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Trade Barriers in Forest Industry between Malaysia and Europe

Noor Aini Binti Zakaria

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Trade Barriers in Forest Industry between Malaysia and Europe

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Feeling gratitude and not expressing it is like wrapping a present and not giving it

~William Arthur Ward~

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Abstract

This study analyses the international timber trade between Malaysia and Europe with respect to the importance of environmental issues on trade and the role of Malaysia as a major timber exporter to Europe. It also evaluates the comparative advantage of Malaysian wood products and the willingness of French consumers (to represent European communities) to pay for sustainable forest management. The first part gives an overview the clashes of perception between developed and developing countries on the environmental concerns over trade. It was observed that environmental standards may act as non-tariff barriers to exporting countries. In addition, the stringent requirements posed by importing countries on technical, marking and labelling to some extent provide unnecessary barriers to trade. The second part deals with the role of Malaysia as a key player in the tropical timber trade. This part evaluates the main export market for Malaysian wood products to the world. For the purpose of this thesis, the analysis focuses on the European market. From the observations, it was found that the export of wooden furniture surpassed major timber exports in 2004. However, to penetrate the European market, Malaysia has to compete with the Chinese with their lower cost tropical wood products, and Brazil with their advantage in certification and labelling of tropical wood products. In tandem with that, the commitment towards sustainable forest management at national level causes shortage of raw materials in Malaysia. To a certain extent, the internal and external factors create necessary challenges to enter the European market. In the third part, the Balassa approach was used to classify the comparative advantage of Malaysia's twenty one types of wood products in Europe. It was estimated that Malaysia had high comparative advantage only in five products which were mechanized and intermediary industrial products. The products identified were sawn wood, wooden mouldings, plywood, veneer and builders' joinery and carpentry. The remaining products had lower comparative advantage and disadvantage to export to the European market based on the Balassa index. In the last part, the estimation on the willingness to pay for sustainable forest management attributes was conducted. Besides that, additional attributes such as fair trade and wood origin were included. A questionnaire was set up using all the attributes reflected in the hypothetical wood flooring product in the market. Based on the result, consumers were willing to pay the highest for the presence of fair trade and wood origin (in this study referring to French origin); nevertheless they were still willing to pay for sustainable aspects of forest. However, the willingness to pay for all the attributes was altered depending on the respondents' knowledge of forest labelling, their attitudes towards environmental preservation, living area, education level, type of job and income level. In the overall finding of the thesis, all the results from each part were synthesized in a systemic approach simultaneously deliberating on the macro and microeconomic perspectives as well as the dimensions on demand and supply. Overall, the findings suggest that the challenges and constraints facing the Malaysian timber industry indirectly shaped the export of Malaysian wooden products. Malaysia has adapted by going into value-added products to lessen the impact of environment-related trade barriers and to circumvent the shortage of raw materials supply. Malaysia has successfully customized the wooden products to the sustainability and legality requirements of the European market by pursuing the national certification (Malaysian Timber Certification) and being committed to sustainable forest management objectives.

Keywords: Trade barriers, wood products, comparative advantage, willingness to pay, sustainable forest management, Malaysia, Europe

Résumé

Ce travail étudie l'influence des questions environnementales sur le commerce international à partir des échanges de bois tropicaux Malaisie – Europe, la Malaisie étant un important exportateur de bois. Les avantages comparatifs des produits forestiers Malaisiens sont évalués, ainsi que la propension à payer le bois issu de gestion forestière durable par les consommateurs français (en tant qu'Européens). La première partie envisage les différences de perception entre pays développés et pays en développement pour le lien entre commerce et environnement. Il apparaît que les normes environnementales agissent comme des barrières non-tarifaires. Ces barrières sont accentuées par les critères de marquage, d'étiquetage, et de technologie imposés par les pays importateurs. La seconde partie analyse le rôle clé de la Malaisie dans le commerce des bois tropicaux. Les principaux marchés d'exportation des bois Malaisiens sont évalués. Le marché Européen est étudié plus en détail. Il apparaît que les ventes de meuble ont dépassé en 2004 celles des autres principaux produits forestiers. Sur le marché Européen la Malaisie fait face à la concurrence de produits tropicaux à bas prix venant de Chine, et à celle de produits forestiers éco-certifiés venant du Brésil. Concomitamment, l'engagement de la Malaisie dans une dynamique de gestion plus durable y crée une pénurie relative de matériau brut. La troisième partie calcule l'index de Balassa d'avantage comparatif, pour 21 produits forestiers Malaisiens sur le marché Européen. Seuls 5 produits industriels intermédiaires ou à transformation fortement mécanisée, ont un avantage comparatif marqué. Il s'agit des sciages, moulures, contreplaqués, placages, charpente et menuiserie industrielle. Les autres produits présentent des avantages comparatifs faibles ou même négatifs. La quatrième partie estime la propension à payer pour différents attributs environnementaux, ainsi que d'autres tels le commerce équitable et l'origine géographique. Un questionnaire reprenant ces attributs pour du parquet bois hypothétique a été utilisé. Il semble que les consommateurs soient prêts à rémunérer le plus les critères de commerce équitable et d'origine Française, la gestion durable étant recherchée dans une moindre mesure. La propension à payer les tous les attributs varie en fonction des notions et attitudes qu'ont les consommateurs sur l'éco-certification, l'environnement, ainsi qu'en fonction de leur lieu d'habitation, niveau d'éducation et de revenu, et type de profession. Enfin les résultats des 4 parties sont synthétisés en reliant les échelles micro et macroéconomiques, avec les dimensions de demande et d'approvisionnement. D'une façon générale, les résultats suggèrent que les opportunités et contraintes propres à la l'industrie du bois de Malaisie façonnent les exports de produits. La Malaisie s'adapte en se tournant vers des produits à plus haute valeur ajoutée et à moindre impact environnemental, pour pallier aux barrières commerciales et à la pénurie relative de matériau. La Malaisie s'est dotée d'une certification nationale (Malaysian Timber Certification) propre à remplir les critères de durabilité et de légalité de l'Europe, et s'est engagée la gestion durable des forêts.

Mots-clés: Barrière commerciale, produits forestiers, avantage comparatif, propension à payer, gestion forestière durable, Malaisie, Europe

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List of Abbreviation

BJC	Builder's Joinery and Carpentry
C&I	Criteria and Indicators
CAD	Computer Aided Design
CAM	Computer Aided Manufacturing
CAPI	Computer Aided Personal Survey Instrument
CBD	Convention on Biological Diversity
CE	Choice Experiment
CE	European Conformity
CIRAD	French Agricultural Research for Development
CITES	Convention on International Trade in Endangered Species of Fauna and Flora
CM	Choice Modelling approach
CNC	Computerised Numerical Control
CR	Contingent Ranking
CRt	Contingent Rating
CTE	Committee on Trade and Environment
CTESS	Committee on Trade and Environment Special Sessions
CVM	Contingent Valuation Method
EC	European Communities
ECs	European Commissions
EMIT	Environmental Measures and International Trade
EU	European Union
FAO	Food and Agriculture Organization
FLEGT	Forest Law Enforcement Governance and Trade
FMU	Forest Management Unit
FRIM	Forest Research Institute Malaysia
FSC	Forest Stewardship Council
GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariff and Trade
GDP	Gross Domestic Product
HS	Harmonized System
IMP	Industrial Master Plan
INRA	French National Institute for Agricultural Research
ISPM15	International Standards for Phytosanitary Measures
ITTA	International Tropical Timber Agreement
ITTO	International Tropical Timber Organization
LVL	Laminated Veneer Lumber
MEAs	Multilateral Environmental Agreements
MITI	Ministry of International Trade and Industry, Malaysia
MMMP	Mechanized Mass Market Products
MRS	Marginal Rates of Substitution
MTC	Malaysia Timber Council
MTCC	Malaysia Timber Certification Council
MATRADE	Ministry of External Trade, Malaysia
MTCS	Malaysian Timber Certification Scheme
MTIB	Malaysian Timber Industry Board

NAFTA	North American Free Trade Agreement
NTMs	Non-tariff Measures
PC	Pair-wise Comparison
PDO	Protected Designation of Origin
PEFC	Programme for the Endorsement of Forest Certification Schemes
PEFCC	Pan-European Forest Certification Council
PPMs	Processes and Production Methods
PRF	Permanent Reserved Forest
RCA	Revealed Comparative Advantage
SCM	Subsidies and Countervailing Measures
SCP	Sustainable Consumption and Production
SFM	Sustainable Forest Management
SIP	Sustainable Industrial Policy
SMEs	Small and Medium Enterprises
SPS	Agreements on Agriculture, Sanitary and Phytosanitary Measures
STOs	Specific Trade Obligations
TBT	Technical Barriers to Trade
TRIMs	Trade Related Investment Measures
TRIPS	Trade-Related Aspects of Intellectual Property Rights
EFTA	European Free Trade Association
UN Comtrade	United Nation Commodity Trade Statistics
UNCED	United Nations Conference on Environment and Development
UNCTAD	United Nations Conference on Trade and Development
USD	United States Dollar
VPA	Voluntary Partnership Agreement
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization
WTP	Willingness to Pay

INTRODUCTION

Background of the Thesis

Malaysia is among the countries in Southeast Asia which have experienced remarkable economic growth and industrialization since the past decade. Exports of natural and forest related products contribute much to the development of the Malaysian economy. It is difficult to ignore the fact that forest products industry plays a key role and has economic potential in further developing the economy. Recognizing that the forest-based industry is one of the main contributors to the Malaysian economy, sustainable development of the industry should be ensured. Furthermore, the industry also has been identified as having a huge potential to generate more foreign exchange and employment for the domestic economy. The contribution of the timber industry in the Malaysian economy is significant. In 2008, timber and timber products contributed an estimated RM22.5 billion (3.3 percent), the fifth largest contributor to Malaysia's total export earnings after electrical and electronics (38.5 percent), palm oil (9.2 percent), crude petroleum (6.8 percent) and liquefied natural gas (5.4 percent) (National Timber Industry Policy, 2009). During the First Industrial Master Plan (IMP1) in 1986 to 1995, the Malaysian timber industry was driven by the upstream activities. The exports of Malaysian timber grew steadily at the rate of five percent during the Second Industrial Master Plan, mainly due to the readily available raw materials, relatively low labour cost and a continuous growth of the international timber trade (1996-2005). Furniture is the main contributor to the growth of the timber industry.

The timber industry in Malaysia covers upstream and downstream activities. The upstream activities focus on the sustainable harvesting of natural forest and forest plantations whereas downstream activities involve primary, secondary and tertiary operations, ranging from the processing of the raw materials to the manufacturing of semi-finished and finished products. To date, 60 percent of export value is derived from products of the primary processing activities comprising logs, sawntimber, plywood, veneer, fibreboard and particleboard (National Timber Industry Policy, 2009). The remaining 40 percent of export earnings is covered by exports of mouldings, flooring, laminated veneer lumber, laminated timber, furniture, builder's joinery and carpentry (BJC), such as doors, windows and other engineered wood.

Forest Governance and Related Agencies in Malaysia

Before further elaborating on the topic, it is important to understand the background of the forest-based industry including the policies and related agencies involved in the Malaysian timber industry. In terms of policy, the three regions of Malaysia (Peninsular Malaysia, Sabah and Sarawak) have developed forest policies independent of each other; however they share many similarities. The three separate bodies determining forest policies in Malaysia are the Peninsular Malaysia Forest Department (in Kuala Lumpur), the Forestry Department of Sabah and the Forestry Department of Sarawak. Under the Malaysian Constitution, forestry is a state matter and each state is empowered to enact laws on forestry and to formulate forestry policy independently. The federal government only provides technical assistance on forest management, conducting research and training, and in the maintenance of experimental and demonstration stations (Woon and Norini, 2002). In Peninsular Malaysia, the Interim Forest Policy was first formulated in 1952 and officially adopted as the National Forestry Policy (NFP) in 1978. In Sarawak, legal framework is provided by the Forest Ordinance 1954 whereas the implementation of the Sabah state forest policy is driven by the Sabah Forest Enactment 1968. Among others, the similarities in the forest policies of the three regions lie in the provision for the creation of permanent forests for protective and production purposes and the declaration that forest resources can be harvested for export purposes (Woon and Norini, 2002).

