally sourced timber, in particular the so-called EU Timber Regulation.

2. The EU Timber regulation: the European tool to contrast the illegal wood in EU market

In order to contrast the placing of timber and timber products deriving from illegal activities on the European market, the EU Parliament has approved Regulation (EU) 995/2010, also known as EU Timber Regulation (EUTR). The EUTR came into force on March 2013 in all European Member States that were given responsibility to implement and enforce the Regulation at national scale. The EUTR is applicable to a wide range of wood-based products and distinguishes into two main types of actors:

- **“operators”**: i.e. any natural or legal person that places timber or timber products on the market. This includes wood importers from non-EU countries, but also individuals or organizations that, within the EU, harvest forests/trees and sell timber or timber-based products;

- **“traders”**: i.e. any natural or legal person who, in the course of a commercial activity, sells or buys on the internal EU market timber or timber products already placed on the internal market.

According to article 6 of Regulation (EU) n. 995/2010, traders are obliged to maintain traceability of timber products they buy/sell for 5 years, whereas operators have to define, implement and maintain a due diligence system (DDS) to demonstrate that the products placed on the EU market have been legally sourced.

A DDS has to be composed by three main components:

a) Information gathering: the operator shall have direct access to information on the product (e.g. trade name, wood species, quantities, etc.) and supplier(s), the country of origin and documentation to demonstrate the compliance of product with the applicable legislation in the country of origin;

b) Risk assessment: the operator shall implement a risk assessment procedure that, by considering the information set out in the previous step of the DDS, evaluate the risk of illegally harvested timber or timber products being placed on the market. The procedure implemented has to consider at least risk assessment criteria listed under article 6 (point b) of Regulation (EU) n. 995/2010., such as prevalence of illegal harvesting in the country of origin or complexity of supply chains;

c) Risk mitigation: if the risk assessment identifies a certain risk that a product contains illegally harvested timber, risk mitigation procedures must be put in place. These procedures should be adequate and proportionate to minimize effectively the identified risk, and might include requesting additional information from suppliers as well as third parties certifications.

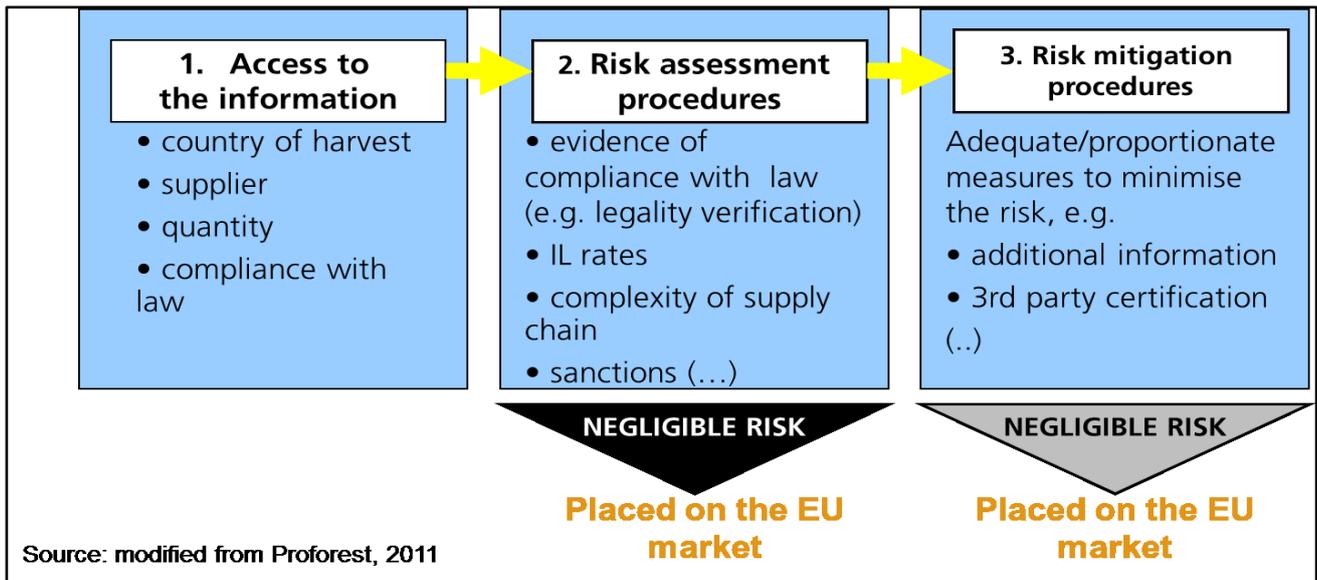


Figure 2. Main elements of the DDS required by Timber Reg.

Operators can either develop and implement their own DDS or take advantage of a DDS developed by a Monitoring Organization (MO). MOs are organizations enabled to develop a functional DDS and grant operators the right to use it. In order to do so, MOs must be formally recognized by the European Commission (Proforest, 2011). So far the European Commission has recognized ten MOs: two of them, i.e. ConLegno and ICILA, have an operational scope limited to Italy⁴⁴.

3. The level of implementation of the EUTR in Italy

Although Regulation (EU) 995/2010 came into force on 3rd March 2013, many EU Member States, including Italy, are quite late in its full implementation (Jonhson *et al.*, 2015). In the case of Italy poor implementation mostly derives from the late designation of the Ministry of Agricultural, Food and Forestry Policies as the national Competent Authority and the State Forestry Corps (*Corpo Forestale dello Stato*, CFS) as the body in charge of performing controls. Designations were finalized and formalized just in December 2012⁴⁵, just two months before the Regulation would have come into full force. The penalties and control procedures were defined only in December 2014, but additional decrees are now needed to make the system fully operative (Jonhson *et al.*, 2015). As a consequence, the Italian Competent Authority hasn't implemented any official controls so far. During 2014, however, the CFS and Conlegno jointly carried out a pilot audit/visit to three companies with potentially high-risk suppliers. One of the three companies reported a significant decrease in the number of wood species imported because it preferred to focus on fewer species and consolidate trade relationships with reliable suppliers (Pasqualotto, 2014).

The National Federation of Wood, Cork, Furniture and Furnishing Manufacturers (Federlegno-Arredo) in 2014 estimated that almost 100,000 Italian enterprises are subjected to the Regulation (EU) 995/2010. More in detail, 25,000 of them should qualify as operators, and the remaining ones as traders. Among the

⁴⁴ List of MO recognised at European level is available at the following link: http://ec.europa.eu/environment/forests/timber_regulation.htm

first group, about 5,000 companies qualify as operators because they harvest and then first place on the European market domestic wood (FederlegnoArredo, 2014).

Forest companies that harvest domestic wood, and represents the core of the Italian wood-energy sector, appear isolated in view of EUTR implementation. Indeed, on the one hand, many of them are very small without a strong and efficient management, and, at Italian level, there isn't a strong national association that can represent their interests to the public authorities. On the other hand, the Italian monitoring organizations activities, until now, are focusing on supporting medium and big companies, that deal mainly with imported wood. In Autumn 2015, Conlegno (one of the two Italian monitoring organization) probably will make available specific DDS for Italian operators that deal with domestic wood.

4. Questions and doubts of Italian operators about the EUTR implementation

Even though the EUTR is not fully implemented, many questions about its implementation are arising among Italian operators. In particular, the EUTR appears challenging for small and medium Italian enterprises that represent the core of the Italian wood sector. Based on dialogue with operators and empirical experience, the main uncertainties for Italian operators can be summarized in the following two questions:

- At Italian level, what are the documents necessary to demonstrate the compliance of wood products with the applicable legislation?
- What are the real costs for the Italian operators?

4.1 What are the documents necessary to demonstrate the compliance with the applicable legislation?

In order to comply with EUTR requirements, operators are required to implement a DDS. As a first step critical information shall be gathered to demonstrate the compliance of wood products with the applicable legislation in the country of harvest. Regulation (EU) 995/2010 (article 2 (point h)) clarifies that applicable legislation includes laws and normative requirements covering the following aspects:

- *rights to harvest timber within legally gazetted boundaries,*
- *payments for harvest rights and timber including duties related to timber harvesting,*
- *timber harvesting, including environmental and forest legislation including forest management and biodiversity conservation, where directly related to timber harvesting,*
- *third parties' legal rights concerning use and tenure that are affected by timber harvesting, and*
- *trade and customs, in so far as the forest sector is concerned.*

To clarify some ambiguous aspects of the Regulation (EU) 995/2010, the European Commission has published a “*Guidance document for the EU timber regulation*” that provides examples of possible proofs for each matters considered in the applicable legislation (table 2).

Table 2. Examples of evidences necessary to demonstrate the compliance with the applicable legislation (Source: European Commission, 2013)

<i>Legislation matters to be covered</i>	<i>Examples of proof of legality</i>
1. Documentation for rights to harvest timber within legally gazetted boundaries	➤ documentation of ownership/rights to land use ➤ contracts ➤ concession agreements
2. Payments for harvest rights and timber including duties related to timber harvesting	➤ contracts, ➤ bank notes, ➤ official receipts
3. Timber harvesting, including environmental and forest legislation including forest management and biodiversity conservation, where directly related to	➤ official audit reports; ➤ environmental clearance certificates; ➤ approved harvest plans,

timber harvesting.	➤ official documents issued by competent authorities in a country of harvest etc.
4. Third parties' legal rights concerning use and tenure that are affected by timber harvesting	➤ environmental impact assessments, ➤ environmental management plans; ➤ environmental audit reports
5. Trade and customs, in so far as the forest sector is concerned	➤ contracts, ➤ bank notes, ➤ trade notes, ➤ import licenses, export licenses, ➤ official receipts for export duties

In the case of Italy it is to be remembered that forest legislation is defined at regional level and, since 1972 (Decree n.11, 1972), Regions have full financial and technical responsibility over forest management regulation activities within their territories. Therefore, in order to demonstrate the compliance with applicable legislation for products derived from Italian forests, operators shall take into account the national legislation for covering the matters n.1, 2 and 5, whereas, for matters 3 and 4 they shall make reference to relevant regional legislation and address regional authorities. The devolution of forest management regulation at regional scale, however, has brought to a non-homogenous legal framework, with different requirements depending on the region, an increased number of normative requirements and the consequent risk of duplicating responsibilities and creating administrative conflicts (CNEL, 2000). This emphasized by the fact that while forestry issues are under the responsibility of Regions, environmental ones are still managed at central level. In some cases, these overlapping and sometimes unclear roles have resulted in non-linear and costly procedures for the issuing of harvesting license (Rigon, 2012) discouraging operators from investing in forest management activities or, sometimes, pushing them to not authorized logging operations.

It is recommendable that all regional authorities, jointly with CFS, will supply clear indications about the evidences needed to demonstrate the legality of the wood products, as required by Regulation (EU) 995/2010. So far only two Italian Regions, i.e. Piedmont and Lombardy, have developed guidelines and informative/supporting materials for operators. The same regions have also implemented specific on-line procedures and systems for the issuing of harvesting licenses as well as a mutually valid system for qualifying forest enterprises and operators with regard to technical skills as well as health and safety requirements.

Italian operators are also waiting clarifications from regional/national authorities about:

- the proof of legality required for wood deriving from removals that remain below minimum thresholds (in terms of either removed volume/quantity or harvested area). According to some regional legislations (e.g. Piedmont one) in this cases operators are not required to have any authorization to proceed, but might then find themselves in trouble in case of control, when required to prove the legal origin of wood;
- the evidence for legality of wood products derived from tree outside the forest. These include not only wood from agricultural activities (e.g. management and harvesting of linear forest systems, forest belts, hedges or small woodlots), but also material deriving from poplar plantations and arboriculture systems for the production of high-quality wood assortments. Indeed, these plantations are normally not classified as forests, rather as temporary agricultural land-uses, therefore operators are not required to have any official authorization for logging these areas.

4.2 What are the real cost for the Italian operators?

The burden that operators, and in particular small and medium enterprises, shall face in order to meet ETR requirements is a debated issue. At the moment it remains difficult to estimate the costs for the

implementation of a DDS because most Italian companies are waiting for the enforcement of national legislation before starting to develop and implement their DDS (Jonhson *et al.*, 2015). However, many and different factors, such as for example the number and kind of suppliers, or the general management capacity and skills, are likely to influence the costs for implementing a DDS. Although there are no specific data available yet, the implementation of an effective DDS is expected to require investments in internal organization and control systems that represent additional costs and might decrease economic competitiveness, especially for small-medium enterprises (Florian *et al.*, 2012).

Furthermore, national implementing legislation (Decree n.178) specifies (point 4.1) that no additional public resources will be made available for the Competent Authority for the implementation of the Regulation (EU) 995/2010. According to the same source operators will also be required to pay a fee in order to be included in the national register of operators. The entity of this fee at the moment remains unknown. Further uncertainty exists about whether there will be a connection between the register of operators, created for the purposes of complying with EU requirements, i.e the EUTR and the Forest Law Enforcement Governance and Trade (FLEGT) Acton Plan, and the register of the qualified companies that the Italian Government commits to create in the next years to guarantee an appropriate professional level of the forest operators. In the case that two registers will be kept separated, operators will have to pay a double fee to register them in national official registers. While bringing extra costs for companies willing to operate in full compliance with legal requirements, these measures might no result effective for those companies operating informally, especially if controls will remain weak or totally absent. Many of these informal organizations operate in the production and trade of energy wood and related products.