The Malaysian Timber Industry Board (MTIB) was recognized as a statutory body to manage federal forest charges in Malaysia. It was established in 1973 by an Act of Parliament to promote and coordinate the overall development of the timber industry. The MTIB is accountable to issue export licences and collect export taxes, and acts as an enforcement agency with limited power. Furthermore, the MTIB is authorized to promote and improve trade related activities, encourage the effective utilization of timber, promote efficient timber processing techniques and provide technical advisory services (MTIB, 2010). In general, the MTIB is responsible for initiating development of the various sectors of the timber industry and providing technical, marketing and other forms of assistance to ensure their continued growth within a rapidly industrializing Malaysian economy (MTIB, 2010).

Another agency mainly involved in the timber industry is the Malaysian Timber Council (MTC) which was established in January 1992. It was formed as a limited company by guarantee under

the Companies Act 1965 to promote the development and growth of the Malaysian timber industry. The establishment of the MTC is driven by the initiative of the timber industry, yet governed by a Board of Trustees whose members are appointed by the Minister of Plantation Industries & Commodities (MTC, 2011). The main objectives of the MTC's establishment are to promote the Malaysian timber trade and develop the market for timber products globally; to promote the development of the timber industry by expanding the industry's manufacturing technology base, increasing value-adding in production and increasing the pool of knowledge workers; to augment the supply of raw materials for the timber-processing industries; to provide information services to the timber industry and to protect and improve the Malaysian timber industry's global image.

In the need to implement timber certification, the Malaysian Timber Certification Council (MTCC) was established in 1998 by the government to encourage and ensure sustainable forest management in the country (MTCC, 2011). It runs as a non-profit organization and as an independent national certifying and accrediting body. It develops and operates the Malaysian Timber Certification Scheme (MTCS) to provide the independent assessments of forest management practices in Malaysia as well as to meet the demand for certified timber products. Recently, it has been admitted as a member of the Pan-European Forest Certification Council (PEFCC). As the European market is the traditional market for Malaysian timber products, the PEFCC endorsement should be an added advantage to expand the business in the European market.

Research and Development

The efforts on R&D activities should be strengthened to further develop the Malaysian timber industry. In the 8th Malaysia Plan (2001-2005), the Government of Malaysia planned that the development of the forestry and wood-based product group would be encouraged and supported in terms of finance, infrastructure; research and development (R&D), supporting services and human resource development to further expand the related industry. The continuous support of the government on R&D activities for the forestry and wood-based industry has been outlined in the National Timber Policy. R&D on the raw materials supply from the natural forest, forest plantations and alternative sources are crucial to accommodate the demand of the wood products. In terms of competitiveness of forest products, the R&D activities on diversifying the uses of

timber products, improving production technology and the quality of wood were intensified. The R&D on promoting and marketing the Malaysian wood products at local and international levels were enhanced through some agencies such as MTIB and MATRADE. These indicate that the government gives full support and is taking steps to commercialize and increase the contribution of the forest product industry to develop the economy of the country.

Problem Statement

There is a growing trend in the international market to impose non-trade barriers on imported products from other nations due to environmental concerns. Issue such as the ban on Borax preservative¹ by Sweden, Japan's regulations on the emission of formaldehyde gas from the timber-based products, and the CE marking from the European Union countries and EU-FLEGT, are among the standards and rules that may impede the development of the timber trade of Malaysia.

Recently, most of the consumers in the European countries seem to have become more aware of the importance to integrate environmental consideration into their purchasing decisions. Also there is a growing demand in purchasing ecolabelled wood products in the market where European wood processing sectors are obliged to adopt environmental standards and supply certified wood products to the consumers. This potential impact of the demand by European wood processing firms and distributors, big companies, small and medium enterprises (SMEs), public procurements and individual purchasers could be expected to broadly change the purchasing pattern for wood products in the European market specifically and the rest of the world generally.

Therefore, being one of the major producers and exporters of wood-based products in the world market, Malaysia needs to strengthen its wood-based industry and identify potential barriers to compete globally and develop the standards to maintain the quality of products to be internationally competitive.

¹ It is used to preserve rubberwood against insects.

Previous Works

In analyzing the trade barriers to Malaysian timber export, there already exist two works conducted by Islam et al. in 2010. In the first study of Islam et al. (2010), they analyzed the barriers to timber trade for Malaysia. They found that tariffs on wood products tend to increase with the degree of processing. They also stated that tariffs for timber products in developed countries are generally less than 5% for most products with the exception of some products in certain markets (but they did not clearly define the products). Besides classifying the tariff rate, they also examined non-tariff barriers such as export restrictions, standards and regulations which may hinder the trade and erode the benefits of tariff liberalization in Malaysia. However, the question of non-tariff barriers was not very much emphasized in their study. In their second study, Islam et al. (2010) used secondary data collected from various sources such as UNCTAD, Malaysian Timber Council and WTO. The data were used to calculate the import-weighted average tariff rates for each region. The study discovered that the average applied tariffs for the raw materials were actually lower than those of the value-added products, but they suggested the increasing non-tariff barriers created the potential to limit the value-added products in the market which non-tariff barriers are more difficult to identify and evaluate. In the EU, they identified several non-tariff barriers that had emerged in the market. Among all, the CE marking has been made compulsory for exporters on wood-based panels, and the increasing demand on certain certification schemes, they believed may discriminate the Malaysian timber products though they have been certified under national schemes such as MTCC.

Even though efforts have been made on the R&D of the timber industry, the findings are still inadequate. The R&D on specific needs to meet the demand of the market should be extensive to assist the Malaysian timber industry to grow in the international market. Therefore, this study contributes to the extension of analyzing the trade barriers by Islam et al. (2010) in different ways. This study emphasized on the potential trade barriers that might result from consumer behavior (to some extent shaped by government policies) in Europe towards Malaysian wood products, conducted differently from the previous works of Islam et al. (2010). It is important for Malaysia to minimize the barriers and adapt to the changes demanded by major importing countries to be competitive in the international market. Therefore, Malaysian producers and exporters need to identify potential trade barriers put up either by consumer demand or

government regulations and transform these to tools for competitive advantage to gain market share in the exports of wood-based products in the global market.

Objectives of the Thesis

The objectives of this research were:

- I. To provide an overview of the Malaysian wood-based industry and its capacity to adapt and react to the trade barriers or to adjust them to competitive advantage in the forest related industry.
- II. To identify the trade barriers and equivalent regulations in the forest-based industry facing the Malaysian producers in exporting the products to Europe and the impact on the Malaysian forest industry.
- III. To analyze the perceptions and behaviors of European consumers (this study chose French) with regard to their preferences for wood products and knowledge of sustainable forest management.
- IV. To establish the coordination between Malaysian and French industrial and government players to meet the challenges of the European demand in the wood-based industry.
- V. To develop a strategy to widen the exports of Malaysian wood products by improving the quality of the products with the fulfillment of the international standards and importing countries' regulations.

Significance and limitation of the thesis

This study can make a significant contribution to the Forest Research Institute Malaysia (FRIM), French National Institute for Agricultural Research (INRA, France) and Agricultural Research for Development (CIRAD, France) regarding the question of how wood production systems in the tropics can sustain their development through necessary adaptations to the world competition, and through new paths for addressing an evolving exigent market like Europe. This research can contribute to the development of the wood-based trade between Malaysia and Europe. To some extent, this research gives a new dimension on consumer behavior in Europe, taking France as a sample, on preferences of wood products and can definitely benefit Malaysian exporters. Knowing the preferences and the perceptions of the French consumers in buying wood

products is an advantage for the exporters to adjust their products as demanded. However, it is believed that taking French consumers as a sample to represent the whole European population is a drawback in the discussion as it only represents about 2.63% of the French population.

Sources of Data and Methodology

This study is a qualitative and quantitative research where the analysis was based on the primary data collected from the survey and secondary data also used to support the primary data. The major part of this study depended on library research and information from books, journals, discussion papers and articles. The primary data was collected from the consumer survey in France during January 2009. Furthermore, the secondary data were obtained from United Nations Commodity Trade Statistics (UN Comtrade), library of Forest Research Institute Malaysia (FRIM), French National Institute for Agricultural Research (INRA, France) and French Agricultural Research for Development (CIRAD, France). The additional information was acquired from the Ministry of External Trade, Malaysia (MATRADE); Ministry of International Trade and Industry, Malaysia (MITI); Food and Agriculture Organization (FAO); Malaysian Timber Industrial Board (MTIB); and Forestry Department of Malaysia.

Organization of the Thesis

This research is divided into five chapters. The introduction gives a general idea about the research by highlighting the objectives, significance, methodology and data acquired.

Chapter one presents a general discussion on the relationship between environment and international trade. It provides a background on the environment in the WTO and some environmental issues related to the trade.

Chapter Two deals with the timber sector in Malaysia focusing on the European market. It examines the exports of timber products from Malaysia to Europe with detailed discussion on the issues and challenges facing the Malaysian timber industry.

Chapter Three discusses on the analysis of the comparative advantage for Malaysian wood products in 15 European countries based on their consistent good performance of imports and

exports of wood products from Malaysia. The comparative advantage of the wood products is estimated using the Balassa approach.

Chapter Four elaborates on the preferences and willingness to pay for the wood products, specifically wood flooring, in France. We took French consumers as a sample to represent the European community as a whole. The willingness to pay was analyzed using the MacFadden conditional logit model with Limdep Nlogit 3.0 software.

The discussion of results and findings of chapter one, two, three and four are merged in Chapter Five as findings for the whole thesis. The conclusion summarized the thesis.

CHAPTER 1

TRADE AND ENVIRONMENT

1.1 Background

Generally, international trade is perceived as a vital mechanism for domestic economy growth through the expansion of exports and imports. To some extent, it also helps small companies to grow and become more competitive in the world market. According to Simula (1999), trade has direct and indirect influences on environment and is considered as an agent affecting sustainable management of natural resources. There are many issues debated about the relationship between international trade and the environment. The issues of deforestation, sustainable forest management (SFM), labelling and certification have been widely discussed.

According to Peck (2002), deforestation is caused mainly by socio-economic development which contributes to the need for more land for agriculture and for fuel wood. In addition, destruction of natural forest also disturbs the ecosystem, damaging trees and vegetation as well as contributing to the accumulation of greenhouse gases in the atmosphere. A growing interest in trade and environmental issues is seen at regional and national levels. For instance, the European community (EC) has examined the environmental implications and impacts of the EC's effort to remove barriers to intra-EC trade and complete its internal market by 1992 and beyond. In the United State, environmental issues figure prominently in congressional debates concerning the extension of the United States Trade Representative's Authority to negotiate on a "fast-track" the GATT Uruguay Round and the North American Free Trade Agreement (NAFTA) with Mexico and Canada.

According to Lallas et al. (1992), the rising interest in trade and environmental issues can be a signal to important developments in international trade. Firstly, there is greater awareness of the ecological interdependence between life forms on earth and nature, and the potentially profound consequences of many environmental problems. Therefore, this awareness has resulted in efforts to review the environmental impacts of trade and to use trade-restrictive measures as one means to protect the environment at national and international level. Secondly, the volume of international trade has grown dramatically over the past several decades, reinforcing the

economic and ecological interdependence of nations and peoples (Lallas et al. 1992). Based on that, the efforts to examine the relationship between trade and other policy concerns including environmental protection have been encouraged among the policy-makers. Lastly, there is a relationship between environmental protection and international trade policies as mentioned in the Brundtland Report (Lallas et al., 1992). In the report, long-term environmental protection is an integral requirement of sustainable economic development and open trade is essential for long-term environmental protection.