Conclusions

A full and effective implementation of the Regulation (EU) 995/2010 would be an important tool to guarantee transparency and equal competition among companies in the Italian wood-energy sector, that is characterized by a significant proportion of biomass obtained from unclear sources. The modality and the delay of the Italian government to make operative the Regulation is a negative starting point. This inactivity of the Italian public authorities can increase the concrete risk that the Regulation will not be effective to detect companies operating in total informal context. Moreover, this situation can contribute to create a market with two levels, on the hand the regular companies that have to pay extra cost for the DDS implementation, for the fee of national register of operators and for the possible voluntary certifications. On the other hand, illegal companies can carry on their activities, with indirect advantages of competitiveness respect legal companies. The lack of strategic planning and the coordination among public authorities can also favor a general increase of the bureaucratic and economic burden and decrease the general competitiveness of the Italian forest sector.

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Annex 2

PAPER: Andrighetto N., Pettenella D., Favero M. (2015). **Nuove stime sulle biomasse legnose a fini energetici. Un quadro informativo ricco ma disomogeneo.** Sherwood, Foreste ed Alberi Oggi, 209, pp. 37-40

Riassunto

Il rapporto “I consumi energetici delle famiglie”⁴⁶, pubblicato a dicembre 2014 dall’ISTAT, rappresenta la prima indagine statistica ufficiale a scala nazionale sulla quantità consumata e sulla spesa sostenuta dalle unità familiari per le diverse tipologie di fonti energetiche. Il documento contiene informazioni sui consumi di biomasse legnose per fini energetici che non erano mai stati raccolti in precedenza a livello istituzionale. Da una parte, essi rappresentano utili riferimenti per inquadrare la reale dimensione del settore legno-energia in Italia, dall’altra, evidenziano nuovamente come l’insieme delle fonti statistiche sulla disponibilità potenziale di biomasse legnose sia incompleto e scarsamente coerente.

I dati sui consumi di biomasse legnose nel settore domestico secondo l’ISTAT

Nel 2013, secondo il rapporto ISTAT, il 14,5% delle famiglie italiane ha utilizzato come principale fonte di riscaldamento domestico biomasse di origine vegetale. Tra queste, quelle di origine legnosa sono la componente maggioritaria. Dal rapporto ISTAT che le famiglie ricorrono maggiormente alle biomasse come fonte di riscaldamento nei comuni più piccoli, in special modo di montagna, nelle regioni nord-orientali (in particolare in Provincia di Trento) e del centro Italia (soprattutto in Umbria e Abruzzo). Consumare biomasse costa alle famiglie circa 450 euro l’anno, sia per la legna sia per i *pellet*, ma la legna spesso non è acquistata, infatti le famiglie che acquistano tutta la legna che consumano sono il 45,1%; il 55,0% utilizza legname autoprodotta o recuperata (nel 37,9% dei casi il fabbisogno è coperto totalmente dall’autoconsumo; nel 17,1% solo in parte). Il 68,3% biomasse legnose è di provenienza forestale (26,0% querce), 14,5% delle agricola, mentre il 17,2% degli intervistati non ne conosce l’origine. Tra le informazioni contenute nel rapporto, quella più rilevante per il settore forestale è sicuramente rappresentata dal dato relativo alle quantità di biomasse legnose a fini energetici complessivamente utilizzate nel settore domestico in Italia. Secondo l’ISTAT, infatti, nel 2013 per riscaldare le proprie abitazioni le famiglie italiane hanno utilizzato 17,7 milioni di tonnellate (Mt) di legna da ardere (pari ad un consumo medio familiare di 3,2 t) e circa 1,5 Mt di *pellet* (1,4 t a famiglia). Questi dati sui consumi sono in una posizione centrale rispetto al *range*, in effetti molto ampio (14,7-24,0 Mt – vd. tabella 1), dei dati di consumo residenziali raccolti in indagini realizzate nel passato. Si tenga tuttavia presente che la confrontabilità è limitata dal fatto che le indagini richiamate in tabella 1 si riferiscono ad un arco temporale abbastanza ampio, dalla prima indagine del 1997 ai dati ISTAT del 2013: 16 anni che sono stati caratterizzati – in base ad una evidenza empirica – da una dinamica di crescita dei consumi. Il rapporto ISTAT consente di fare confronti intertemporali anche con le indagini *ad hoc* che sono state realizzate su scala regionale; è il caso della Lombardia, del Veneto, dell’Emilia-Romagna (vd. tabella 2) e di altre regioni.

⁴⁶ Il documento è disponibile al seguente link: <http://www.istat.it/it/archivio/141193>

Tabella 1 – I risultati delle indagini sui consumi di biomasse legnose in Italia

Anno di riferimento	Valori stimati (Mt)	Consumi medi per famiglia (t/anno)	Fonte	Note
1997	21,6	3,27	ENEA-CIRM in Gerardi <i>et al.</i> (1998)	Consumi residenziali. Campione di 1.727 famiglie utilizzatrici
1999	14,7	3,07	ENEA-ATESIA in Gerardi e Petrella (2001)	Consumi residenziali. Campione di 6.000 famiglie
2006	19,1	4,3	ARPA Lombardia-APAT in Caserini <i>et al.</i> (2007)	Consumi residenziali. Campione di 5.000 famiglie
2013	24,0	n.d.	AIEL (Baù, 2014)	Stime sui consumi energetici totali (residenziali e industriali) di legna e cippato*
2013	17,7	3,2	ISTAT (2014)	Consumi residenziali. Campione di 20.000 famiglie

(*): stime sui consumi dell'Associazione Italiana Energie Agroforestali (AIEL) basate sulle vendite e la diffusione degli apparecchi domestici ed i grandi impianti civili ed industriali presenti sul territorio nazionale (Bau, 2014): 19,3 Mt di legna da ardere, 4,7 Mt di cippato e 3,3 Mt di pellet.

Tabella 2 – Consumi energetici di biomasse legnose delle famiglie in Emilia-Romagna

Anno di riferimento	Valori stimati (Mt)	Famiglie che consumano biomasse (n)	Consumi medi per famiglia (t/anno)	Fonte
1997	1.297.388	416.604	3,11	ENEA-CIRM in Gerardi <i>et al.</i> (1998)
1999	977.982	245.252	3,99	ENEA-ATESIA in Gerardi e Petrella (2001)
2006	932.336	376.654	2,48	ARPA Lombardia-APAT in Caserini <i>et al.</i> (2007)
2010	1.472.597	355.281	4,14	ARPA Em.Rom.- TQL in ARPA (2011)
2013	828.609	334.023	2,48	ISTAT (2014)

Il dato sui consumi rilevato dall'ISTAT è già stato utilizzato da *EurObserv'ER* nel suo rapporto annuale "Barometer" (pubblicato nel gennaio 2015) per giungere a stimare che nel 2013 la produzione italiana di energia primaria da biomasse solide è stata pari a 7,45 milioni di tonnellate-equivalenti di petrolio⁴⁷ (Mtoe). Questa stima, pubblicata da un organismo internazionale, è una ulteriore conferma del fatto che nel 2013 l'obiettivo della produzione di energia primaria di 5,25 Mtoe per le biomasse solide, stabilito dal PAN⁴⁸ (Piano d'Azione Nazionale per le energie rinnovabili) al 2020, è già stato ampiamente raggiunto. L'indagine ISTAT è stata sicuramente tenuta presente anche nel Bilancio Energetico Nazionale (BEN) 2013 recentemente reso pubblico dal Ministero dello Sviluppo Economico. La tabella 3 riporta i dati dei BEN 2012 e al 2013 relativi alla voce "biomasse" che il BEN disaggrega in 3 categorie, tra cui la "Legna"⁴⁹. Al 2013 il BEN stima un consumo di 26,7 Mt di legna, un dato che potrebbe essere interpretato come la biomassa legnosa consumata a fini termici da famiglie (17,7 Mt dell'indagine ISTAT?)

⁴⁷ Eurobserv'er indica chiaramente che il valore riguardante la produzione italiana di energia primaria per il 2013 (riportato nel Barometer 2015) è fortemente influenzato dal dato sui consumi pubblicato da Istat a dicembre 2014. Infatti, basti pensare che un anno fa EurObserv'ER aveva ipotizzato per il 2012 un valore inferiore del 50% rispetto a quello ipotizzato per il 2013.

⁴⁸ Disponibile al seguente link: <http://www.istat.it/it/archivio/141193>

⁴⁹ E' ipotizzabile che il Ministero abbia incluso in questa categoria anche il pellet in termini di legna-equivalente.

sommata a quella delle imprese (9 Mt?). L'aumento dei consumi verificatosi tra 2012 e 2013 è anomalo (da 10,1 a 21,2 Mt, + 109,3%), ma il Ministero non segnala tale anomalia. Evidentemente con tali dati non è possibile ricostruire una serie storica basata su valori omogenei. In effetti anche il rapporto tra "Legna" e "Biomasse per elettricità" riportato dai BEN, sia per i dati di produzione che di importazione netta, desta qualche perplessità.

Tabella 3 – Dati relativi alle biomasse nel Bilancio Energetico Italiano

Anno di riferimento		Legna (kt)	Biomasse per elettricità (kt)	Biodiesel (kt)	Totale (kt)
2012	Produzione	10.153	10.552	287	20.992
	Import-export+variaz.scorte	4.328	0	1.142	5.425
	Consumo interno	14.471	10.552	1.429	26.452
2013	Produzione	21.254	14.135	459	35.848
	Import-export+variaz.scorte	5.498	0	876	6.374
	Consumo interno	26.752	14.135	1.335	42.222

Fonte: Ministero dello Sviluppo Economico (vd. <http://dgerm.sviluppoeconomico.gov.it/dgerm/ben.asp>).

I dati relativi all'offerta e la domanda di biomasse legnose in Italia

I dati dell'indagine ISTAT sollecitano una domanda: in che misura i consumi sono coperti dall'offerta interna di biomassa? Per ragionare sui dati dell'offerta, vanno considerati in primo luogo i prelievi forestali per fini energetici che, così come registrati dall'ISTAT e pubblicati da EUROSTAT, nel 2012 – ultimo anno di cui si dispongono dati – sono pari a 5,3 M m³ (circa 2,7 M t⁵⁰). Tale volume corrisponde a quasi il 70% dei prelievi totali nazionali, percentuale che risulta in continua crescita dalla fine degli anni '70 in ragione del processo di despecializzazione delle utilizzazioni forestali, sempre più indirizzate verso produzioni di minore valore assoluto e minore valore aggiunto finale rispetto a quelle di legname ad uso industriale (Pettenella e Favero, 2013). Va comunque sottolineato che numerosi studi (Ciccarese *et al.*; 2003; Corona *et al.*, 2007) hanno rilevato come i dati sui prelievi riportati dall'ISTAT siano probabilmente affetti da una forte sottostima. Gasparini e Tabacchi (2011), ad esempio, nel presentare i dati dell'Inventario Nazionale delle Foreste e dei Serbatoi di Carbonio, hanno stimato un dato disaggregato di prelievi di legname da opera e di legna a uso energetico pari complessivamente a 13,3 M m³ (6,6 Mt), ossia un valore 1,7 volte più elevato, per l'anno di riferimento (2005), di quello di fonte ISTAT. Oltre ai prelievi interni, tra le fonti d'offerta di materia prima legnosa bisogna considerare anche la componente legata all'importazione dall'estero. Come riportato dalla banca dati COMTRADE⁵¹, l'Italia nel 2013 ha importato 3,8 m t⁵² di assortimenti potenzialmente destinabili a fini energetici, un dato sfortunatamente non corrispondente a quello del BEN riportato in tabella 3 che, oltretutto, non si riferisce all'impiego potenziale, ma a quello reale (una quota parte dell'importazione di cippato e residui legnosi impiegabili a fini energetici viene utilizzata nelle produzioni industriali di pannelli, paste e altri prodotti). Nel dettaglio, nel 2012 l'Italia costituiva il primo importatore mondiale di legna da ardere e il terzo importatore di *pellet* a uso civile. Per completare il quadro dell'offerta di biomasse legnose a fini energetici è necessario annoverare il materiale legnoso derivante dal riciclo e dai prelievi fuori foresta. Secondo i dati Rilegno, rielaborati dalla Fondazione per lo Sviluppo Sostenibile e FISE UNIRE (2014) i rifiuti in legno raccolti e riavviati a riciclo nel 2013 ammontavano a 1,4 Mt (48% costituiti

⁵⁰ Nel testo viene sempre assunto un coefficiente di conversione di 1 m³ = 0,5 t, come suggerito da Mantau e Saal (2010).