1.2 The Emergence of Trade and Environmental Debates

The discussion on trade and environmental protection was started as early as the 1970s. In tandem with the environmental issue, in July 1970, one international research team was set up at the Massachusetts Institute of Technology to study the effects and limits of continued world-wide growth (WTO, 2004). The growing international concerns regarding the impact of economic growth on social development and the environment, led to the 1972 Stockholm Conference on the Human Environment². This conference discussed common principles to preserve and improve human environment (UNEP, 2008) (refer to annex for details). Although the relationship between economic growth or social development and environment was discussed at the Stockholm Conference, it has continued to be examined in the following years. During 1972, the EMIT³ group was established by the General Agreement on Tariff and Trade (GATT) Council of Representative to cater for some issues stemming from the effect of trade on the environment that had become more evident. As of 1973, the Tokyo Round Agreement⁴ on Technical Barriers to Trade has taken place. The purpose of the negotiation was mainly on how technical regulations and standards for the protection of the environment could form an obstacle to trade. As agreed in the negotiation, the “standard code”⁵ was negotiated.

² The United Nations Conference on the Human Environment, meeting in Stockholm from 5 to 16 June 1972, considered the need for a common outlook and for common principles to inspire and guide the peoples of the world in the preservation and enhancement of the human environment.

³ Group on Environmental Measures and International Trade (EMIT).

⁴ Tokyo Round aimed to reduce tariffs and establish new regulations in controlling the proliferation of non-tariff barriers and voluntary export restrictions

⁵ The Standards Code was drafted to govern the preparation, adoption and application of technical regulations, standards and conformity assessment procedures (WTO, 2009).

In 1982, some of developing countries expressed their concern that the exported products from developed countries were having some prohibited contents that might affect the environment, health and safety. So, in 1989 at the Ministerial Meeting of GATT contracting parties, the establishment of a Working Group on the Export of Domestically Prohibited Goods and Other Hazardous Substances was formed (WTO, 2004). It was decided that the prohibited products on the grounds of harm to human, animal, plant life, health or the environment should be examined. Accordingly, from 1986 to 1993, the Uruguay Round negotiations had made some modifications to the Standards Code, and certain environmental issues were addressed in the General Agreement on Trade in Services (GATS), the Agreements on Agriculture, Sanitary and Phytosanitary Measures (SPS), Subsidies and Countervailing Measures (SCM), and Trade-Related Aspects of Intellectual Property Rights (TRIPS) (WTO, 2004). In 1991, the re-activation of the EMIT group was requested by members of the European Free Trade Association (EFTA)⁶ to discuss trade-related environmental issues. Hence, in accordance with its mandate of examining the possible impacts of environmental protection policies on the operation of GATT, the EMIT group focused on (WTO, 2004):

- i. international trade;
- ii. the relationship between the rules of the multilateral trading system and the trade provisions contained in Multilateral Environmental Agreements (MEAs) (such as the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal); and
- iii. the transparency of national environmental regulations with an impact on trade.

During 1992, following the re-activation of the EMIT group, the “Earth Summit” known as *1992 United Nations Conference on Environment and Development (UNCED)* drew the attention of public to the role of international trade in poverty eradication and combating environmental degradation (WTO, 2004). The conference addressed the importance of promoting sustainable development in international trade.

⁶At the time, the members were Austria, Finland, Iceland, Liechtenstein, Norway, Sweden and Switzerland.

1.2.1 Environment and international trade

Towards the end of Uruguay Round⁷, the emerging role of the World Trade Organization (WTO) in the field of trade and environment had been put into focus. Its competence in the field of trade and environment is limited to trade policies and to the trade-related aspects of environmental policies which have a significant effect on trade (WTO, 2004). Therefore, in addressing the relationship between trade and environment, the WTO itself has no answer to the environmental problems. But, somehow, it believes that trade and environmental policies are complementary to each other. Environmental protection preserves the natural resource base on which economic growth is premised, and trade liberalization leads to the economic growth needed for adequate environmental protection (WTO, 2004). Thus with this as a measure, the WTO takes on the role to continue liberalizing trade and to ensure that environmental policies do not become an obstacle to trade and trade rules do not stand in the way of adequate domestic environmental protection. According to the WTO (2004), WTO members are free to adopt national environmental protection policies provided that they do not discriminate⁸ between imported and domestically produced like products (national treatment principle), or between like products imported from different trading partners (most-favoured-nation clause). Furthermore, WTO members recognize that trade liberalization for developing country exports, along with financial and technology transfers, is necessary in helping developing countries generate the resources they need to protect the environment and work towards sustainable development (WTO, 2004).

In the Preamble to the Marrakech Agreement Establishing of the WTO, the importance of working towards sustainable development was emphasized. During 1994, a Ministerial Decision on Trade and Environment established a Committee on Trade and Environment (CTE). The CTE members consisted of all WTO members and some observers from intergovernmental organizations. The CTE mandates agreed upon identifying the relationship between trade measures and environmental measures in order to promote sustainable development and making appropriate recommendations on any modifications of the provisions of the multilateral trading

⁷ The Uruguay Round commenced in September 1986 and continued until April 1994. The round, based on the GATT ministerial meeting in Geneva (1982), was launched in Uruguay, followed by negotiations in Montreal, Geneva, Brussels, Washington D.C and Tokyo with 20 agreements finally being signed in Marrakech (Wikipedia, 2009).

⁸ Non-discrimination is one of the main principles on which the multilateral trading system is founded. It secures predictable access to markets, protects the economically weak from the more powerful, and guarantees consumer choice (WTO, 2004).

system (WTO, 2004). In addition, the work programmes of the CTE cover broader issues than previously addressed by the EMIT group. In early 1995, the CTE first convened to examine the different items of its mandates. Starting from that year, it held a meeting and information session with the MEA (Multilateral Environmental Agreement) Secretariat to deepen members' understanding of the relationship between MEAs and WTO rules (WTO, 2004). In addition, according to the WTO (2004), it is widely recognized that multilateral cooperation through the negotiation of MEAs constitutes the best approach to resolving transboundary (regional and global) environmental concerns.

1.3 The Doha Mandates on Trade and Environment

At the Doha Ministerial Meeting organized in November 2001, it was agreed between the meeting members to launch negotiations on some issues related to trade and environment. During the meeting, WTO Members reaffirmed their commitment to health and environmental protection and agreed to embark on a new round of trade negotiations, including negotiations on certain aspects of the linkage between trade and environment (WTO, 2004). The Committee on Trade and Environment Special Sessions (CTESS) was established to conduct the issue. In addition, the CTE and the Committee on Trade and Development were asked to act as a forum in which the environmental and developmental aspects of the negotiations launched at Doha could be debated (WTO, 2004). According to the WTO (2004), the Doha mandate has placed trade and environment work at the WTO on two tracks:

- i. The CTE Special Session (CTESS) has been established to deal with the negotiations (mandate contained in paragraph 31 of the Doha Ministerial Declaration- refer to annex 2).
- ii. The CTE Regular deals with the non-negotiating issues of the Doha Ministerial Declaration (paragraphs 32, 33 and 51- refer to annex) together with its original agenda contained in the 1994 Marrakesh Decision on Trade and Environment (mandate contained in paragraphs 32, 33 and 51- refer to annex 2).

Other issues that will be discussed in this section and related to trade and environments are market access and environmental requirements and the effects of trade liberalization on the environment.

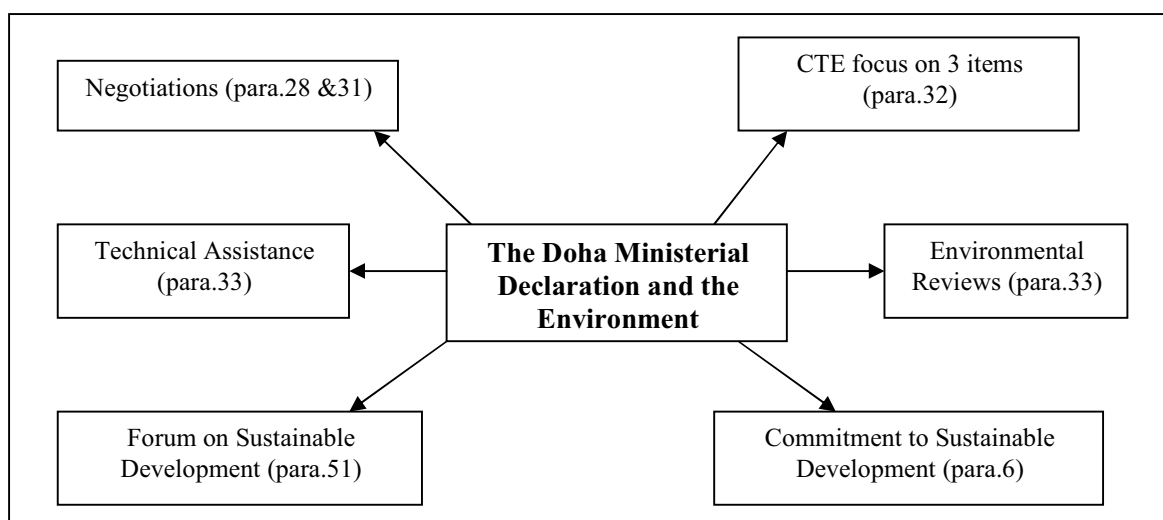


Figure 1: Summary on the Doha Ministerial Declaration Meeting [WTO 2004]

1.4 The Relationship between MEAs and the WTO

Before we go further, the definition of MEAs should be discussed also. According to Caldwell (2001), Multilateral Environmental Agreements (MEAs) are voluntary commitments among sovereign nations that seek to address the effects and consequences of global and regional environmental degradation. The agreements address environmental issues such as the transboundary effects, traditionally domestic environmental issues that raise extra jurisdictional concerns, and environmental risks to the global commons.

Although there has never been a formal dispute between the WTO and the MEAs, the relationship between the MEAs and the WTO should be discussed further to clarify the different roles of both operational frameworks. At the Doha Ministerial Conference, it was agreed to clarify the relationship between the rules of the WTO rules and the MEAs. WTO members have basically agreed to clarify the legal relationship between these rules, rather than leaving the matter to the WTO's dispute settlement body to resolve individual cases (WTO, 2004). Somehow, they mentioned that the negotiations should be limited to defining how the WTO rules apply to WTO members that are party to an MEA.

Since the launching of the negotiations, the common understanding of the mandate has been developed on the basis of two complementary approaches: the identification of Specific Trade Obligations (STOs) in the MEAs and conceptual discussion on the relationship between the

WTO and the MEAs. Closer cooperation between the MEA Secretariat and the WTO members is important to ensure that trade and environment can be developed together. This objective was recognized in the Plan of Implementation of the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg, which calls for efforts to “strengthen cooperation among UNEP and other United Nations bodies and specialized agencies, the Bretton Woods institutions and the WTO, within their mandates” (WTO, 2008).

1.5 Market Access and Environmental Requirements

The market access issue is important for developing countries to enter the international market. Therefore, environmental standards applied by some countries should consider the conditions of the developing countries, especially small and medium-sized enterprises (SMEs) that are vulnerable in this regards. Even though the WTO members consider that protection of the environment and health are parallel with the objectives, they should acknowledge that the environmental requirements set to address the objectives could as much affect the exports of developing countries. Thus, the market access concerns should not weaken the environmental standards, but rather enable exporters to meet them (WTO, 2004). In order to strike a balance between market access and environmental standards, the WTO members need to design protocols that (WTO, 2004):

- i. are consistent with the WTO rules;
- ii. inclusive;
- iii. take into account capabilities of developing countries and;
- iv. meet the legitimate objectives of the importing country.

It is important to include developing countries in designing and developing the environmental measures to mitigate the negative effects of trade. This includes active participation of developing countries in the early stages of the international standard-setting process. In discussing the market access issue, labelling requirements and taxes for environmental purposes have been highlighted for further discussion.