⁵¹ Dati disponibili al seguente link: <http://comtrade.un.org/>

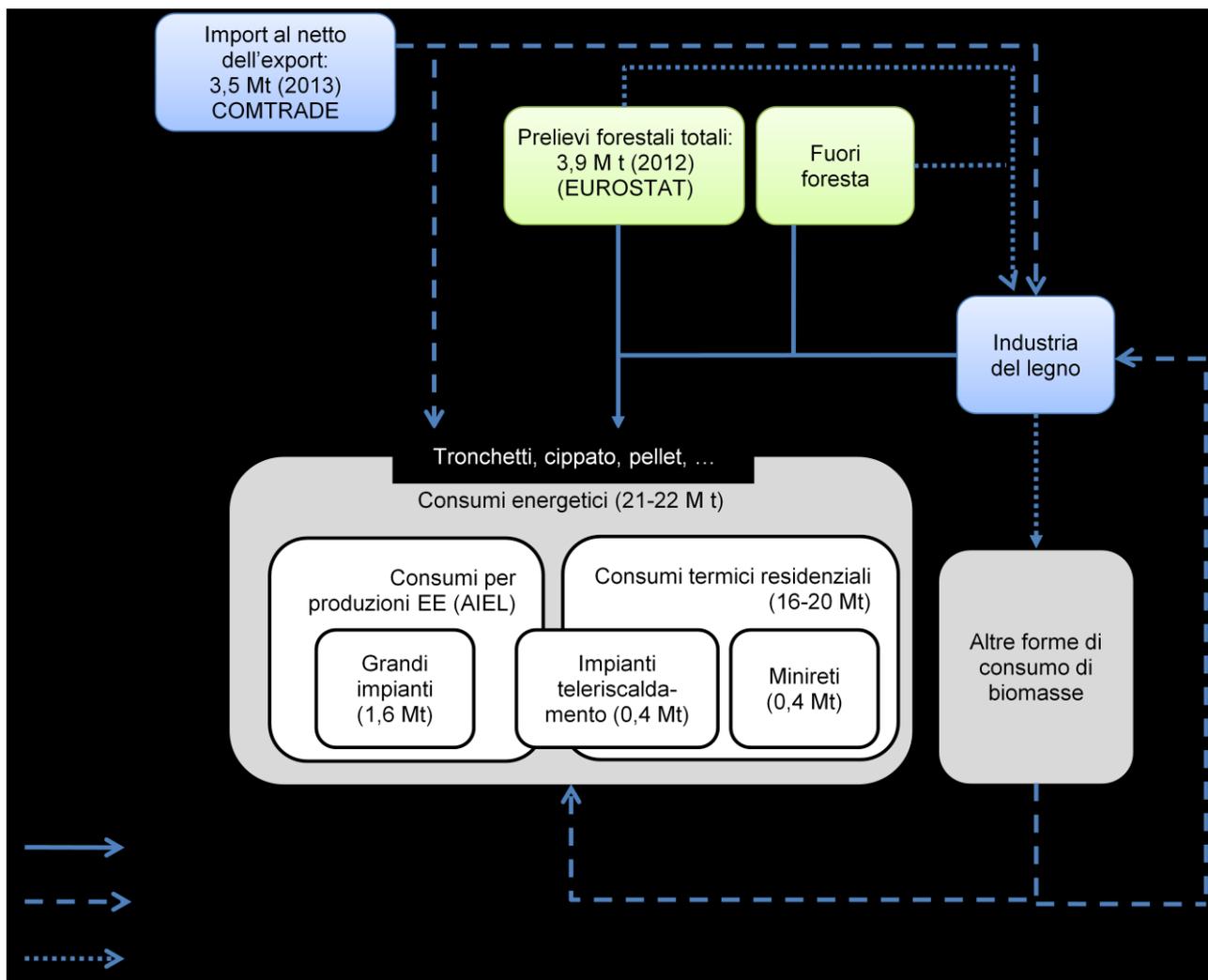
⁵² In particolare: 0,78 M t di legna da ardere, 1,75 M t di *pellet*, 0,63 M t di cippato.

da imballaggi). Una modica quantità degli imballaggi in legno raccolti (66.000 t) sono stati avviati al recupero energetico in impianti industriali, mentre in base ad una indagine di Rilegni affidata, per la terza annualità all'Istituto di Ricerca CRA di Milano⁵³, nel 2012 il 34% delle famiglie possiede impianti a biomasse legnose in prevalenza costituiti da caminetti aperti, caminetti chiusi e stufe a pellet o cippato. Sono 5.034.000 le famiglie che utilizzano notevoli quantità di imballaggi di legno per riscaldare o cucinare; il loro consumo annuo a livello nazionale è stato stimato pari a 353.000 t. Per quanto riguarda i prelievi fuori foresta, considerato che non esistono dati statistici ufficiali, ci si può avvalere soltanto della stima fornita dalla Federazione Italiana Produttori di Energia da Fonti Rinnovabili (FIPER), che indica in 3-4 Mt il quantitativo annuo di sottoprodotti da verde urbano e ambientale, sia pubblico che privato, potenzialmente impiegabile a fini energetici (FIPER, 2013). Dal lato opposto, quello cioè relativo ai consumi, a quelli domestici rilevati da ISTAT vanno aggiunti quelli industriali, per i quali Antonini e Francescato (2010) di AIEL hanno stimato un consumo di cippato di circa 1,8 Mt nei 45 grandi impianti per la produzione di energia elettrica (450 MWe), di 0,41 Mt negli 86 impianti di teleriscaldamento e 0,38 Mt nelle mini-reti di 5 Regioni (Piemonte, Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia e Toscana). La figura 1 cerca di sintetizzare i flussi di biomasse legnose a fini energetici sulla base delle fonti di documentazione sopra riportate. Nonostante il quadro di sintesi sia evidentemente incompleto (non è nota, ad esempio, la quantità di scarti delle lavorazioni industriali impiegate a fini energetici) o parziale, e i dati medi annuali si riferiscano ad un periodo (2009-2013) nel quale ci sono state variazioni significative, è ugualmente evidente come il divario tra la stima dei consumi e quella delle fonti di approvvigionamento sia netto. Infatti, anche ipotizzando che tutto il materiale disponibile venga utilizzato a fini energetici, escludendo cioè possibili impieghi alternativi ad uso industriale (come nel caso del materiale di riciclo), la somma delle possibili fonti di biomassa legnosa non coprirebbe neppure il 50% dei consumi domestici rilevati da ISTAT nell'indagine citata.

Sulla base di quanto esposto, si può presupporre, prima di tutto, che il settore legno-energia italiano sia caratterizzato da un'articolata economia informale legata ad utilizzazioni su piccola scala e realizzate da operatori privati che sfuggono alle rilevazioni delle statistiche ufficiali, causando una forte sottostima dei dati ufficiali. In secondo luogo, è lecito ritenere che all'interno del settore legno-energia italiano alcune risorse, come i residui industriali e i prelievi fuori foresta, giochino un ruolo importante, finora mai correttamente stimato, nel soddisfare la domanda di biocombustibili legnosi.

⁵³ L'indagine è citata nel rapporto della Fondazione per lo Sviluppo Sostenibile e FISE UNIRE (2014).

Figura 29 – Sintesi dei flussi di biomasse legnose a fini energetici. Fonte: nostre elaborazioni sui dati delle fonti informative citate nel testo e in figura (con relativo anno di rilevazione).



(*) Per il consumo industriale di biomasse legnose per fini energetici è stato utilizzato il dato fornito da Antonini e Francescato (2010).

Una maggiore chiarezza dei dati come base per una nuova programmazione di settore

Alla luce di queste considerazioni, è auspicabile che si proceda quanto prima ad una revisione delle previsioni programmatiche per ciò che attiene all'impiego ed alla valorizzazione della prima fonte di energia rinnovabile del Paese. Il raggiungimento dell'obiettivo fissato dal PAN per il 2020 per le biomasse solide, infatti, non è più solo un'ipotesi (Tommasetti, 2010), bensì viene ormai documentato anche da organismi internazionali qual è EurObserv'ER. A livello istituzionale, oltre all'attivazione di una nuova e diversa programmazione strategica, appare necessario ipotizzare anche un potenziamento del sistema di raccolta e di registrazione delle statistiche di settore. Ad esempio, la base informativa riguardante le biomasse legnose potrebbe risultare più realistica se, sul piano dei prelievi forestali, venisse prevista la possibilità di incrociare i dati sulle superficie tagliate e quelli relativi alle masse legnose asportate. Appare inoltre quanto mai opportuno iniziare ad approfondire il tema dei prelievi fuori foresta e quello dei residui industriali utilizzati per fini energetici, fornendone stime credibili.

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Annex 3 .

Andrighetto N., Pettenella D., Masiero M. (2017). **Changing patterns in wood trade: the emerging EU regional market.** Oral presentation in IUFRO 125th Anniversary Congress in the session 7:D9, Freiburg 18-22.11.2017.

Abstract for oral presentation (accepted)

In the last decade many political and socio-economical drivers have been characterizing the European timber market. Since the global demand for timber products in emerging economies has increased, Europe has gradually diminished its leading role on the international timber market. At the same time, the legal requirements for placing timber in the EU market have become stricter through the implementation of the Regulations (EU) 2173/2005 and 995/2010.

Our study aims to demonstrate that, due to these (and other) driving forces, the EU timber market is subjected to a regionalization process, with a growing concentration of trade flows among European countries. To test this hypothesis the research analyses the EU roundwood and sawnwood markets, trying to identify their most recent trends. Starting from 2005-2014 UN Comtrade data, the research aims to assess the level of regionalization of the EU timber market, through trade-related indicators such as changes in the number of trading partners for selected EU countries and the trends in extra-EU timber imports.

Results show how, after the economic crisis (2008), the role of the intra-EU trade in roundwood and sawnwood has suddenly risen, while imports of tropical timber dropped. In 2012-2014, although less evident, these trends continued.

Annex 4

BOOK CHAPTER: Jianbang G., Cerutti P., Masiero M., Pettenella D., Andrighetto N., Dawson T. (2016). **Quantifying illegal logging and related timber trade (chapter 3)**. In: D.Kleinschmit, S.Mansourian, C. Wildburger, A. Purret (eds.), *Illegal Logging and Related Timber Trade – Dimensions, Drivers, Impacts and Responses*. A Global Scientific Rapid Response Assessment Report. IUFRO World Series Volume 35. 2016 Vienna, p. 37-59.

3.1 Introduction

There is ample, albeit scattered and not always coherent, evidence of illegal logging and timber trade around the world, especially in tropical forest regions (Hoare, 2015a; Nellemann, 2012). Understanding the extent of illegal logging and timber trade as well as the trade flows is critical to understanding and addressing the problem. Yet, accurately quantifying illegal logging and timber trade is challenging, if not impossible, because of its illicit nature and timber laundering. Illegality leads to the lack of data on its measurement; timber laundering adds another difficulty in distilling the illegal components from existing timber production and trade data. This chapter provides an overview on the economics of illegal logging and timber trade. Estimates of the extent of illegal logging and timber trade and the methods used to make the estimates are summarized and compared. Major legal and illegal global timber trade flows are depicted along with domestic, regional, and global wood supply chains representing key agents in producer, processing, and consumer countries. Financial flows associated with illegal logging and timber trade are also illustrated using a case study. Finally, data gaps are identified, and new developments of illegal logging and timber trade are discussed along with suggested solutions.

3.2 Species, markets, and players

3.2.2 Rare and endangered tree species

Illegal logging and timber trade often targets very valuable species that are under harvest and/or trade regulations. Such species are also often rare and/or endangered, and this is one reason why illegal logging and timber trade may also be detrimental ecologically and economically. These rare and endangered species have higher economic values than other species because of their unique physical and chemical properties (e.g. color, texture, odor, and hardness of the wood) and/or simply because of their scarcity (rarity), which creates higher incentives for illegal harvesting and trade. Increased logging and trade in turn enhances the rarity/scarcity of the species, intensifying their threatened status or even driving them to extinction. This represents a vicious cycle among value, rarity (scarcity), and illegality (Fig. 3.1).

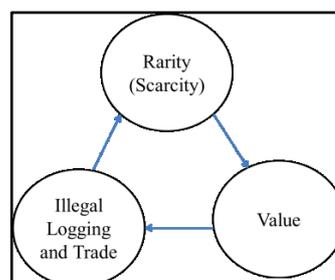


Fig. 3.1 Vicious cycle among value, rarity, and illegality

Among the rare and endangered species targeted by illegal logging and timber trade are mahogany (genus *Swietenia*), rosewood (genus *Dalbergia*), and ebony wood (genus *Diospyros*). For each of these genera, there are many species. These wood species are generally used in niche markets such as parquets, boats, furniture, musical instruments, and other items, and actively traded in domestic and global markets. Compared to mahogany and rosewood, ebony wood is more widely used as ornamental material in small items and is of higher prices. Because of their threatened status, some species have also been put under the protection of international conventions, such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 2016), and listed under the IUCN (2016) Red List of Threatened Species. Many mahogany, rosewood, and ebony wood species are classified into the endangered or vulnerable category on the IUCN list.

3.2.3 Domestic, regional, and global markets and their interlinks

There are multiple market layers for wood products. In terms of geographic scope, there are domestic (local and national), regional, and global markets. Additionally, there are legal and illegal markets as well as formal and informal markets (see Chapter 2 for a discussion on these definitions). These different layers and types of markets are interlinked, constituting a complex web of timber production, trade, and markets.