1.5.1 Labelling requirements and taxes for environmental purposes

The growing complexity and diversity of environmental labelling schemes create difficulties for developing countries in export markets and somehow may reduce the market access for them. In addition, an ecolabelling scheme based on life-cycle analysis, is not easy to conduct and is also related to a few aspects of the process of production or of the product itself. The WTO members agreed that environmental labelling schemes should be based on voluntary, participatory, market based and transparent to inform consumers about environmentally friendly products. However, environmental labelling schemes could be misused for the protection of domestic markets (WTO, 2004). Therefore, the environmental ecolabelling scheme should not result in unnecessary barriers or disguised restrictions on international trade. To some extent, the processes and production methods (PPMs) become a thorny issue in the ecolabelling debate. Many developing countries argued that measures which discriminate between products based on “unincorporated PPMs”⁹, such as some ecolabels, should be considered WTO inconsistent (WTO, 2004).

Since all ecolabelling schemes require some level of life-cycle analysis, they may eventually create non-tariff barriers for importers especially for developing countries who see these schemes as protectionist barriers to trade. Resource labelling in forest products has taken the form of forest product certification, a tool for providing credible environmental forest management information to consumers of wood products (Ruddel et al., 1998). Since forest product certification is concerned with the environmental impacts at one location in the forest products supply chain, resource labels provided by forest products certification are sometimes referred to as a single issue ecolabel. According to Ruddel et al. (1998), ecolabelling and forest product certification are potentially problematic within the context of the TBT agreement and the NT¹⁰ principle. The TBT agreement seeks to ensure that product standards are not used as disguised protectionist measures and to reduce product standards which may operate as barriers to market

⁹ WTO members agree that countries are within their rights under WTO rules to set criteria for the way products are produced, if their production method leaves a trace in the final product (e.g. cotton grown using pesticides, with there being pesticide residue in the cotton itself). However, they disagree over the WTO consistency of measures based on what are known as "unincorporated PPMs" (or "non-product related PPMs") - i.e. PPMs which leave no trace in the final product (e.g. cotton grown using pesticides, with there being no trace of the pesticides in the cotton) (WTO, 2004).

¹⁰ This principle requires that any restriction placed on imports (such as product standards) be no less favorable than those applied to domestic products so that standards do not create unnecessary obstacles to trade (Ruddell et al., 1998).

access. The environmental benefits communicated by ecolabels and resource labels are not reflected in the products' physical characteristics (Ruddell et al., 1998). Both ecolabelling and forest product certification rely on non-product related PPM criteria (i.e. environmental attributes) which are prohibited by the TBT agreement.

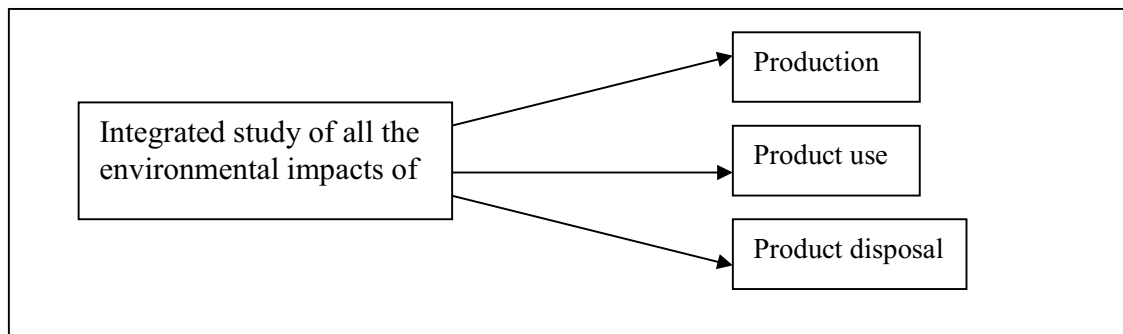


Figure 2: Life-cycle analysis [WTO 2004]

According to the WTO (2004), the issue of unincorporated PPMs has triggered a discussion on legal aspects in the WTO on the extent to which the TBT Agreement¹¹ covers and allows unincorporated PPM-based measure. To date, a major challenge facing the TBT Agreement is the increasing use of process-based regulations and standards. It has been argued that the TBT principles of equivalence and mutual recognition could have useful applications in the labelling area, where members could come to recognize the labelling schemes of their trading partners, even when they are based on certain criteria that differ from their own, provided that they succeed in achieving the intended objective (WTO, 2004). On the packaging issue, a number of countries have set up policies on the packaging purposes such as recovery, re-use, recycling and disposal materials that can be used in the markets.

Other issues such as environmental charges and taxes have been widely debated by developing countries. Recently, environmental charges and taxes are increasingly being used by the WTO members on traded goods. Since environmental taxes and charges are at least as much process-oriented as product-oriented, the WTO rules have raised concern over the competitiveness implications of environmental process taxes and charges applied to domestic producers (WTO,

¹¹ This agreement exists to ensure that regulations, standards, testing, and certification procedures do not create unnecessary obstacles to trade.

2004). Somehow or rather, these policies (on environmental labelling and taxes) can increase the cost to exporters and potentially act as barriers to trade for some countries and become the obstacles to the market access. Therefore, WTO rules should be reviewed to accommodate the charges and help exporters to increase the market access for the traded goods.

1.6 Effects of Trade Liberalization on the Environment

For developing countries, international trade is considered as an important means to gain benefit in increasing the exports and improving the income of a country. To some extent, trade liberalization contributes to the economic development of a country with the incoming foreign investment in certain sectors. Therefore, it is assumed that trade liberalization in certain sectors has the potential to bring benefits for trading partners. The removal of the trade restrictions and distortions should be emphasized by the WTO members. According to the FAO (1995), some environmental interest groups argued that by contributing to economic growth and increasing the world's demand for natural resources, trade liberalization is a cause of the problem and not the solution. Some groups proposed trade restrictions to protect the environment. They supported trade barriers and tighter restrictions in multilateral agreements to control excessive resource depletion and protecting consumers from hazardous imported products (FAO, 1995).

On that issue, in 1992, the United Nations Conference on Environment and Development (UNCED) outlined a work programme on trade and the environment and established a guideline for trade and the environment to encourage member governments to work towards national trade and environmental policies that are more compatible with each other (FAO, 1995). Following that in 1993, the United States, Canada and Mexico signed an agreement on an environmental adjunct to NAFTA that subjects trade agreements to environmental review. In 1994, a committee on trade and the environment within the WTO was set up to ensure that trade rules were responsive to environmental objectives. This is where Committee on Trade and Environment of the WTO came into the picture. The WTO Secretariat prepared a background note to address the fact that trade liberalization is not the primary cause of environmental degradation, nor are trade instruments the first-best policy for addressing environmental problems (WTO, 2004). Also the CTE has the responsibility of promoting sustainable development and making appropriate recommendations on any modifications of the provisions of the multilateral trading system (WTO, 2004).

For developing countries, the issues of sustainable development, trade and environment pose real policy dilemma as they need to increase incomes and at the same time reduce environmental damage in their countries. To some extent, the dependency of the developing countries on their natural resources cannot be denied. The developmental and food security needs, together with the macroeconomic imbalances of these countries impose pressure on their natural resources in order to reduce food import dependence and generate foreign exchange from exports (FAO, 1995). Among others, the forest sector is considered as one of the main contributors to income generation from the export of products and attracting foreign direct investment to the country. Therefore, the pressing needs to increase income and develop the economy as well as reduce the environmental damage raise important questions about how to balance between all the effects associated with environmental protection, economic development and trade.

1.7 Recent Trends in International Trading System

Several important trends have developed within the GATT liberal trading system over the past decades. The number of GATT contracting parties has increased markedly and includes many developing countries too. Also, contracting parties have expanded GATT beyond trade in “goods” to some other areas. For instance, the negotiations were extended by including services, trade related investment measures (TRIMs) and intellectual property rights in the Uruguay Round (Lallas et al. 1992). Furthermore, the Uruguay Round negotiators created a separate negotiating group to address trade in natural resource products and sanitary and phytosanitary measures. Indeed, negotiations in these areas are relevant to the environmental concerns.

In addition, countries continue to form regional trading blocks and most of them aim to establish more open or preferential trading rules among the participants. The underlying reason of setting up the regional trading block is to make the parties more competitive through economies of scale, diversification of labour markets, broader resource bases and trading preferences (Lallas et al., 1992). Many countries have also actively enforced the provisions of their GATT-based domestic trade instruments including those relating to anti-dumping, subsidies and unfair trade practices (Lallas et al., 1992). These regional and bilateral arrangements along with domestic trade rules, add another layer of rules governing international trade that increasingly affects international trade patterns (Lallas et al., 1992). To date, there has been some attention given to the potential impacts of trade on environmental protection. This trend in international trade is

changing the conditions and priorities among developing countries to increase their market access. Several “economically advanced” developing countries have rapidly increased their trading activities, and many other developing countries seek to expand exports to foster internal development (Lallas et al., 1992). Many countries face pressure to increase natural resource product exports to earn income to repay international debts, or in response to fluctuating commodity prices or market access barriers in other products. Hence, the increasing trend has resulted in rising stress on the environment in those countries (Lallas et al., 1992).

1.8 Environmentally Related Standards as Non-tariff Barriers

Recently societies have increasingly become aware of the problems of environmental degradation, pollution and disruption of ecosystem at local, national and global level. Scientific and technological advances have increased greatly the understanding of the causes and consequences of environmental degradation and the global nature of the environmental problems. Liberalized trade and investment also may improve the exchange of environmental engineering and treatment technologies and services among countries, helping them to better address environmental problems. However, developing countries remain concerned that developed countries have used and will use environmental standards and related trade measures to protect their domestic markets. In tandem with that issue, it is widely recognized that non-tariff barriers (NTBs) to trade have been increasingly widespread since the 1980s. These include quantitative restrictions or subsidies in agriculture, textiles and other sectors, voluntary restraint agreements, such as those in the steel sector and tariffs that increase according to the trade item’s level of processing (Lallas et al., 1992). It is assumed that some of these measures may have significant implications for environmental protection and economic development. Furthermore, strong pressure on developing countries to export natural resources and other products to service international debts or for some other reasons places additional stress on the environments of developing countries.

According to Ruddell et al. (1998), several developments in market access and trade in forest products have the potential to become new non-tariff barriers. To some extent, environmental regulations and standards may act as trade barriers especially for developing countries in adapting to these standards. The following issues might create unnecessary non-tariff barriers in forest products (Ruddell et al., 1998):

- i. Environmental and trade restrictions on production and export in developed countries that might affect international trade patterns,
- ii. Quantitative restrictions on imports of “unsustainably produced” timber products,
- iii. The use of ecolabelling and “green” certification as import barriers.

The WTO has sent a strong message that countries having high domestic environmental standards cannot use trade policy to force their standards on the rest of the world even if the countries imposing the trade policy apply the same requirement on their domestic products. Furthermore, the agreement on TBT (GATT Standards Code) adopted in the Tokyo Round of GATT Negotiations is designed to prevent countries from using product-related standards and technical regulations to create unnecessary obstacles to trade and to encourage countries to harmonize standards at the international level. The GATT Standards Code was negotiated in order to further develop rules and disciplines to prevent “implicit discrimination” against imports through the use of “product standards”.

1.9 Conclusion

This chapter has discussed in detail the relationship between international trade and the environment. The issue of international trade and environment has been debated since the early 1970s among researchers, environmentalists, and traders and even by the public also. Problems such as global warming, deforestation and some environmental issues have been argued as caused by international trade. Similarly, the WTO has formed a committee to further analyse the impact of trade liberalization on the environment itself. In addition, some schemes like environmental labelling have been established to mitigate the impact of trade on the environment. However, the environmental standards imposed have affected some developing countries which have to rely on their natural resources to increase their GDP, to attract foreign direct investment or even to use the exports of the natural resources to repay their debts. It is assumed that some environmental requirements set to address the WTO objectives to liberalize trade and protect the environment have affected the exports of developing countries.

Apart from that, developing countries have also found that higher environmental standards imposed by importing countries have the potential to act as non-tariff barriers on their products.

Therefore, it cannot be denied that, the higher environmental standards on their export commodities might affect the export value especially of forest products and services.