A diagram shown in Fig. 3.2 illustrates the interlinks among the domestic, regional, and global markets, which involve two producer countries, one processing country, and one consumer country. Each country in the web has its own domestic market that is further connected to the regional and global markets. The entire web represents the global web of markets. A more complex global web of wood products markets often consists of multiple producer, processing, and consumer countries and mixed flows of legal and illegal wood products.

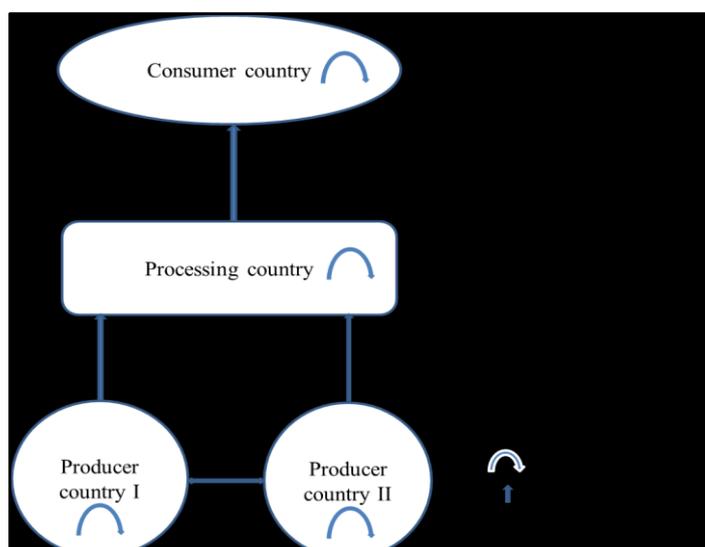


Fig. 3.2 Interlink of domestic, regional, and global markets

Domestic markets include local and national markets. Timber supply to the domestic markets in many tropical forest countries is largely provided by informal logging/milling, namely chainsaw milling. Although chainsaw milling in some countries is allowed under certain conditions, it is illegal in most tropical countries (Wit *et al.*, 2010). Chainsaw milling does not require sophisticated and expensive equipment. Its cost is relatively low, thus meeting the needs for providing cheap timber to the domestic markets. Because of low initial capital investments and technical requirements for chainsaw milling, its barriers to entry are also low. As a result, although individual chainsaw milling operations are small scale their aggregate production level can be substantial (Bayol *et al.*, 2013), and it is difficult to monitor and control chainsaw milling.

Regional markets involve multiple countries, particularly neighboring countries in a region. A neighboring country could be a “pass-through”, processing, and/or consumer country. Some pass-through countries may not engage in timber processing while some others may. A “pass-through” country can play various roles in timber trade and laundering. It transits timber from the original producer country to the next country in the regional or global supply chain, and in some cases it re-exports the timber back to the original producer country (part of timber laundering) (Hoare, 2015a). In an illegal timber trade web, a pass-through country is often the place where the initial phase of timber laundering takes place. The timber supply to regional markets can be provided by both informal and large scale industrial logging. The market shares by different forms of logging vary from case to case.

Global markets involve producer, pass-through, processing, and consumer countries. Global trade constitutes only a small portion of total global timber production. Large and well-connected operators are often the key players in the global markets although small operators of informal logging/milling are also involved. In the past decade, timber from illegal forest conversion has become a significant portion of international timber trade (Hoare, 2015a; Lawson, 2014a).

3.2.4 Supply chains for domestic, regional, and global markets

The supply chains of wood products differ across different market types and layers. From the domestic to global markets, the complexity of supply chains increases.

The supply chains for domestic markets are relatively simple. Their key players generally include loggers, transporters, traders, financiers, and consumers at the domestic level. The effort required to disguise illegality in the domestic market is often minimum in a tropical producer country, and timber transport to domestic markets is of short distance with few barriers. Thus, there are not many middlemen along domestic timber supply chains. However, given the large size of some domestic markets, many operators can be involved, as well as state officials collecting bribes all along the value chain (Cerutti *et al.* 2013).

The complexity of regional supply chains varies depending upon the nature and structure of the regional markets. The key players along a regional supply chain consist of loggers, transporters, traders, financiers, and consumers at both domestic and regional levels. The existence of a regional market is often due to the differences in forest resource endowments and wood processing capacity across the countries of the regional market as well as their historical economic, cultural, and political ties. Geographic adjacency also facilitates the forming of a regional market as it reduces transport costs and the risk associated with illegal activities (e.g. border crossing).

The global supply chains of illegal wood products are the most complex. Their key players include loggers, transporters, traders, financiers, and consumers from the domestic to regional and to global levels. Unlike the players of the domestic (and some regional) supply chains, the players of the global supply chains are often large and more sophisticated operators, who have more resources and means to facilitate illegal production and cross-border trade. A global supply chain often interlinks with domestic and regional ones and involves many middlemen. Timber laundering can take place in multiple stages along a complex global supply chain, making it difficult and costly to monitor illegality.

3.2.5 Major producers and importers of legal and illegal tropical timber

Illegal logging is widespread across all tropical forest regions. Yet, Brazil, Indonesia, and Malaysia remain the three dominant suppliers of illegal (and legal) tropical timber (Fig. 3.4) although their severity of illegal logging has decreased in recent years. Brazil, Indonesia, and Malaysia respectively supplies 50

percent, 25 percent, and 10 percent of the world's total estimated illegal tropical timber in 2013 although other producer countries may have higher percentages of illegality (Hoare, 2015a).

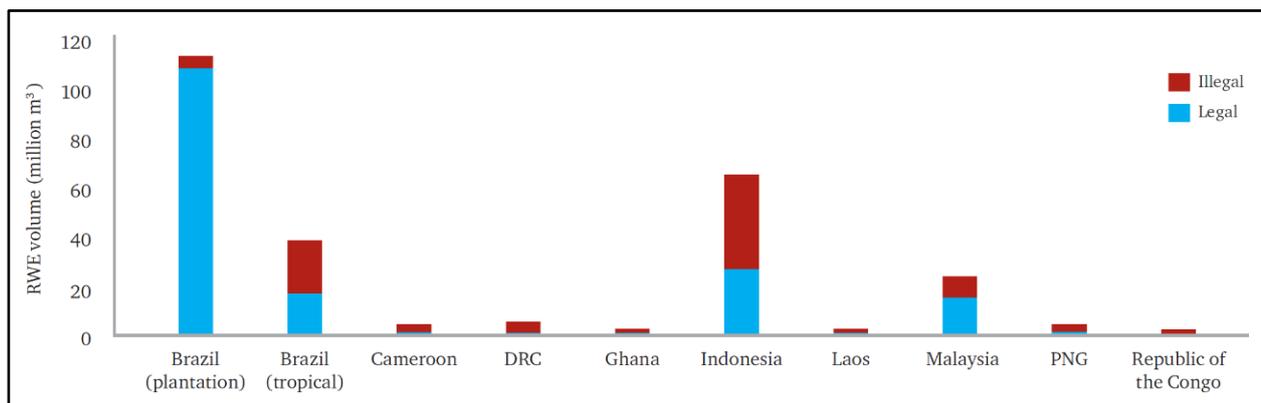


Fig. 3.4 Estimated production of legal and illegal timber by selected tropical countries, 2013 (Source: Hoare, 2015a)

Traditionally, the EU, the US, and Japan were the major importers of tropical wood products. In recent years, China and India have surpassed them to become the two main global importers of tropical roundwood, together covering 72 percent of global tropical log imports in 2014 compared to 28 percent in 2000 (Fig. 3.5).

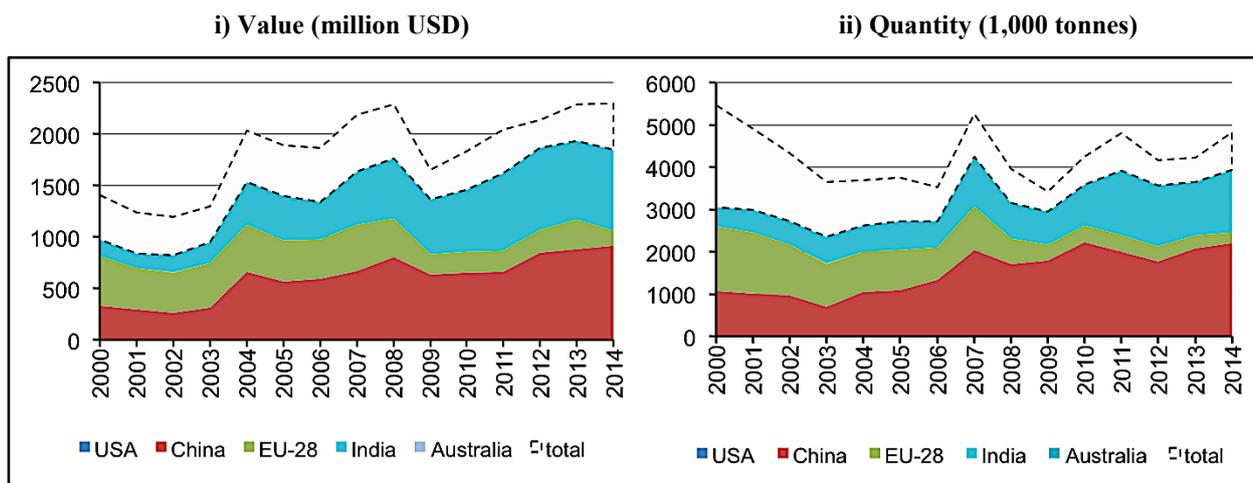


Fig. 3.5 Tropical roundwood imports by selected countries (Data source: UN Comtrade Database, 2016)

Approximately 70 percent and 67 percent of the tropical logs exported, respectively, from Africa and Southeast Asia were destined to China and India in 2014 (Fig. 3.6). In 2000 these figures were 25 percent for Africa and 34 percent for Southeast Asia. The increased imports of tropical logs by China and India are attributable to at least three reasons. First, rapid economic growth in China and India increases their domestic demand for wood products in general and tropical wood products in particular. Second, as an export oriented economy, China converts primary wood products to secondary wood products (including furniture) for exports. Given its limited domestic forest resource, China has to depend upon imported wood materials to produce secondary products for exports. Third, producer countries may prefer exporting timber to markets characterized by less stringent regulatory frameworks (e.g. China and India) since legality requirements set by other market destinations (e.g. the EU and the US) are often associated with extra costs necessary to provide certification and/or required documentation (Giurca *et al.*, 2013).

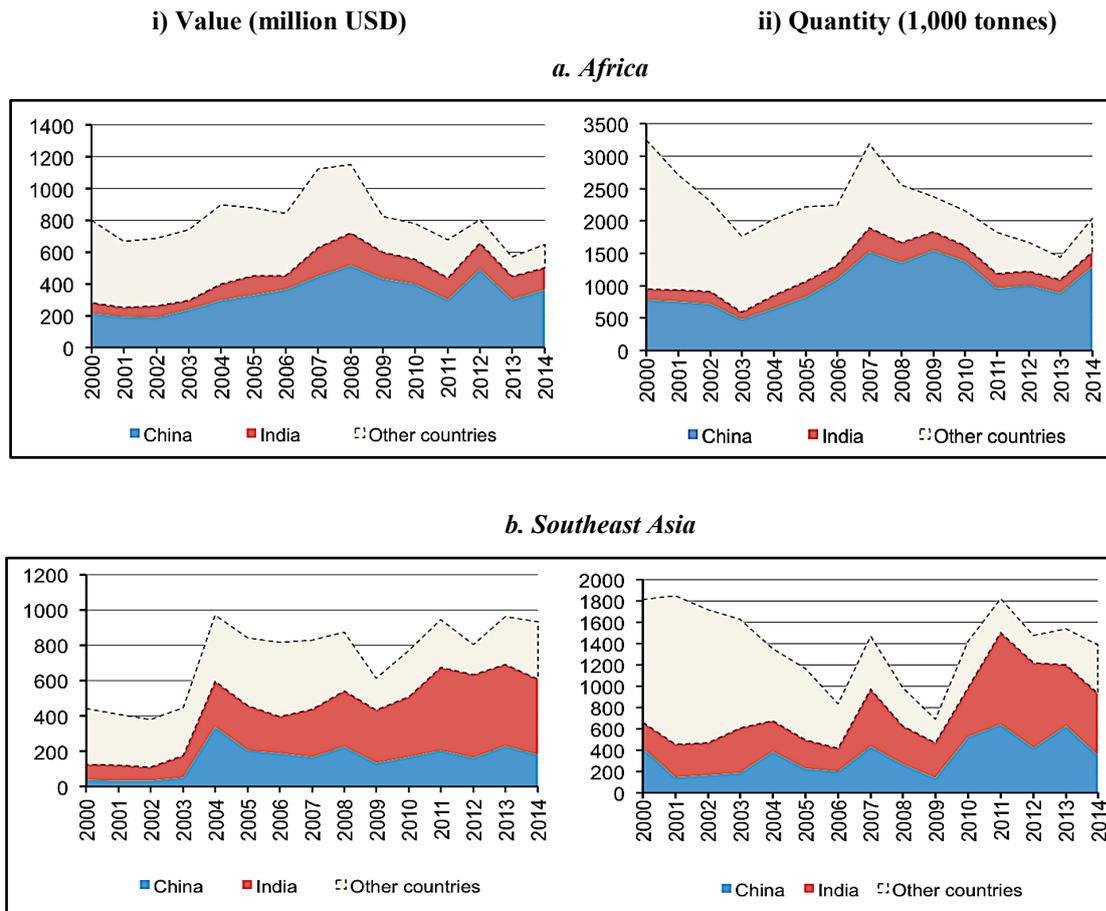


Fig. 3.6 Tropical roundwood imports by China and India from Africa and Southeast Asia (Data source: UN Comtrade Database, 2016)

3.3 Magnitude and flows of global wood products trade

3.3.1 Quantity and value flows of global trade of legal and illegal wood products

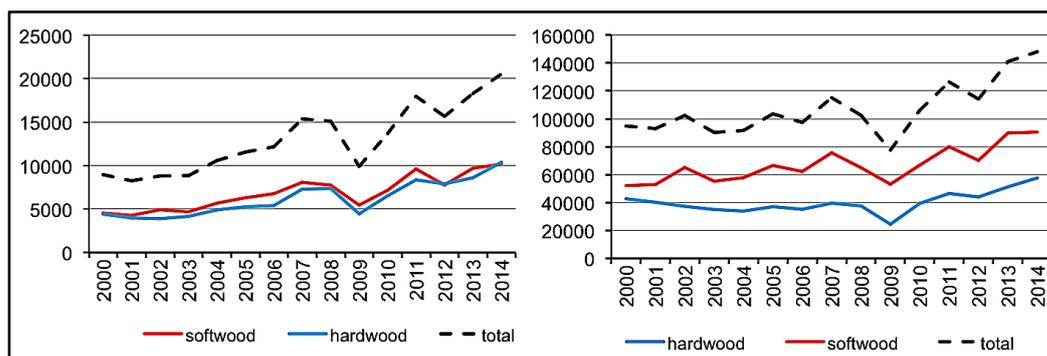
The global annual trade value of wood products (primary and secondary wood products excluding furniture) amounts to USD250 billion, of which approximately USD4.5 billion are tropical industrial roundwood (average of 2011-2012) (FAO, 2016). Historically, bilateral trade of wood products took place primarily between consumer and producer countries, largely between producer and consumer countries in the developed world and between a consumer country in the developed world and a tropical timber producer country. As China became the global processing hub of wood products and the demand for wood products in emerging economies increased, this trade pattern has changed dramatically (Fig. 3.7). China now has become the world's largest importer and exporter of wood products (UN Comtrade Database, 2016). Although wood products trade among developed countries remains an essential part of total global wood products trade, trade with China and other emerging economies has become increasingly important in overall wood products trade in general and illegal timber trade in particular. Take primary wood products (roundwood, sawnwood, plywood, and veneers) as an example (because they are the direct products of illegal logging). From 2000 to 2014, the global total trade of primary wood products increased by 41 percent in quantity and doubled in value. The growth trend, however, was not monotonic: all four commodity groups show a decrease in 2008-2009 as a result of the global financial crisis (Fig. 3.8). Most of the suspicious trade of tropical hardwood have taken place in route of countries where the rapid growth in overall hardwood trade has occurred. China

and India have witnessed rapid growths in their tropical hardwood imports (Fig. 3.6); meanwhile they are also among the large importers of illegal tropical hardwood (Hoare, 2015a). Based on the major global trade flows of illegal wood products described by Nellemann (2012) and Hoare (2015a), a large portion of timber from tropic forest countries and Russia is shipped to China, the US, the EU, Japan, and India. The primary wood products imported by China are further processed into secondary wood products which are consumed in China and exported to the US, the EU, Japan, and the rest of the world. Financial (money) flows follow the opposite direction of timber or wood product flows. International transactions associated with illegal timber trade are often in large volume and involved banks in consumer, pass-through, processing, and producer countries. Because of large volumes and the well-developed banking systems in the consumer and processing countries, it is relatively easy to trace the money flows associated with illegal trade. On the other hand, the money flows in producer countries are more informal and in small volume, and the banking systems in most tropical timber producer countries are poorly developed. Although the volume of transactions is small, the number of transactions is large. As such, the money flows in tropical timber producer countries are difficult to trace (Kishor and Lescuyer, 2012).

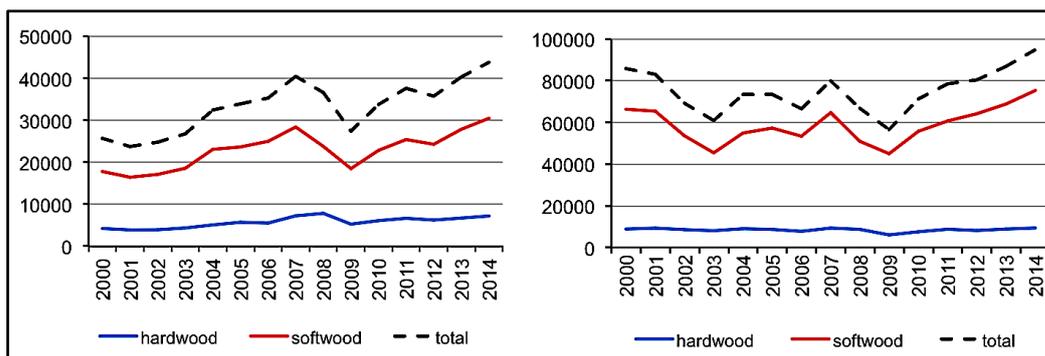
i) Value (million USD)

ii) Quantity (1,000 tonnes)

a. Roundwood



b. Sawnwood



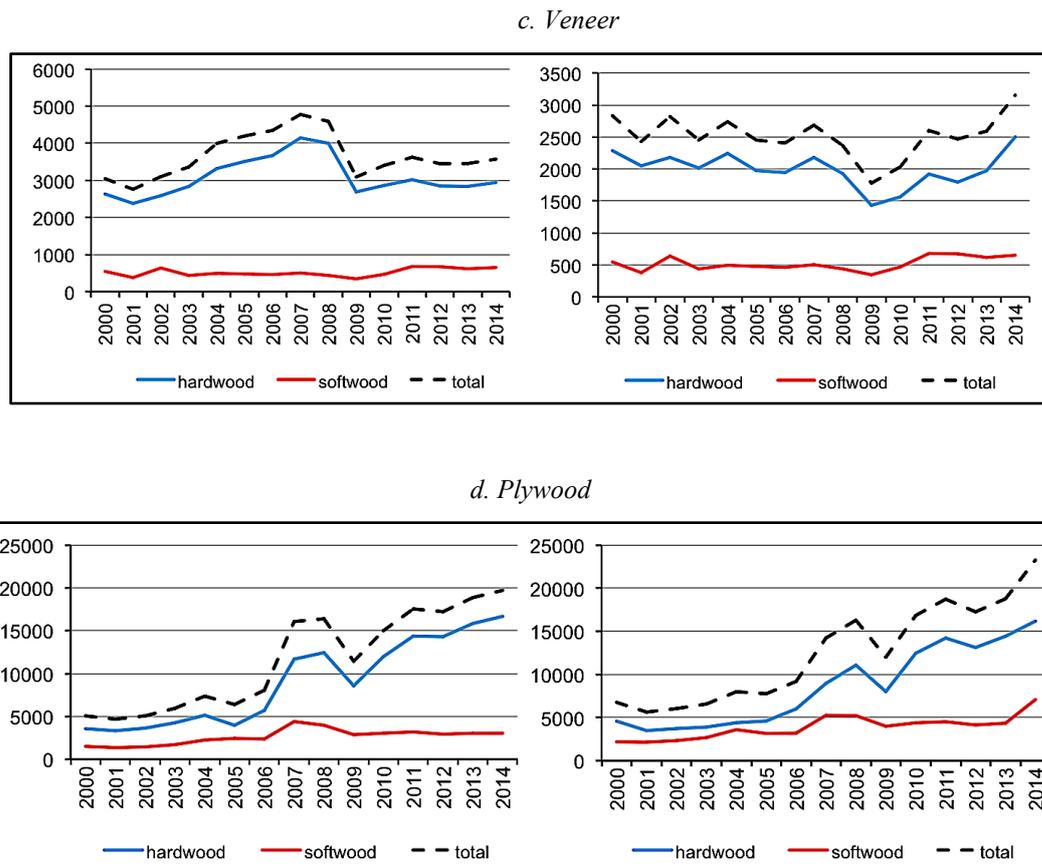


Fig. 3.8 Trend in international trade of primary wood products (Data source: UN Comtrade Database, 2016)

Most benefits associated with international illegal timber trade accrue to the middlemen—processors, traders, and financiers—in the producer, pass-through, processing, and consumer countries, particularly those in the pass-through and processing countries. As to the portion of timber revenues left in the local communities of the producer countries, most of it goes to few local “elites” (Kishor and Lescuyer, 2012). Local loggers receive only minimal compensation although it is usually higher than the income that the loggers can get otherwise. Hence, the local loggers also have incentives to engage in illegal logging. While the actors associated with illegal logging and timber trade gain from their illegal activities, such activities are also reported to cause annual losses in the order of billions of US dollars in assets, revenues, taxes and royalties (World Bank, 2006; Nelleman 2012). Moreover, revenues from illegal timber trade have been used to finance corruptions and other illegal activities. In some African and Southeast Asian countries (e.g. Liberia, Democratic Republic of the Congo (DRC), Sierra Leone, Cambodia, and Myanmar), revenues from illegal timber trade were a major financial source for wars and conflicts (Seneca Creek Associates and WRI, 2004).

3.4 Assess, compare, and relate existing estimates on illegal production and trade

3.4.1 Methods used to estimate illegal logging and timber trade

By their very nature, statistics on illegal activities are difficult to find. Therefore, indirect methods are used to estimate illegal production and trade. The following methods are widely used.

Trade data discrepancies

Export/import discrepancies between trade-partner countries have long been used as an important indicator of illegal timber trade (Brunner *et al.*, 1998; Johnson, 2002). Scientific literature identifies a large number of factors that can contribute to discrepancies in trade statistics between two countries (Castaño, 2007; Chen, 2010; Eastin and Perez-Garcia, 2004; Guangcui, 2003). They can be classified into “primary normal factors” (e.g. imports are recorded as “cost, insurance and freight”, CIF) and exports as “free on board”, FOB), “secondary normal factors” (e.g. differences in product classifications) and “abnormal factors” (e.g. illegal activities) (Castaño, 2007; Goetzl, 2005). While trade data discrepancies offer a hint of problems that may exist with unreported trade, “data discrepancies by themselves are not prima facie evidence that illegal trade has occurred” (Seneca Creek Associates and WRI, 2004, p. 4). However, if significant or persistent differences are detected, and if there are additional evidences available, than discrepancies can be assumed as an indicator for illegal timber trade. In particular, discrepancies can become informative about the volume of illegal trade only in cases where large volumes of primary wood products are traded (Chang and Peng, 2015; Lawson, 2007). This might become a limitation when considering that, as a general trend, trade flows for primary materials, especially towards Northern countries (e.g. the US and the EU) are on the decrease, while those for processed or even finished products are on the increase. In addition, since trade data discrepancies build on gaps between import and export data, they do not apply to illegally sourced timber traded on the domestic markets of producer countries. In general, trade data quality and consistency remain questionable, and discrepancies might be the result (among others) of poor quality data, errors in collection and compilation of trade statistics, inconsistent product classification, inaccurate measurements and conversion factors, and modified/falsified shipping documentation referred to legally harvested timber (e.g. to avoid paying royalties or export taxes) (Castaño, 2007).

Wood-balance analysis

This approach represents the basis for many estimates of illegal logging rates in producer countries. It compares timber inputs (the sum of production and imports) and outputs (the sum of exports and domestic consumption) at the country (or regional) level. Where a deficit between inputs and outputs emerges and cannot be otherwise explained, this is interpreted as an indicator of illegality. The corresponding material shortfall can then be interfered as coming from illicit domestic harvesting and/or imports (Lawson, 2007). Wood-balance analysis techniques have been implemented by several authors to analyse illegal logging rates and trade at both global (Dieter, 2009; Johnson, 2003; Seneca Creek Associates and WRI, 2004) and national levels (Lawson and MacFaul, 2010; Palmer *et al.*, 2002; Prasetyo *et al.*, 2012). Although largely used to estimate the scale of illegality (both in absolute and relative terms), such analyses have some limitations. For example, official estimates of industrial roundwood production might relate to the formal sector rather than include also the (not necessarily illegal) informal sector, thus underestimating removals. Moreover, production data might not be able to capture domestic illegal harvesting (e.g. roundwood from plantations established through natural forest conversion, informal small-scale logging, etc.) that have increased in recent years (Hoare, 2015a) and trade statistics *per se* do not allow identifying the proportion of illegally sourced material embodied within imports. Finally data capture at the national and subnational scales can vary from country to country, and within each country, thus making comparison difficult and not always consistent. Wood-balance analyses are not just used for detecting illegal timber. They allow generating aggregated summary of wood resource availability and use, thus representing key information sources and forecasting tools for the forestry and wood industry sectors (Knauf, 2015).