CHAPTER 2

MALAYSIAN TIMBER EXPORT: AN OVERVIEW OF THE WORLD MARKET

2.1 Background

In this chapter, the role of Malaysia as a major tropical timber supplier will be examined. Attention is first drawn to the contribution of Malaysia in terms of production and export of tropical timber in the world market. The traditional markets such as Asia and Europe will be highlighted. However, the discussion will focus on the European market as the case study.

Why Europe instead of Asia? It is presumed that the rising numbers of non-tariff barriers that have emerged in the market to be the central concern of the Malaysian timber industry, and Europe is probably the most difficult market for tropical timber products to access. Therefore, examining the European market as well as, issues and challenges influencing the timber trade between Malaysia and Europe as the central focus of this study is expected to have important bearing on the decisions of policy makers and also those who seek to export Malaysian timber products to Europe.

2.2 Malaysia as a Key Player in the International Tropical Timber Trade

Malaysia has been a major timber producer since the 1970s. The Malaysian timber industry has grown from being a producer of logs to one of primary and higher value-added products such as sawlogs, sawntimber, plywood, veneer, furniture builder's joinery and carpentry (BJC) and especially, wooden furniture products. Figure 3 shows the aggregate export earnings of timber relative to Malaysian GDP in real term (1979=100). The export earning in timber products seems to show a rising trend, except for the year 1998. As the Asian region is the major export destination of Malaysian timber products, the Asian financial crisis affected the Malaysian timber industry significantly.

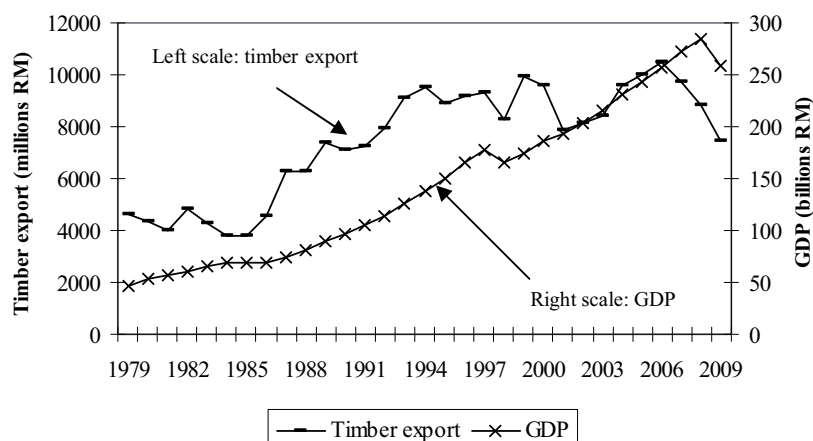


Figure 3: Timber exports relative to Malaysian GDP, 1979-2010 (in RM)
 [Gross Domestic Products-Department of Statistics Malaysia, (2010) and Timber exports-
 Maskayu Bulletin (1979, 1980,...2010)]

At the international level, in 2002, Malaysia was the fourth largest world supplier of sawlogs, contributing 4.3 percent (5.1 million m³) of the world's supply (119.7million m³). However due to Malaysia's commitment to achieving sustainable forest management (SFM), the volume of supply declined to 4.9 million m³ ranking Malaysia as the fifth largest supplier in the world in 2007 (Table 1).

No	2002		2003		2004		2005		2006		2007	
	World	119.7	World	121.1	World	123.5	World	133.0	World	138.5	World	138.5
1	Russian Federation	37.7	Russian Federation	37.8	Russian Federation	41.8	Russian Federation	48.3	Russian Federation	51.1	Russian Federation	49.3
2	USA	11.2	USA	10.4	USA	10.5	USA	9.9	USA	9.7	USA	10.1
3	New Zealand	7.8	New Zealand	7.5	Germany	5.6	Germany	6.8	Germany	7.6	Germany	6.7
4	Malaysia	5.1	Malaysia	5.6	Malaysia	5.4	Canada	5.9	New Zealand	5.5	New Zealand	5.9
5	Germany	4.9	Canada	5.2	New Zealand	5.2	Malaysia	5.8	Malaysia	4.9	Malaysia	4.9
6	Canada	4.6	Germany	4.6	Latvia	4.5	New Zealand	5.1	Canada	4.8	Latvia	4.1
7	France	4.6	France	4.5	France	4.2	France	4.3	France	4.2	France	4.1
8	Latvia	4.4	Latvia	4.4	Canada	4.0	Latvia	4.2	Latvia	3.8	Sweden	3.8
9	Estonia	3.3	Estonia	3.3	Czech Rep	3.0	Czech Rep	3.2	Sweden	3.0	Canada	3.6
10	Czech Rep	2.5	Czech Rep	3.1	Ukraine	2.9	Sweden	3.1	Czech Rep	2.9	Ukraine	3.3

Table 1: World's major suppliers of logs in terms of volume (million m³), 2002-2007
 [Ministry of Plantation Industries and Commodities Malaysia 2009]

In terms of sawntimber production, Malaysia ranked ninth and tenth in world production from 2002 to 2006 contributing from 1.9 percent to 2.5 percent respectively (Table 2). Accordingly, following the harvesting reduction in the SFM, in 2007 Malaysia's rank as sawntimber supplier dropped from the 10th to the 12th.

No	2002		2003		2004		2005		2006		2007	
	World	118.2	World	123.2	World	132.1	World	136.4	World	137.5	World	131.5
1	Canada	37.3	Canada	38.0	Canada	41.1	Canada	41.1	Canada	39.0	Canada	33.1
2	Sweden	11.2	Sweden	11.0	Russian federation	12.5	Russian federation	14.7	Russian federation	15.9	Russian federation	17.2
3	Russian federation	9.0	Russian federation	10.5	Sweden	11.2	Sweden	12.2	Sweden	13.2	Sweden	11.3
4	Finland	8.1	Finland	8.1	Finland	8.2	Finland	7.6	Germany	9.0	Germany	9.5
5	Austria	6.4	Austria	6.7	Austria	7.3	Germany	7.3	Finland	7.7	Austria	7.8
6	Germany	4.8	Germany	4.7	Germany	6.2	Austria	7.2	Austria	6.8	Finland	7.0
7	USA	4.5	USA	4.3	USA	4.4	USA	4.3	USA	4.6	USA	4.3
8	Brazil	2.9	Brazil	3.3	Brazil	3.6	Brazil	3.4	Chile	3.3	Chile	3.6
9	Latvia	2.8	Latvia	3.2	Malaysia	3.3	Chile	3.4	Brazil	3.1	Brazil	3.1
10	Malaysia	2.5	Malaysia	2.9	Latvia	2.9	Malaysia	3.2	Malaysia	2.6	Romania	2.3

Table 2: World's major suppliers of sawntimber in terms of volume (million m³), 2002-2007 [Ministry of Plantation Industries and Commodities Malaysia 2009]

For plywood supply, Malaysia maintained her position as the second largest supplier to the world from 2002 to 2007 (Table 3). In 2002 and 2003, Malaysia supplied about 17.4 percent and 18.2 percent of plywood respectively.

No	2002		2003		2004		2005		2006		2007	
	World	20.7	World	21.4	World	24.5	World	25.2	World	28.5	World	29.9
1	Indonesia	5.8	Indonesia	5.0	China	4.6	China	5.8	China	8.5	China	10.1
2	Malaysia	3.6	Malaysia	3.9	Malaysia	4.3	Malaysia	4.5	Malaysia	4.9	Malaysia	4.8
3	China	2.1	Brazil	2.3	Indonesia	4.0	Indonesia	3.4	Indonesia	3.0	Indonesia	2.7
4	Brazil	1.8	China	2.3	Brazil	3.0	Brazil	2.7	Brazil	2.8	Brazil	2.5
5	Russian federation	1.1	Russian federation	1.2	Russian federation	1.4	Russian federation	1.5	Russian federation	1.5	Russian federation	1.5
6	Finland	1.1	Finland	1.1	Finland	1.2	Finland	1.1	Finland	1.2	Finland	1.2
7	Canada	1.0	Canada	1.0	Canada	1.0	Canada	1.1	Canada	0.9	Canada	0.9
8	USA	0.5	USA	0.5	USA	0.5	USA	0.5	Chile	0.7	Chile	0.7
9	Belgium	0.3	Belgium	0.4	Belgium	0.4	Chile	0.4	USA	0.4	USA	0.6
10	Chile	0.2	Chile	0.3	Chile	0.3	Belgium	0.4	Belgium	0.4	Austria	0.5

Table 3: World's major suppliers of plywood in terms of volume (million m³), 2002-2007 [Ministry Of Plantation Industries and Commodities Malaysia 2009]

In 2004, the percentage declined and slightly recovered in 2005 at 17.6 percent and 17.9 percent respectively. However, 2006 and 2007 both saw declining percentages of supply from Malaysia at about 17.2 percent and 16.1 percent respectively. The lower percentages were due to increase in world demand (especially from China). Nevertheless, in actual volume, there were increases.

No	2002		2003		2004		2005		2006		2007	
	World		World		World		World		World		World	
	World	53.5	World	61.9	World	74.1	World	80.0	World	89.7	World	106.5
1	Italy	8.3	Italy	9.3	Italy	10.5	China	13.4	China	17.1	China	22.0
2	China	5.4	China	7.0	China	10.1	Italy	10.1	Italy	11.1	Italy	12.4
3	Germany	4.5	Germany	5.3	Germany	6.2	Germany	6.5	Germany	8.0	Germany	10
4	Canada	4.0	Canada	4.1	Poland	5.0	Poland	5.3	Poland	6.0	Poland	7.1
5	Poland	3.0	Poland	4.0	Canada	4.3	Canada	4.4	Canada	4.5	Canada	4.2
6	USA	2.1	USA	2.3	USA	3.0	USA	3.0	USA	3.2	USA	3.6
7	France	2.0	Denmark	2.2	Denmark	2.5	Denmark	2.4	France	3.0	Vietnam	3.1
8	Denmark	2.0	France	2.1	France	2.3	France	2.4	Denmark	2.5	France	3.0
9	Indonesia	1.5	Austria	2.0	Austria	2.0	Malaysia	2.0	Vietnam	2.4	Denmark	2.8
10	Malaysia	1.4	Indonesia	1.5	Malaysia	2.0	Indonesia	2.0	Malaysia	2.2	Malaysia	2.5

Table 4: World's major suppliers of furniture in terms of value (billion USD), 2002-2007 [Ministry Of Plantation Industries and Commodities Malaysia 2009]

Furthermore, Malaysia ranked as either the ninth or tenth largest world supplier of furniture from 2002 to 2007 except for 2003 (Table 4). In 2003, Malaysia ranked 12th with contribution of 2.4 percent (USD1.5 billion) relative to the world's total (USD61.9 billion). From 2002 to 2007, Malaysia supplied about USD1.4 billion to USD2.5 billion to the world market. However, after 2004 Malaysia experienced declining percentages in world furniture export relative to China. Since then, China has emerged as the major player in the world furniture market reducing the comparative advantage of other producers.

Figure 4 shows Malaysia's export of timber and timber products to the world in real term (1970=100). The export destinations of Malaysia are mainly the Asian region followed by Europe. The figure shows that after 1997, a significant drop in timber export to the Asian region is evident. The financial crisis experienced by the region was one of the major reasons that contributed to the slowdown of Malaysian timber exports affecting the Malaysian timber industry and reducing the trade among the countries in the region.