Import source analysis

This approach is used to assess illegal trade by multiplying estimated illegal logging rates in source countries by trade volumes reported by official statistics. It largely depends on estimates of illegality at source that are normally elaborated based on existing literature as well as expert perceptions surveys, field

surveys, and interviews with stakeholders. Such estimates might be imprecise, vary according to the source, and are rarely updated in a consistent manner over time (Lawson, 2007). Contreras-Hermosilla *et al.* (2007) developed one of the first sets of estimates. Additional ones were developed and (in some cases) used to complement each other (Li *et al.*, 2008; Miller *et al.*, 2006; Seneca Creek Associates and WRI, 2004). Import source analysis is largely used by Chatham House by “calculating roundwood equivalent volumes (RWE) and US dollar values for individual import flows (source country/product) from official import data (for timber products, wood furniture, and pulp and paper), and then multiplying these by estimates of the proportion of wood considered likely to be illegally sourced in each individual wood flow in each year” (Lawson, 2014b, p. 2).

Expert survey

This method involves the surveys of experts about their perceptions of illegality. Although this survey method can be applied to estimating both illegal logging and illegal trade, most of its applications so far have been in illegal logging (production). To estimate illegal logging, researchers ask a selected group of experts in producer countries about their perceptions of extents of illegal logging in their countries. To estimate illegal trade, on the other hand, the survey respondents include experts from producer, processing, and consumer countries. The surveys can be done via mail, phone, face-to-face interviews, and online. This method does not use the existing production and trade data which are not intended/designed to cover the illegal components of production and trade. Hence, it can bypass the weaknesses associated with currently available production and trade data in estimating illegal production and trade. When data on production and trade are not available, this method could be the only tool to estimate illegal production and trade. However, this method has its own limitations. The validity of its estimates depends on the selection (sampling) of experts and their knowledge of the illegal activities. Additionally, perceptions could be different from the reality. Because costs will incur in the survey, this method may be more expensive than wood-balance analysis and the trade data discrepancies methods, which use the data already available. This survey method has been used to estimate the percentage or a range of percentage of illegal logging in total timber harvest (Hoare, 2015a; Lawson and MacFaul, 2010) and the percentage of illegal conversion of forestland for agricultural production in total forestland conversion or total agricultural production (Lawson, 2014a).

Hybrid method

A hybrid method is any combination of the above methods. A hybrid method can be more effective and yield better estimates of illegal production and trade if its combined strengths outweigh its combined weaknesses. As described previously, each method for estimating illegal logging and trade has its strengths and weaknesses. Hence, a hybrid method, which combines multiple methods described above, can take advantage of strengths of each method to overcome some weaknesses intrinsic to some other methods. Additionally, when multiple methods are used, their results (estimates) can be compared. Mutual confirmation or disconfirmation is a useful indication of how good the estimates of illegal production and trade are although validation remains difficult.

3.4.2 Compare estimation methods and their estimates

There have been several attempts to estimate illegal logging and associated timber trade. Most of these estimates have focused on illegal production and trade of timber for commercial use. Recently, some effort has been made to estimate illegal forest conversions for agricultural (crop and livestock) production and their associated timber production and trade (Lawson, 2014a). Table 3.1 shows some recent estimates of magnitudes of illegal logging in high risk producer countries. Seneca Creek Associates and WRI (2004) employed wood flow (import source) analysis coupled with interviews conducted in the producer countries;

Hoare (2015a) was based on the work of Chatham House, which used wood-balance analysis, expert surveys, and other methods and information. World Bank (2006) primarily drew on Seneca Creek Associates and WRI (2004). Nellemann (2012) did not provide estimates of illegal logging in individual countries, instead gave a range of estimate on illegal logging at the global aggregate level based on the synthesis of existing reports including Seneca Creek Associates and WRI (2004) and World Bank (2006).

These four different reports all focused on timber for commercial use. In this sense, their estimates are comparable. Yet, the year of their estimates was different. Additionally, given the difficulty in estimating illegality, usual caution should be taken when using these estimates. As a general remark, the majority of illegally produced timber (particularly roundwood and lumber) is consumed in domestic markets of producer countries (Seneca Creek Associates and WRI, 2004): the ratio of domestic consumption to exports is 7 for roundwood, 2 for lumber, and 0.9 for plywood. Of the three types of primary wood products (logs, lumber, and plywood), plywood has the highest percentage of illegal production and trade. In particular illegal hardwood plywood is almost completely exported. In general terms hardwood is more likely to be illegally harvested and traded than softwood. Illegally produced wood products (except for lumber) are also more likely to be illegally traded than legally produced wood products (Table 3.2).

Table 3.1 Estimated percentages of illegal logging

Country	Source of estimate			
	Seneca Creek Associates and WRI (2004)	World Bank (2006)	Hoare (2015a)	Nellemann (2012)
Bolivia	80	80		
Brazil (Amazon)	20-47	20-47	> 50	
Cambodia	90	90		
Cameroon	50	50	65	
Colombia	42	42		
DRC			> 90	
Ecuador	70	70		
Gabon	50-70	70		
Ghana	34-60		70	
Indonesia	70-80	70-80	60	
Laos	45	45	80	
Liberia	80			
Malaysia	35	35	35	
Myanmar	50	50		
Papua New Guinea	70	70	70	
Peru	80-90	80		
Republic of Congo			70	
Russia	20-50	10-50		
Thailand	40	40		
Vietnam	20-40	20-40		

There are only a handful attempts to estimate the volumes and values of illegal timber production and trade at the global and multiple-country levels (Table 3.3). These estimates were made in different years using different methods and covered different scopes of products and geographic areas. Hence, they may not be readily comparable. Seneca Creek Associates and WRI (2004) estimated that the value of suspicious (likely illegal) primary wood products (roundwood, lumber, and plywood) produced worldwide was USD22.5 billion. Of the total suspicious output, about USD5 billion was internationally traded, accounting for approximately 10 percent of global trade value of primary wood products in 2002. Hoare (2015a) reported that the share of illegal wood products trade had remained relatively stable (about 10 percent of total trade volume of wood products) since 2000. From 2006 to 2013, the import volume of illegal wood products by China, India, and Vietnam increased by more than 50 percent whereas the illegal import volume slashed by one-third for the US and one half for the EU, respectively.

Table 3.2 Estimated percentages of illegal production and trade of primary wood products at the global level (Source: Seneca Creek Associates and WRI, 2004)

Product	Illegal production in total production	Illegal trade in total trade	Illegal trade in total production	Illegal trade in illegal production	Legal trade in legal production
Roundwood (logs)	8	14	1	14	7
Softwood		12	1		
Hardwood		17	1		
Lumber	6	6	2	27	30
Softwood		2	1		
Hardwood		23	5		
Plywood	17	23	9	53	35
Softwood		4	1		
Hardwood		30	17		

Table 3.3 Estimates of illegal timber trade

Source of estimate	Volume (million m ³)	Value (USD billion)	Products covered	Countries covered
Seneca Creek Associates and WRI (2004)	18 (roundwood) 6.9 (lumber) 5.2 (plywood)	5	Primary wood products (roundwood, lumber, and plywood)	Worldwide
Hoare (2015a)	60 (roundwood equivalent)	17	Primary and secondary wood products (including	Imports into 10 countries (China, India, Vietnam, Thailand, Japan,

A significant portion of illegal logging and trade stems from illegal forest clearance. Thirty-one percent of global tropical timber traded originates from illegal forest conversion. Of all causes of illegal logging and trade, the majority of wood products illegally produced and traded originates from forest clearance for commercial agricultural production. From 2000 to 2012, total and illegal conversion of forestlands for commercial agriculture was attributable to 71 percent and 49 percent of total tropical deforestation, respectively. Between 2000 and 2012, 24 percent of total tropical deforestation was directly caused by illegal conversion for agricultural exports. Brazil and Indonesia have witnessed the largest area of forest conversion for commercial agriculture. They together accounted for 75 percent of total tropical forest area that was illegally converted for commercial agriculture between 2000 and 2012 (Lawson, 2014a).

Table 3.4 Estimated exports of timber from forest conversion in tropical countries, 2012 (Source: Lawson, 2014a)

Country	Total RWE ^(a) primary tropical product exports (million m ³)	% of exports from forest conversion (main estimate)	Implied conversion exports RWE (million m ³)
Malaysia	15.6	65	10.1
Indonesia	10.4	75	7.8
Papua New Guinea	3.2	30	1.0
Burma	2.6	50	1.3
Solomon Islands	2.1	15	0.3
Cameroon	1.8	5	0.1
Laos	1.6	55	0.9
Brazil	0.5	20	0.1
Gabon	1.1	10	0.1
Congo	0.9	2	0.0
Ivory Coast	0.7	4	0.0
Ghana	0.5	1	0.0
Others	3.4	14	0.5
Total	44.4		22.2

^(a) RWE express the volume of wood-based products as equivalent to the volume of logs (roundwood) used in the manufacture of the same products, by considering appropriate conversion factors.

3.5 Following the trade data

3.5.1 Recent trends of trade flows of illegal wood products

Since 2000, the share (in volume) of primary and secondary wood products at high risk of illegality has decreased for most of the major processing and consumer countries although no persistent declining trend in total volume of imports has been observed (Fig. 3.10). China has emerged as the largest importer of wood products at high risk of illegality (Fig 3.10) although a

significant portion of China's imports is processed for exports to other consumer countries including the US, the EU, and Japan, among other countries (Zhang and Gan, 2010).

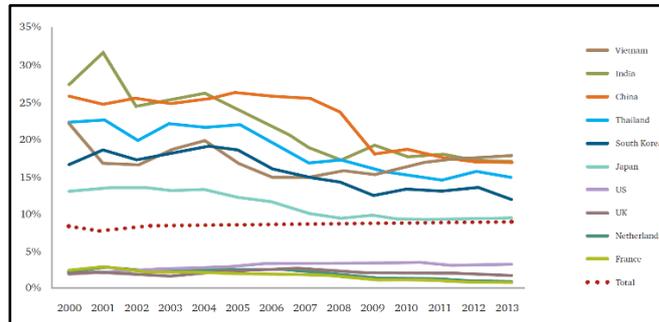
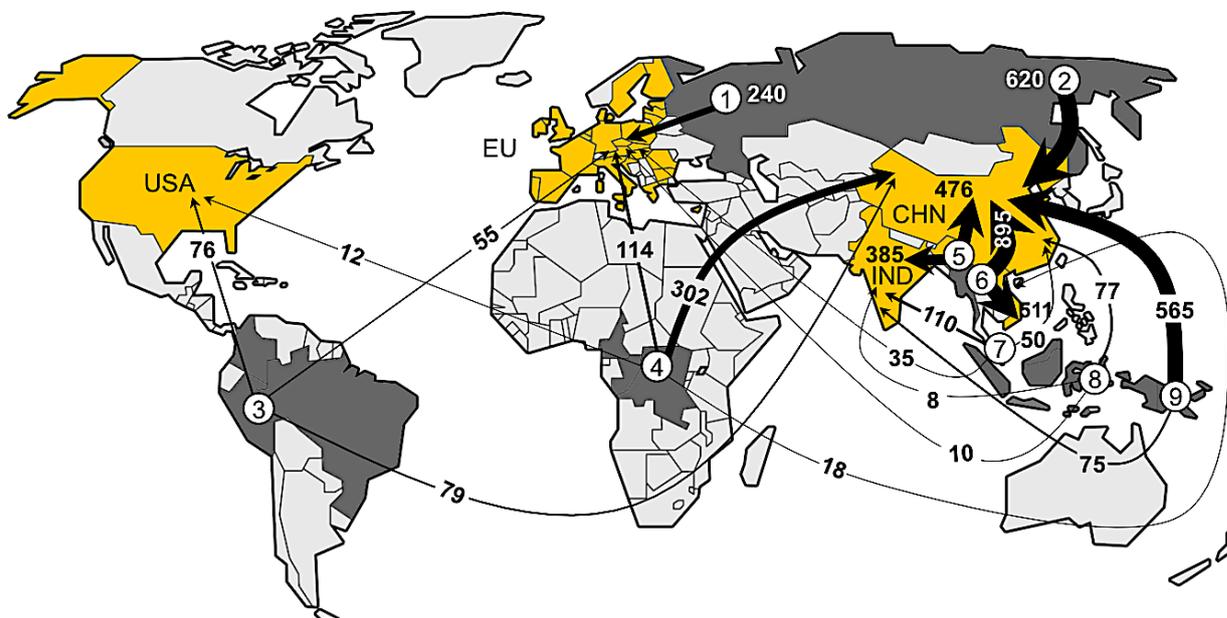


Fig. 3.10 Estimated roundwood-equivalent (RWE) percentages and volumes of imports of wood products at high risk of illegality by selected processing and consumer countries (Source: Hoare, 2015a)

Because of few studies on estimating illegal timber trade flows and the importance of the information on trade flows of primary wood products in understanding illegal logging and trade, we estimate the value of illegal trade flows for roundwood and sawnwood. We use import source analysis, i.e. by multiplying estimated illegal logging rates in producer (source) countries by trade volumes in 2014 reported in the United Nations Commodity Trade Statistics Database (UN Comtrade Database, 2016). The analysis focuses on four key producer countries/regions, i.e. the Russian Federation, South America (Brazil, Colombia, and Peru), the Congo Basin (Cameroon, DRC, and the Republic of the Congo), Southeast Asia (Cambodia, Indonesia, Laos, Malaysia, and Myanmar), and Oceania (Papua New Guinea). For each source country total export and the top-three trade partners (i.e. countries to which wood is exported) are identified and analyzed. With few exceptions (Brazil and Malaysia) trade flows are quite concentrated and the top-three trade partners cover on average between 88 and 89 percent of total exports and in some cases (e.g. Cambodia, Laos and Papua New Guinea) almost the entire export flow from the producer country/region. Source analysis has been preferred over other methods because of several advantages it ensures, especially when implemented at a global scale. It allows using officially recorded international trade statistics and making reference to widely accepted and used illegal logging rates. Although it requires important efforts in treating/cleaning trade data, it allows quick calculation, a consistent approach and can be easily replicated at different scales. Moreover future studies and reports can easily build on this approach by simply up-dating/revising trade figures and illegal logging rates. At the same time we are aware that this methodology is not free of limitations, the main one being the fact that --despite huge efforts to improve and up-date them-- illegal logging rates remain just 'best estimates' produced to give an idea of the scale of the problem. The focus limited to roundwood and sawnwood, as well as the selection of key source-countries, result in some underestimation, for example by excluding flows for finished and semi-finished products (e.g. pulp and paper, furniture, veneers, wood panels, etc.). Finally this approach does not take into account illegal trade that occurs domestically. As reported in 3.4.1 above, different methodologies have been adopted in the past. We do not intend to ignore the relevance of these methodologies, rather we believe they might be less efficient and effective when implemented at a global scale. For example wood-balance analysis can guarantee very detailed results, however it requires huge efforts in terms of data collection and analysis that seem to be viable (an reliable) only when the scale is limited to single countries/regions. This is even more evident when considering the increasing trend to trade processed products/materials, thus increasing the complexity of supply chains. As for trade data discrepancies, although in principle they remain a good indicator for detecting potentially illegal flows, they do not always allow univocal and clear interpretations because discrepancies might derive from many factors that cannot easily be identified and taken into account (e.g. product classification and recording by different custom offices, re-export, etc.).

The total value of illegally traded roundwood and sawnwood is estimated to be about USD6.3 billion, 42 percent of total roundwood and sawnwood exports from the producer countries. China is by far the leader among top illegal wood importers, importing more than 50 percent of the total illegal trade value from the four producer regions. China together with India, Vietnam, the EU and the USA covers more than 82 percent of global trade in illegally sourced roundwood and sawnwood. As for the exporters, the Southeast Asia accounts for about 54 percent of illegal roundwood and sawnwood exports (with Myanmar and Laos playing a major role), followed by the Russian Federation (20 percent) and Oceania (i.e. PNG) (nearly 11 percent). Fig. 3.11 and Table 3.5 provide an overview of the main global trade flows of illegal roundwood and sawnwood in 2014. A more detailed analysis for each region is also presented. It is worthwhile remembering that there are many studies assessing illegal logging for different countries/regions: illegal logging rates they report are estimations and can change over time based on available information. For the aims of this report reference was made to some of the most recent (and largely quoted) studies. We do not intend to cover all of them, and it is not our aim to give an exhaustive overview of different estimations provided so far.



1. Russian Federation; 2. Russian Federation Far East; 3. South America (Brazil, Colombia, and Peru); 4. Congo Basin (Cameroon, Democratic Republic of Congo, and Republic of the Congo); 5. Myanmar; 6. Laos; 7. Malaysia; 8. Indonesia; 9. Papua New Guinea. For details on intra-regional trade flows within South-East Asia, please refer to Figure 3.12. CHN = China; EU = European Union; IND = India; USA = United States of America

Fig. 3.11 Main global illegal trade flows of roundwood and sawnwood, 2014 (million USD)

Table 3.5 Global illegal trade flows of roundwood and sawnwood by source region and importer, 2014 (million USD) (Source: own elaboration from UN COMTRADE, 2016)

	Source regions (exporters)					Total export value	Percentage on total
	Russian Federation	South America	Congo Basin	Southeast Asia	Oceania		
Total export	6,328.0	682.0	1,004.9	6,082.8	978.9	15,076.6	
<i>Illegal logging rates (percent)</i>	20 ^(a)	Brazil: 53 ^(b) ; Colombia	Cameroon: 33 ^(e) ; DRC: 87 ^(f)	Cambodia: 94% ^(h) ; Laos: 87 ⁽ⁱ⁾	Papua New Guinea:	Total illegal export	

		75 ^(c) ; Peru: 72.5 ^(d)	Republic of the Congo: 72.5 ^(g)	Indonesia: 30 ^(k) ; Malaysia: 18.5 ⁽ⁱ⁾ ; Myanmar: 72 ^(l)	70 ^(m)	towards top- importers		
Importers	China	619.9	78.6	302.0	1730.6	564.7	3295.7	52.1
	Vietnam		0.8	18.3	748.2		767.3	12.1
	India		10.2	1.4	509.3	75.5	596.5	9.4
	EU	239.4	55.2	113.7	45.6		453.9	7.2
	Thailand				101.4		101.4	1.6
	USA		75.6	12.6			88.2	1.4
	South Korea	9.4				13.0	22.4	0.4
	Japan			0.7	14.4		15.1	0.2
	Malaysia				12.1		12.1	0.2
	Australia					1.1	1.1	0.0
Other	396.9	166.7	72.7	309.7	30.9	976.9	15.4	
Total illegal export	1,265.6	387.1	521.4	3,471.4	685.2	6,330.8	100.0	
Percentage on Total illegal export	20.0	6.1	8.2	54.8	10.8	100.0		

For each importer values reported on Table 3.5 have been computed by multiplying single trade flows from source countries (exporters) times the corresponding illegal logging rates for each exporter. In the case of multiple exporters within the same region (i.e. the Congo Basin and Southeast Asia) results have been summed-up per single importer. For example the illegal trade flow from South America for a generic importer C would be: $C = F_B \cdot 0.49 + F_C \cdot 0.725 + F_P \cdot 0.75$, where F_B , F_C and F_P correspond to trade flows to country C from Brazil, Colombia and Peru respectively.

Russian Federation

We assume a 20 percent of nationwide average illegal logging rate in the Russian Federation (FAO, 2012; Nellemann, 2012) balancing higher rates for the Russian Far East and lower ones reported for the Western part of the Country. Several studies (EIA, 2015; Smirnov *et al.*, 2013) indicate that illegal forest activities in the Russian Far East are much more widespread. The Environmental Investigation Agency (EIA, 2015) estimates that at least 80 percent of timber harvested in this region has illegal origin. Criminal organizations have developed a robust system to control the harvesting, processing, and trade of valuable temperate hardwood species such as Mongolian oak (*Quercus mongolica*), Manchurian ash (*Fraxinus mandschurica*), Japanese elm (*Ulmus propinqua*), Amur linden (*Tilia amurensis*), and Manchurian linden (*Tilia manshurica*). By taking advantage of gaps/weaknesses of existing forest law and law-enforcement mechanisms, these organizations perpetrate illegal activities, including overharvesting by exceeding legally-permitted harvesting levels, abuse of sanitary harvesting permits for cutting old-growth timber in protected areas, timber smuggling performed by local illegal loggers, and laundering of illegally sourced timber through official permits (EIA, 2014). China is the main importer of Russian hardwood timber: 96 percent of hardwood roundwood is exported to China to be processed into furniture and flooring for China's domestic consumption and for exports to the European, Japanese, and US markets. From 2004-2011 Mongolian oak harvested in the Russian Far East and exported to China exceeded the authorized logging volume by 2-4 times (Smirnov *et al.*, 2013). Data from UN Comtrade Database (2016) do not allow for differentiating timber exports from different regions of the Russian Federation. Based on the nationwide data we assume that exports towards China (about USD620 million, equally distributed between roundwood and sawnwood) as well as other East Asian countries (e.g. Japan and South Korea) are likely to originate from the Russian Far East, whereas those towards the EU (USD240 million, two-thirds of which are sawnwood) originate mostly from the western part of the country.

South America

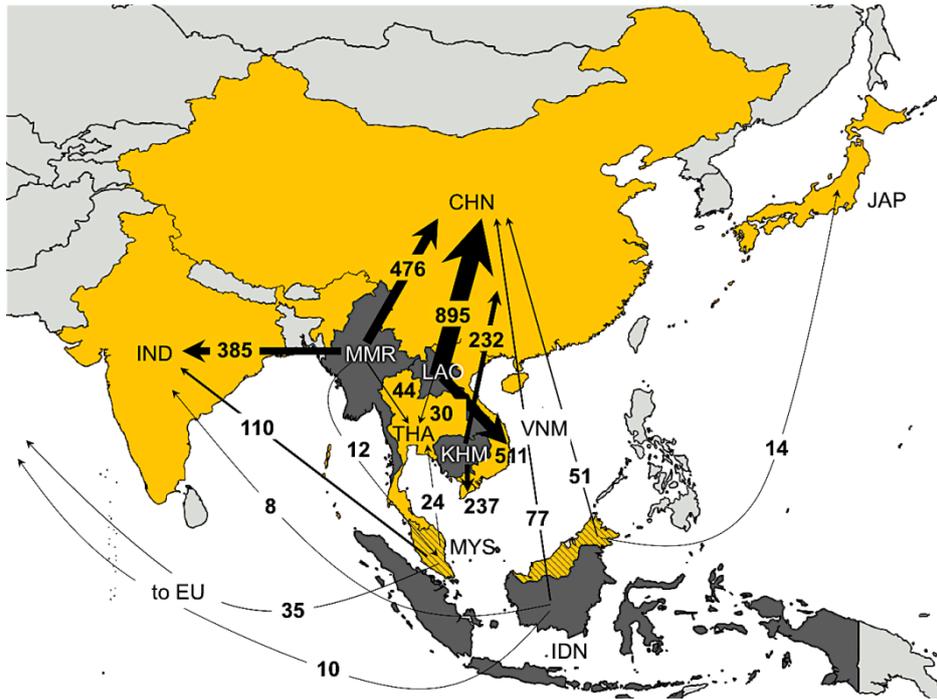
The total value of illegally sourced roundwood and sawnwood exported from South America is estimated at USD365 million. Brazil remains the main illegal wood producer and exporter in the region (76 percent of total regional trade value). The country's main export markets are the US, the EU, and China; however, between 2010 and 2014 Brazilian sawnwood exports to the EU decreased by more than 30 percent, whereas its exports to the US increased by 13 percent. Notwithstanding the development of many legislative initiatives to control illegal logging and the 50-75 percent decline of illegal logging rates in the Brazilian Amazon between 2000 and 2008 (Chatham House, 2010), the enforcement of forest legislation in Brazil is often hampered by a lack of coordination between government agencies, limited resources, and inadequate penalties (Wellesley, 2014). Fabrication of official documents and the fraudulent use of genuine ones are increasingly common phenomena. Greenpeace Brazil (2014), for example, highlights five different ways to launder illegal timber harvested in Pará and Mato Grosso states . They include, among others, the authorization of harvesting permits for areas already harvested, and permits are then used to provide documentary support for illegal timber logged elsewhere. Another option consists of the overestimation of the volume of valuable tree species in a certain area covered by a valid harvesting permit in order to use the exceeding volume to launder illegally harvested timber from other areas. All of these fraudulent mechanisms build on gaps/limitations of the existing law enforcement system, as well as negligence or collusion by officials. Besides timber extraction, land-use change is a crucial driver for deforestation and forest degradation. From 2000-2012, at least 90 percent of forest conversion for agriculture in the Brazilian Amazon was illegal (Lawson, 2014a) although conversion activities tended to be destructive (e.g. by burning large forest areas) and do not always feed illegal logging trade. Forged documents and papers are not just limited to Brazil, and they are also a common issue in Peru (EIA, 2012; Timber Committee, 2016). Peruvian exports are mostly directed to China (50 percent) and the US (10 percent). Colombia exports are mainly roundwood with India and China being the main destinations, each importing about USD10 million per year.

Congo Basin

The total export value of illegally sourced roundwood and sawnwood from Cameroon, DRC, and the Republic of the Congo amounted to USD521.4 million in 2014. The Republic of the Congo (41 percent) and Cameroon (36 percent) contributed to most of this value. Most (68 percent) of the Cameroon exports was sawnwood, whereas roundwood accounted for 92 percent of the total export value from the Republic of the Congo. Since 2012 China has surpassed the EU and became the largest roundwood and sawnwood importer from the Congo Basin. In 2007, 90 percent of the DRC's timber exports were destined to the EU, while in 2014 this value decreased to 29 percent (Lawson, 2014c). In 2014 China imported about 58 percent of the total value of illegal roundwood and sawnwood from the Congo Basin, mostly (91 percent) in the form of roundwood. The EU imported 22 percent, mostly sawnwood (74 percent). Vietnam (USD18 million), the US (USD12 million), and marginally India (USD1 million) altogether covered another 6 percent of the total export value from this region. Illegal activities in the Congo Basin cover a broad range of typologies. The improper use (or abuse) of logging permits is one of the most common illegal activities, as recent cases in DRC (with artisanal logging permits) and Cameroon (with timber recovery permits) reveal (e.g. Global Witness 2012; Greenpeace Netherlands, 2015). Of course, illegal logging in Africa is not restricted to the Congo Basin; rather it occurs in many other African countries. Among them, Mozambique represents a relevant case, with an estimated 50 percent illegal logging rate and China importing nearly 90 percent of Mozambican timber exports, mostly logs of valuable hardwood species (Pau Ferro, Mondzo, Chanate, Jambire, and Umbila) (EIA, 2013b).