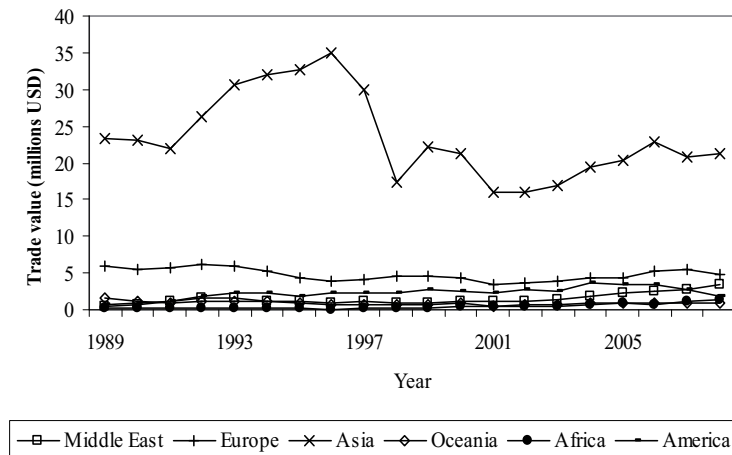


Figure 4: Malaysia's exports of timber and timber products to the world (real term), 1989-2008 [United Nations Commodity Trade Statistics 2010]

Figure 5 shows the log productions and exports (in m³) from Malaysia to the world from 1982 to 2010. Both indicated declining trends from the beginning of the 1990s. In Malaysia, logs come from various sources such as permanent reserved forests (PRF), state lands demarcated for development and alienated lands. In the effort of managing the natural forest in a sustainable manner, areas opened for logging especially in Peninsular Malaysia have been greatly reduced (Ahmad Fauzi et al. , 2008). The increasing world demand for palm oil and palm oil products, coupled with the attractive prices of palm oil has converted the areas logged into oil palm plantations. For instance in 2002, more than 90,000 hectares (almost 88.8 percent) of the total area opened for logging activities were converted into palm oil plantations. The continuing declines then are best explained by the commitment of Malaysia to sustainable forest management starting from 1994 when the National Committee on Sustainable Forest Management was established. The reduction of allowable cutting rate has affected the supply of raw materials. Ismariah and Abdul Rahman (2007) opined that in the short term, primary timber industry will be affected due to the dwindling supply of raw materials. However, it is believed that forest plantations and log imports would compensate for the shortage of log supply in Malaysia.

Log export shows a declining trend as local industries started to develop and switch their production lines from primary to value-added products. This was greatly stimulated by the

implementation of the Industrial Master Plans (IMP1 and IMP2) meant for the manufacturing sector including the forest-based industries (Ahmad Fauzi et al. , 2008).

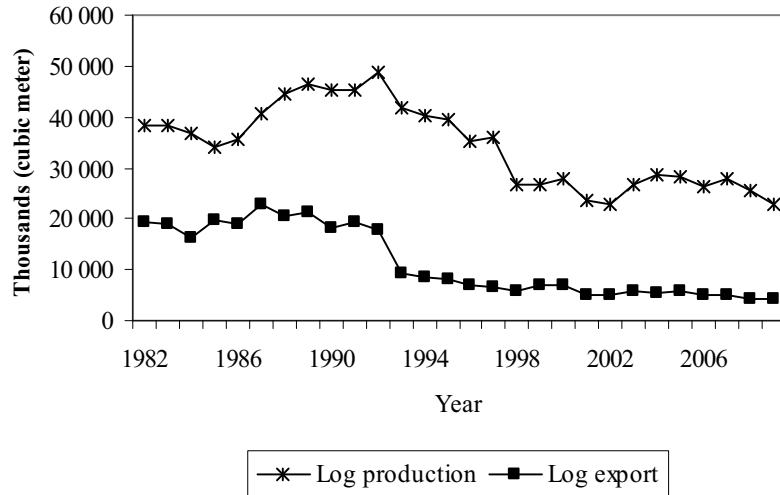


Figure 5: Malaysia's log productions and exports 1982-2009 (m³) [International Tropical Timber Organization 1980, 1981,...2010]

Figure 6 shows the sawntimber productions and exports (in m³) from 1982 to 2009. As with the log production in the country, the forest conservation policy is believed to have shaped the outputs of forest products and directly influenced the sawntimber productions and exports.

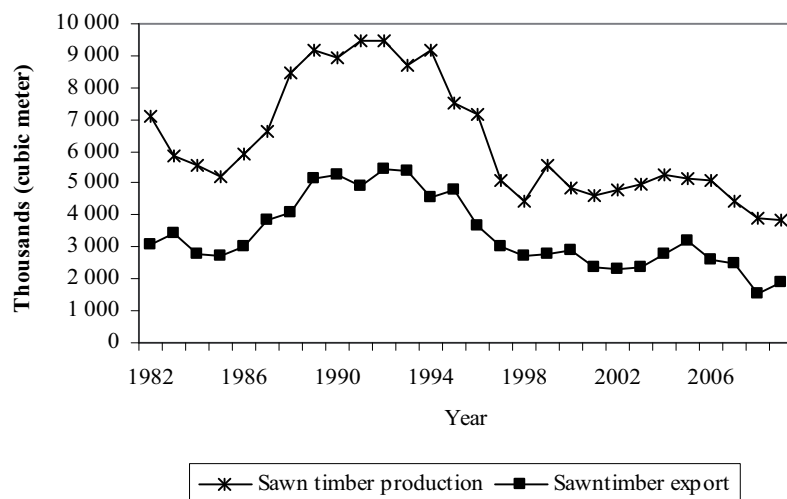


Figure 6: Malaysia's sawntimber production and exports (m³), 1982-2009 [International Tropical Timber Organization 1980, 1981,...2010]

The overall production of sawntimber has experienced a downward trend since it is highly dependent on the volume of log processed and the recovery rate of log species. Besides, the imposition of the export ban in 1990 witnessed a sharp decline in the log exports as the majority of logs produced were being processed locally (Ahmad Fauzi et al. , 2008). In addition, due to the economic slowdown in 1998, purchases from the construction sector remained passive together with the reduced demand from the housing and mouldings sectors; all these contributed to the declining trend of sawntimber export.

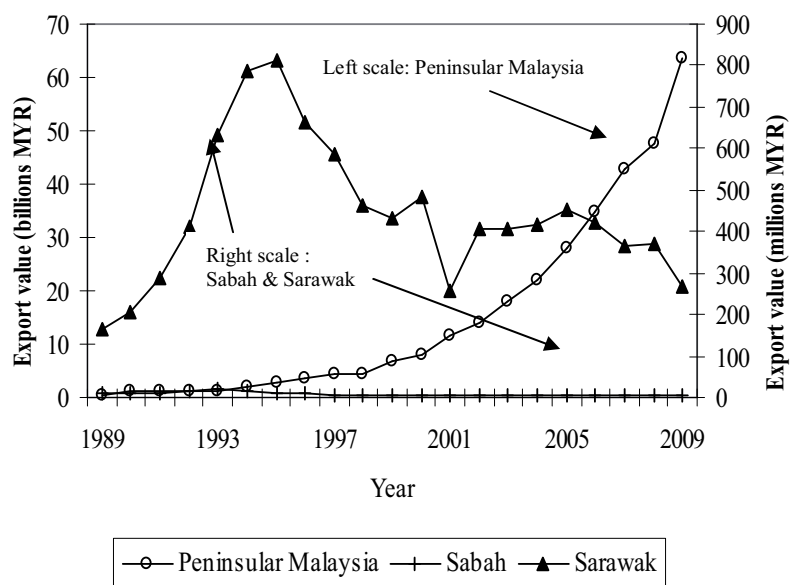


Figure 7: Malaysia’s sawntimber exports by Peninsular Malaysia, Sabah and Sarawak, 1982-2009 [International Tropical Timber Organization 1980, 1981,....2010]

Figure 7 shows the sawntimber exports by Peninsular Malaysia, Sabah and Sarawak from 1982-2009 in real term (1970=100). The major contributors of Malaysian export earnings for sawntimber were Peninsular Malaysia and Sarawak, while Sabah contributed less. Peninsular Malaysia shows a gradual rising trend of export earnings for sawntimber compared to Sarawak and Sabah.

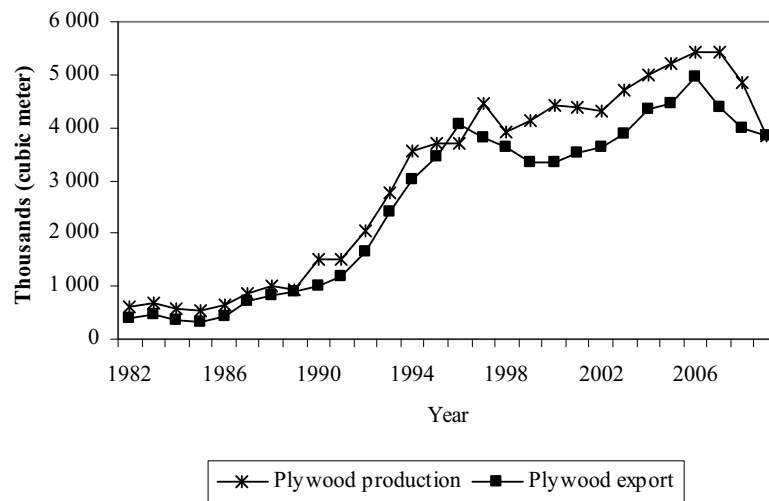


Figure 8: Malaysia's plywood productions and exports (m³), 1982-2009
 [International Tropical Timber Organization 1980, 1981,....2010]

In Figure 8, plywood productions and exports indicated reverse trends to those for sawntimber. The productions and exports show rising trends from 1982 to 2005. However, from 2006, the export and production of plywood started to decline which was probably due to the change in processing and export policies of Malaysia. The promotion of downstream processing of primary timber products and export of value-added items had influenced the plywood products as well.

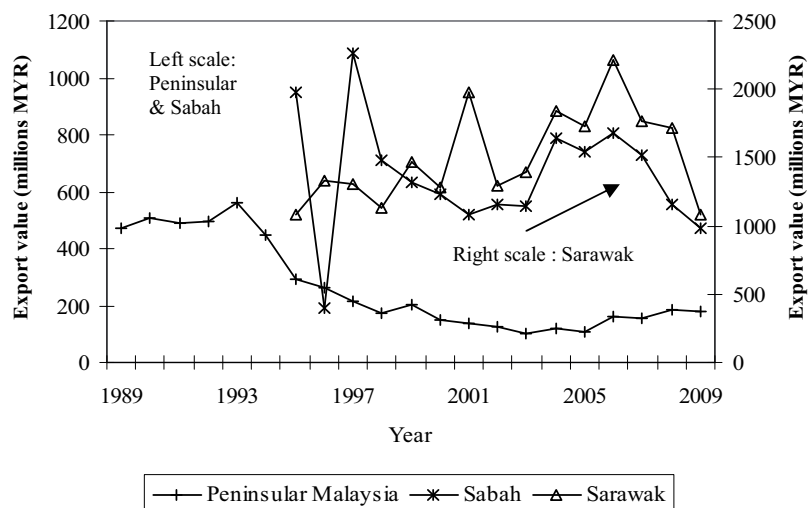


Figure 9: Plywood exports by Peninsular Malaysia, Sabah and Sarawak, 1982-2009 (in RM)
 [International Tropical Timber Organization 1980, 1981,....2010]

Figure 9 supports this inference by the declining export earnings in real term (1970=100) of plywood from Sabah and Sarawak (which are the major producers of plywood) in 2006. However, Peninsular Malaysia being a small contributor to the export earnings of plywood did not show a clear decline.

The overall production of mouldings in Malaysia started to grow from 1981 and reached its peak in 1997 and 2001. The production drop substantially in 2002, presumably due to the commitment of Malaysia towards sustainable forest management whereby the accompanying decline in sawntimber production affected the moulding mills consumed a considerable amount of sawntimber in their production lines. Nevertheless, mouldings are also among the major timber products that contributed to the export earnings of the Malaysian timber industry (Figure 10 and 11). Though the contribution of mouldings is considered small and not substantial relative to the other products, its export values in real term (1970=100) were more stable from 1982 to 2009 (refer Figure 12).

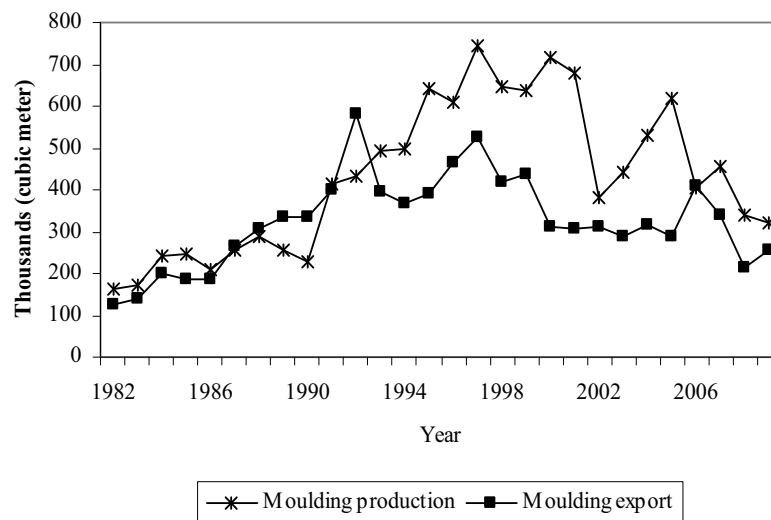


Figure 10: Mouldings productions and exports (m³), 1982-2009 [International Tropical Timber Organization 1980, 1981,....2010]

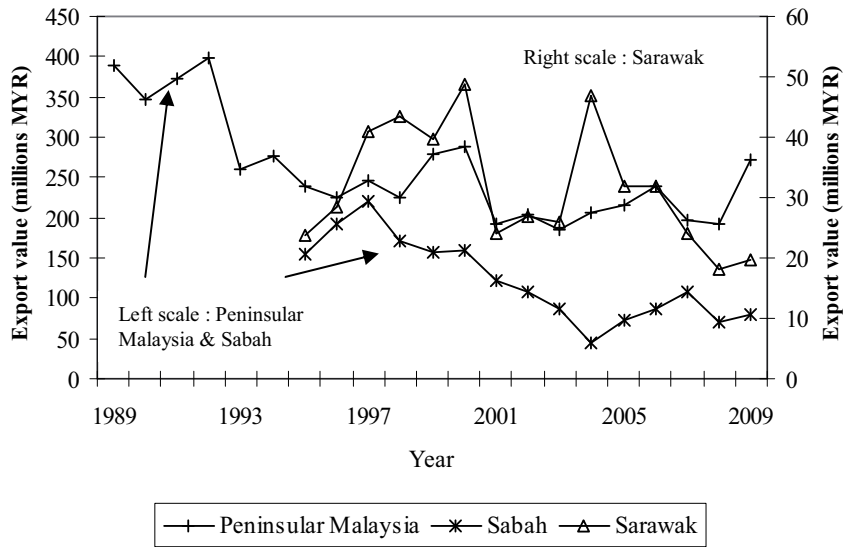


Figure 11: Mouldings exports by Peninsular Malaysia, Sabah and Sarawak, 1982-2009 [International Tropical Timber Organization 1980, 1981,.....2010]

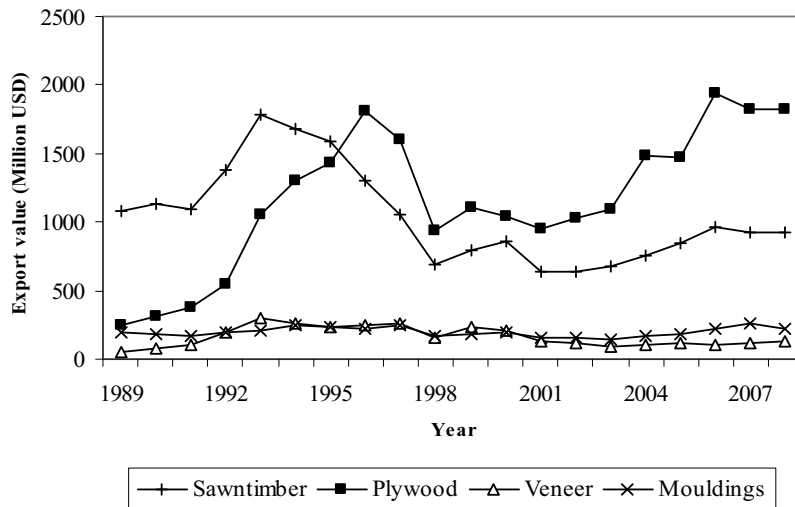


Figure 12: Exports of major timber products from Malaysia to the world, 1982-2009 [United Nations Commodity Trade Statistics 2010]

In the overall export of timber products from Malaysia, Figure 13 indicates that Malaysia has made significant progress in the export of wooden furniture in real term (1970=100) compared with the other major timber products.

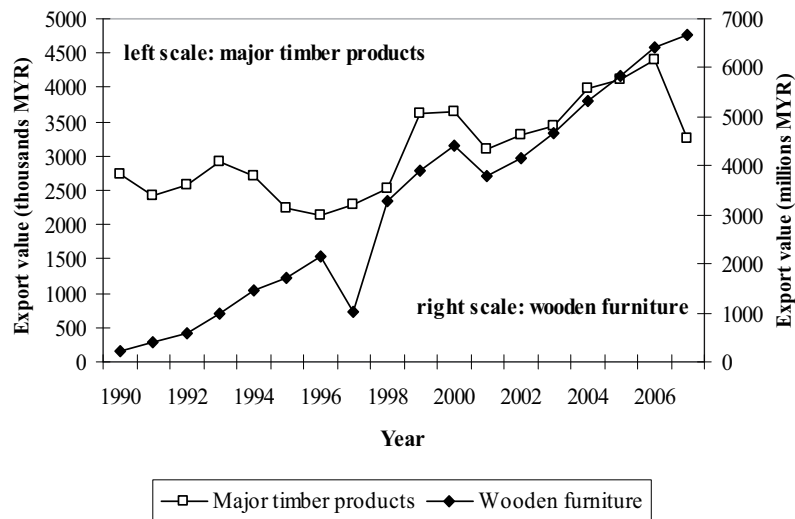


Figure 13: Malaysia’s exports of major timber products (combined) and wooden furniture to the world, 1990-2007 (in RM) [Forestry Department of Semenanjung Malaysia 1990, 1991,..2007]
 *Major timber products are summations of sawntimber, plywood, mouldings and veneer

It is remarkable that the export values of wooden furniture escalated rapidly after 1997. This was likely due to the growing interest in rubberwood-based furniture products drawing greater attention from the manufacturers for the export market as a result of the government policies in promoting value-added products as well as the changing policies on forest management which had impacted the Malaysian timber industry.

2.3 Asia: Major Destinations for Malaysian Tropical Timber Products

From the exports statistics of timber and timber products, it is evidenced that Asia was the major market for Malaysia taking up about 50 percent of the total exports from Malaysia relative to the world. The geographical locations of the countries were grouped into Eastern Asia¹², South Central Asia¹³ and South East Asia¹⁴ for this analysis (Figure 14). The highest values of Malaysian timber export went to China, Japan and Korea which are considered the real market for Malaysian timber products in Asia.

¹² Eastern Asia comprises China, Hong Kong, Japan and Mongolia

¹³ South Central Asia comprises Afghanistan, Bangladesh, Bhutan, India, Kazakhstan, Kyrgyzstan, Maldives, Nepal, Pakistan, Sri Lanka, Tajikistan, Turkmenistan, Uzbekistan

¹⁴ South East Asia comprises Brunei, Cambodia, Indonesia, Myanmar, Philippines, Singapore, Thailand, Vietnam, Lao, Timor Leste

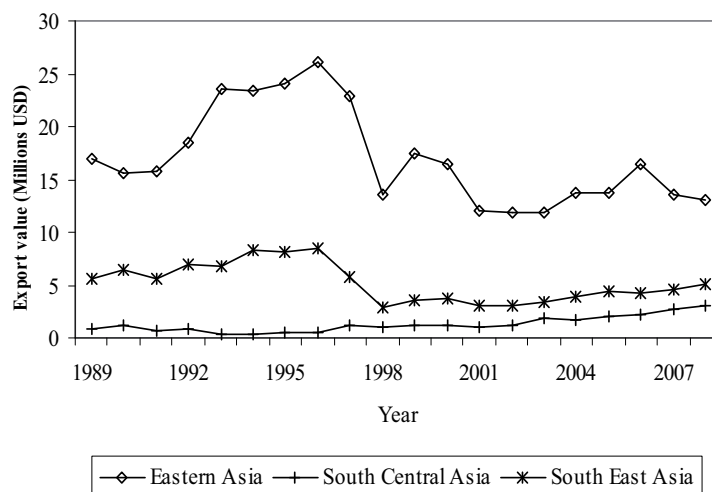


Figure 14: Malaysia's exports of timber and timber products to Eastern Asia, South Central Asia and South-East Asia (real term), 1989-2008 (in USD) [United Nations Commodity Trade Statistics 2010]

The rest of the timber products were exported to Europe, the Middle East, Oceania, Africa and America (Figure 15). However, as Europe is the focus in our central discussion, special attention shall be given to this region, but it should be noted that Asia is the real export market of Malaysia. No further analysis will be made of the Malaysian timber export in the Asian region.

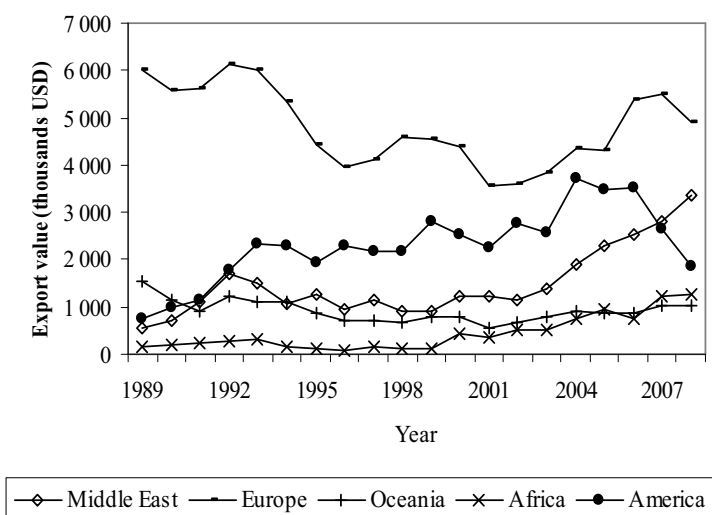


Figure 15: Malaysia's exports to the Middle East, Europe, Oceania, Africa and America (real term), 1989-2008 (in USD) [United Nations Commodity Trade Statistics 2010]

2.4 Europe: Traditional Market for Malaysian Timber Products

For this part, 41 European countries were selected for analysis. The entire European countries were grouped based on their geographical locations and then classified into subregions: Western Europe, Northern Europe, Southern Europe and Eastern Europe (Table 5). These sub-regions will be referred to throughout the whole discussion. In addition, the list of all exported timber products from Malaysia to Europe will not be analysed; only the major exported products will be included in the discussion. There were four major exported products observed from Malaysia to the region, i.e. sawntimber, plywood, veneer and mouldings (further analysis will be made on each of these products in the next discussion).

To begin the discussion, the international timber trade between Malaysia and Europe will be overviewed. It is observed that there has been a significant amount of timber and timber products exported to Europe since 1970s. However, due to the limited of data from the various sources considered such as Maskayu timber bulletin, International Tropical Timber Organization and United Nations Comtrade, the discussion starts with the development of the timber trade from the 1990s instead of 1970s between these two parties.

Sub-regions	Countries
Western Europe	Austria, Belgium, France, Germany, Luxembourg, Netherlands, Switzerland
Northern Europe	Denmark, Estonia, Finland, Iceland, Ireland, Latvia, Lithuania, United Kingdom, Norway, Sweden
Southern Europe	Albania, Andorra, Croatia, Cyprus, Greece, Italy, Malta, Montenegro, Portugal, San Marino, Serbia, Slovenia, Spain
Eastern Europe	Belarus, Bulgaria, Czech, Hungary, Poland, Romania, Russia, Slovakia, Ukraine

Table 5: European subregions based on physical geography

Figure 16 shows the export of timber products relative to the total exports from Malaysia to Europe. Though the export value of timber products is considered small relative to the total export value, still it makes a significant contribution to Malaysia's export earning of foreign exchange.