Southeast Asia

The estimated export value of illegally sourced roundwood and sawnwood from Southeast Asia in 2014 reached nearly USD3.5 billion, a figure that is consistent with estimations made by the United Nations Office on Drugs and Crime (UNODC) in 2010. About 50 percent of this value was imports by China and another 17 percent by India. Laos (USD1,457 million) and Myanmar (USD1,035 million) were by far the main exporters within the region, whereas the role of traditional producers like Malaysia (USD182.7 million) and Indonesia (USD120.1 million) was more limited, though with some relevant trade flows towards the EU (USD43 million). As regards Indonesia, the first Asian timber exporter country to start negotiating a Voluntary Partnership Agreement with the EU and likely the first one that will issue Forest Law Enforcement, Governance and Trade (FLEGT) licenses in the next few months, however, the value of sawnwood exports to China between 2010 and 2014 almost doubled, whereas in the same period its exports towards the EU decreased by 40 percent. Apart from exports towards emerging economies neighboring the region, the area is characterized by quite intense intra-regional (and often cross-border) trade dynamics (Fig. 3.12). In particular, Thailand's imports of illegal wood from regional producer countries reached about USD101 million--mostly from Myanmar (44 percent) Laos (30.5 percent)--and Vietnamese imports from Laos amounted to more than USD511 million despite a ban on exports of logs and sawnwood imposed from 1999-2002. Introduced with the aim to encourage the development of domestic timber processing, the ban was either not enforced or circumvented due to numerous permissions issued in "exceptional cases" (Smirnov, 2015). Based on UN Comtrade Database (2016) the export value of wood products from Laos in the period 2009-2014 increased by more than 8 times, being almost exclusively represented by logs and sawnwood. Vietnam also imported some USD237 million from Cambodia both under the form of logs--for which Vietnam is by far the main destination for Cambodian export--and sawnwood. The Vietnamese government has signed a number of agreements/commitments to coordination on forest management and protection, law enforcement and trade, including with the governments of Laos (2008) and Cambodia (2012), however so far they did not result in a significant reduction in imports or exports of timber at a high risk of illegality (Saunders, 2014b). Although illegal logging practices are quite differentiated, "conversion timber" is the predominant source of timber in the region. This includes, for example, forest conversion for forest plantations or crop and livestock production, mining, hydropower, and road infrastructure development projects in Laos (Barney and Canby, 2011). In Indonesia and Malaysia, a growing proportion of timber has been derived from clear-felling to convert forests into commercial agricultural plantations (e.g. oil palm plantations). In Indonesia, for instance, in 2012 timber from forest conversion represented 72 percent of reported consumption (Blundell, 2014) and in Malaysia in 2010 at least 66 percent of timber production was derived from forest conversion (Lawson, 2014a).



CHN = China; EU = European Union; JAP = Japan; KHM = Cambodia; IDN = Indonesia; IND = India; LAO = Laos; MMR = Myanmar; MYS = Malaysia; THA = Thailand; VNM = Viet Nam

Fig. 3.12 Main illegal trade flows of roundwood and sawnwood within Southeast Asia, 2014 (million USD)

Oceania

During the last six years Papua New Guinea (PNG) has experienced a significant increase in logging, with log exports nearly doubling between 2009 and 2014, at the point that the country now ranks among the world's three largest tropical roundwood exporters. The total value of illegal wood exported from PNG in 2014 was estimated at USD685.1 million, with China being the main destination (USD564.7 million), followed by India (USD75.5 million) and South Korea (USD13 million). Sawnwood exports by PNG were limited compared to roundwood (USD8.6 million) and mostly directed to China, Malaysia, and Australia. The main mechanism behind the recent expansion in PNG's exports is known as Special Agriculture and Business Leases (SABLs). The SABLs, originally intended for agricultural projects, are used by many logging companies to expand their operations. The 5.5 million hectares land leased under SABLs are additional to 10 million hectares already allocated by the PNG government through logging concessions. As a result, more than one-third of the country's forests is now exploited by foreign (logging) companies, with detrimental effects identified on local communities and their rights (Mousseau and Lau, 2013). This is likely to be coupled with tax evasion and financial misreporting by logging companies through transfer pricing operations based on the undervaluation of the price of logs being exported. Lawson (2014d) found a price difference of USD20 per m³ between the export price from PNG and the import price for logs to China, accounting for freight and insurance costs.

3.5.2 New developments in illegal logging and trade and ways forward

Potential trade diversions caused by recent responses by some consumer countries

Recently, several consumer countries/regions (i.e. the US, the EU and Australia) have adopted laws to protect from imports of illegally sourced wood products. While helping reduce the imports of illegal wood products from tropical forest countries and other parts of the world (Gan *et al.*, 2013; Prestemon, 2015), the implementation of these laws are likely to cause trade diversions. The diversions include increased domestic consumption in the producer countries and increased imports by countries that have no or less stringent regulations on illegal trade of wood products. Such diversions can undermine the effectiveness of these initiatives by the consumer countries and call for broader global cooperation in combating illegal logging and timber trade (Gan *et al.*, 2013).

Increased imports by China and India

China and India are two largest importing countries of illegal roundwood (also refer to subsection 3.3.1). Their imports are driven by both domestic consumption and exports. Although the share of illegal imports in China between 2000 and 2013 declined from 26 to 17 percent, this did not correspond to a reduction of illegal imports in absolute terms: China's imports of wood products at high risk of illegality increased from 18 million m³ (RWE) in 2000 to 30 million m³ in 2013 (Hoare, 2015a). China imports illegal timber from all tropical forest regions and Russia while the major source of illegal timber for India is Southeast Asia. Given their huge domestic markets and China's large capacity to process wood products for exports, it is extremely difficult to substantially reduce illegal logging and trade at the global level without engaging these two countries.

Geographic shifts in illegal logging and trade

As illegal logging in Brazil, Indonesia, and Malaysia has declined in recent years (Hoare, 2015a), Russia, other Southeast Asian countries, and Africa have witnessed increases in illegal logging and trade activities. These countries has emerged as new producer countries in illegal logging and trade. Among these rising producer countries, Russia leads the way (see subsection 3.5.1 for more details on the rising role of Russia in global illegal logging and timber trade). This phenomenon suggests that illegal logging is highly geographically fugitive. Illegal logging and timber trade is not limited to tropical forest regions; it can occur in and shift to temperate or boreal forest regions.

Timber originating from illegal forest conversion for export-oriented commercial agriculture

Traditionally, tropical timber traded originates mainly from selective logging of natural forests. During the last decade, conversion timber—timber produced from forest conversion, especially from illegal forest conversion for export-orientated commercial agriculture—has constituted a significant portion of illegal timber trade. It is estimated that illegal conversion timber consists of nearly one-third of tropical timber globally traded (Hoare, 2015a; Lawson, 2014a). Most of the forest conversion has occurred in the Amazon and Southeast Asia. In recent years, forest conversion in the Amazon has been curtailed to some extent, and yet forest conversion in Southeast Asia remains active. The agro-commodities produced on the land illegally converted from forestlands are also primarily destined for export markets. These products include beef, soy, cocoa, palm oil, and timber from plantations, among other products, with an annual trade value of USD61 billion (Lawson, 2014a). Increased global demand and trade for various agro-commodities has placed tremendous pressure on tropical forests and extended the scope of illegal logging and trade. In summary, global imbalance in laws and law enforcements against illegal logging and associated timber trade and increased global demand for agricultural and forest products make it very difficult to eliminate or even significantly reduce illegal timber production and trade at the global aggregate level. Plus, illegal logging

and timber trade are highly fugitive and can easily shift from a location to another or from a form to another. For instance, measures taken by a few consumer countries to curtail imports of illegally sourced wood products could cause trade diversion, leading to only limited success in globally controlling illegal logging and trade. Similarly, log export bans or reductions in illegal logging in some producer countries may encourage log exports from some other countries or shift illegal logging to elsewhere. As a driver for illegal logging fades out or is under control, a new driver may emerge, sometimes for disguised “good” reasons (e.g. forest conversion for oil palm plantations). Hence, effectively controlling illegal logging and associated timber trade at the global level calls for broader and stronger global cooperation although such a cooperation itself is challenging. Additionally, illegal logging and associated timber trade are not merely a forestry problem and thus cannot be resolved by the forestry sector alone. Coordination between forestry and agriculture in terms of land use, production, trade, markets, and policy and among the forestry, fisheries, and wildlife sectors in terms of tracking illegal activities would be necessary and beneficial.

3.5.3 Data gaps

What the data can and cannot tell

Data or statistics on illegal logging and associated timber trade are generally lacking and difficult to verify. As a result, illegal activities are inferred or estimated largely using indirect approaches and data. Although surveys can be used to directly ask the respondents about their estimates of illegality activities, surveys themselves have problems such as statistical biases associated with sampling and the limited (imperfect) knowledge of the respondents about the illegal activities. Hence, accurate and precise estimates of illegal logging and trade are extremely challenging, and inconsistency is inevitable. Estimating illegality using existing production and trade data that are not recorded for the purpose of measuring illegality has several limitations as follows:

- It cannot tell illegal activities that are not covered by existing production and trade statistics.
- It is difficult to separate illegal activities from statistical and other errors and inconsistencies presented in the conventional production and trade data.
- It is difficult to sort out different types of illegal activities (e.g. illegal large-scale industrial logging, informal logging, or other illegal activities) using productions and trade data.

Data gaps and suggestions for bridging the gaps

Several data gaps exist in terms of measuring illegal logging and associated timber trade. First, there are no data that directly measure illegal logging and associated timber trade. Second, there are scant data that present separate measurements of the quantities and values of illegal production and trade originating from informal logging, industrial logging, forest conversion, and other illegal activities. Third, there is a lack of work to understand and quantify statistical errors and inconsistencies in the conventional production and trade data from different sources and to separate them and other errors from the results of trade data discrepancies analysis. Fourth, there is a lack of approaches developed for mutual confirmation or, at least to some extent, validation of illegality estimates derived from different sources and methods. To overcome the challenges presented by these data gaps, we recommend to:

- Minimize speculation in illegality estimates by seeking (or linking it to) some evidence for verification;
- Seek max complement between production/trade statistics and expert survey data;
- Combine/Integrate data on different sources of illegal forest harvests (illegal commercial logging, informal logging, illegal logging for charcoal production, illegal forest conversions (for mining, crops, livestock, plantations, etc.), and other illegal activities);

- Seek for mutual confirmation or validation of illegality estimates derived from production and trade data analysis, expert surveys, and forest inventory;
- Adopt big data analytics to integrate and utilize large amounts of publicly available timber, wildlife, and fisheries data in a more effective and beneficial way. There are already some positive experiences developed in Brazil by both private and public bodies that allow tracking timber in almost real time and access information on law compliance.

3.6 Conclusion

- Significant progress has been made in combating illegal logging and timber trade, particularly in terms of reductions in the production and import shares of illegal wood products in major producer and consumer countries. Yet, Illegal logging and timber trade remains highly fugitive in terms of geographic location and drivers, calling for broader and closer global cooperation across geographic regions and sectors.
- Most of the illegally produced tropic hardwood timber is produced by the informal sector and consumed in domestic markets; only a small portion of illegally produced timber (nearly 10 percent of total global trade value of wood products), which is often of better quality, is internationally traded, which has much higher profit margins.
- The vast majority of illegal primary wood products from tropical forests are produced by Brazil, Indonesia, and Malaysia and imported by China and India. Russia has emerged as the largest single source of illegal timber from temperate and boreal forests. Because the scale of their illegal production and imports, it is extremely important to engage these countries in global efforts to control illegal logging and timber trade.
- Domestic, regional, and global markets of legal and illegal wood products are interlinked, creating difficulty in monitoring and resolving illegal logging and timber trade.
- Timber produced from illegal forest conversion for commercial agriculture has become an increasingly important portion of global illegal logging and timber trade, whereas the role of traditional, large scale logging has diminished in illegality.
- High profitability for wood products and agricultural products grown on the lands converted from forests and consumer preferences for special wood species drive illegal logging and timber trade.
- Existing estimates on illegal production and trade differ substantially, partly because of the estimation difficulty associated with the illegality nature and partly because of the differences in the scope of estimation (e.g. products and time period covered), definition of illegality, data sources, and estimation methods used.
- There is a lack of data that directly measure illegal logging and trade or that quantify different types of illegal activities. There is an urgent need to overcome these data gaps and inconsistencies so that to ensure better estimates of illegal logging and associated timber trade.

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