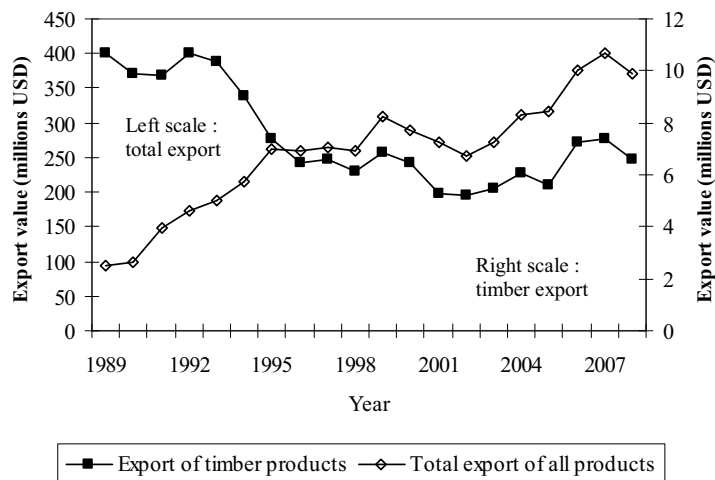


Figure 16: Exports of timber products relative to the total export of all products from Malaysia to Europe, 1989-2008 (in USD) [United Nations Commodity Trade Statistics 2010]

In 1990, the export of timber products accelerated steadily until 1993. After 1994, Malaysia experienced declining export value until 1996 due to some policy related to sawntimber export levy. In 2001, with the global economic recession, Malaysia faced the lowest export value. It took seven years for Malaysia to recover in the European market with the export value climbing steadily. Year 2008 saw the world financial crisis with export of timber products from Malaysia reduced relative to 2007.

Specifically, Western Europe had the dominant market share established about 50 percent (on average) of the total Malaysian timber export in real term (1970=100) from 1989 to 2008 (Figure 17). In 2008, Western Europe experienced a 3 percent reduction in export value which was the USD2.78 million for that year. It was followed by Northern Europe at 37 percent (USD2.19 million), Southern Europe 13 percent (USD7.8 million) and Eastern Europe 3 percent (USD1.0 million). Western Europe exhibited a declining market share relative to Southern Europe and Northern Europe. Among all countries the Netherlands, Austria, Germany, France and Switzerland were the major consumers of timber products from Malaysia (Figure 18). The Netherlands was a significant market with export value of more than USD1.00 million from 1989 to 2008. Timber export to the UK also intensified after 2003. The major products exported to all these countries were sawntimber, mouldings, plywood and veneer.

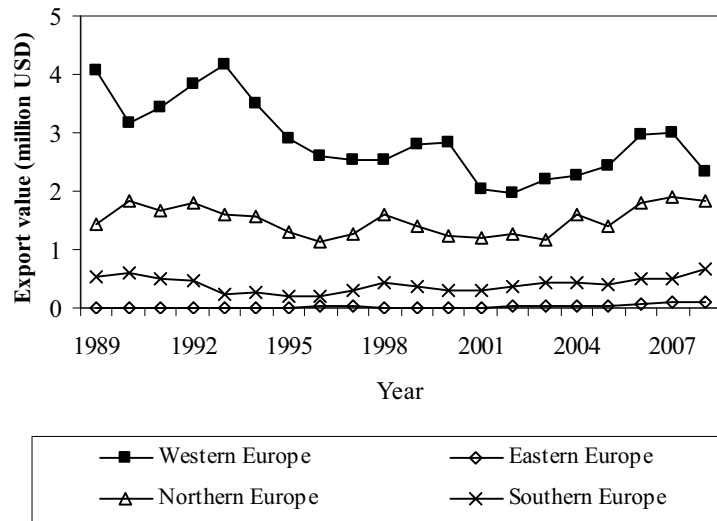


Figure 17: Exports of Malaysian timber products to subregions in Europe, 1989-2008 (in USD) [United Nations Commodity Trade Statistics 2010]

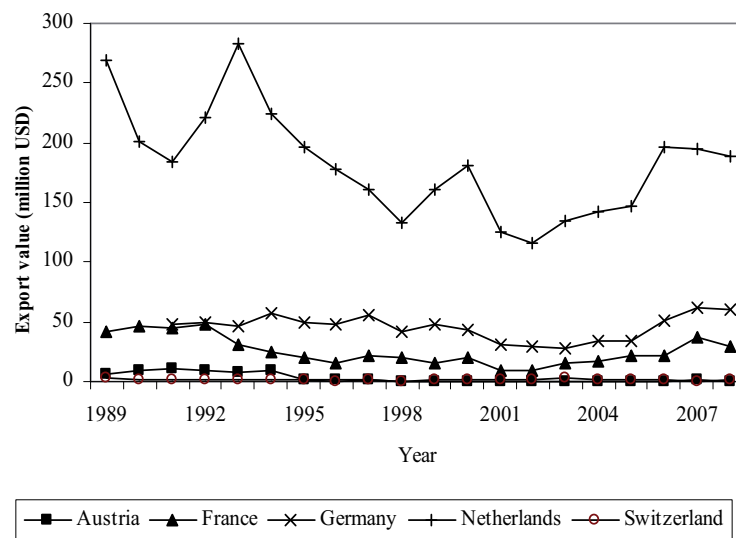


Figure 18: Exports of major timber products to major destinations in Western Europe, 1989-2008 (in USD) [United Nations Commodity Trade Statistics 2010]

Figure 19 displays the major timber products exported from Malaysia to Europe in real term (1970=100) from 1989 to 2008. It is noticed that sawntimber was the major product exported to Europe followed by plywood, mouldings and veneer. The sawntimber export value fluctuated while those of plywood and mouldings gradually rose through the years. In contrast the veneer export value remained steadily low.

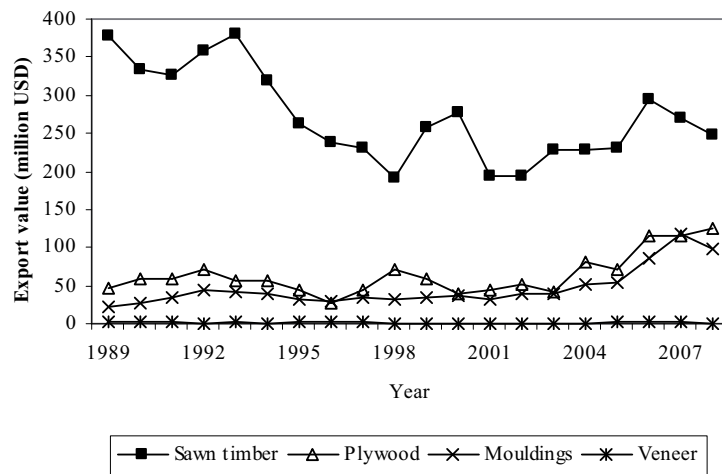


Figure 19: Exports of major timber products from Malaysia to Europe, 1989-2008 (in USD) [United Nations Commodity Trade Statistics 2010]

Sawntimber

Figure 20 shows the exports of sawntimber from Malaysia to Europe in real term (1970=100) from 1994 to 2008. The major markets for Malaysian sawntimber were the Netherlands, the United Kingdom, Germany, Italy and France. Yet, other European markets were still important to Malaysia. In 1989, the Netherlands was the most important market for Malaysian sawntimber with the export value of about USD254.2 million. Other significant markets were the United Kingdom (USD43.3 million), Italy (USD34.3 millions) and France (USD12.5 millions). In 1999, all the major markets faced diminishing export due to the economic effect of the Asian financial crisis. Export to the Netherlands declined by 29 percent, amounting to USD140.7 millions compared to 1994. The United Kingdom experienced the worst reduction of export value by 41 percent compared to other major markets. Germany, Italy and France underwent export shrinkages of 14 percent, 22 percent and 32 percent respectively. In comparing with 1999, all major export destinations still faced reductions in export value except for Italy in 2004. Italy received 48 percent higher export value from Malaysia and amounted to USD 22.1 millions. However, Italy experienced fall in export from by 19 percent in 2008. On the other side, Germany performed well with the climbing export value of about USD15.2 millions compared to 2004.

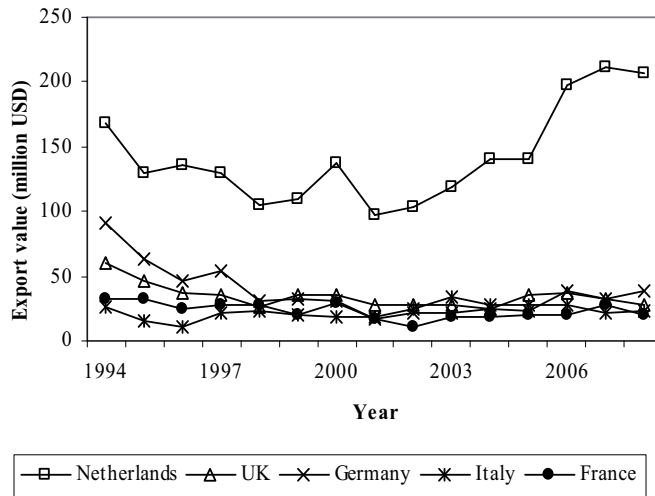


Figure 20: Exports of sawntimber from Malaysia to Europe (by major destinations), 1994-2008 [United Nations Commodity Trade Statistics 2010]

Plywood

Plywood is considered the major export earner among Malaysian timber products relative to other primary products. Figure 21 shows the exports of plywood from Malaysia to Europe in real term (1970=100) from 1994 to 2008. The major export markets for Malaysian plywood are the United Kingdom, Denmark, France, and Germany. In 1989, the export of plywood was largely to Denmark with aggregate of USD3.0 million while other European countries received a smaller amount of export value. In 1994, the United Kingdom was the leading export destination of plywood with export value of USD43.0 million. It was followed by Germany, Denmark, Italy, Ireland and France at USD3.0 million, USD1.5 million, USD1.4 million, USD0.9 million and USD0.8 million respectively. Most of the export destinations of plywood were not affected by the 1997 Asian financial crisis.

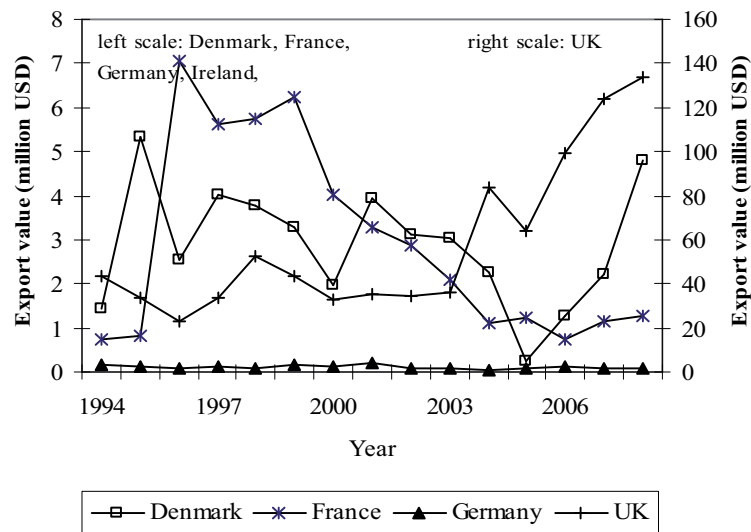


Figure 21: Exports of plywood from Malaysia to Europe (by major destinations), 1994-2008 [United Nations Commodity Trade Statistics 2010]

Instead, in 1999, Denmark, France and Ireland had remarkable growths in export value at 125 percent, 730 percent, 700 percent totally USD3.3 million, USD6.2 million and USD8.0 million respectively compared with 1994. However, Italy experienced negative export value by 34 percent (with reduction of export to USD0.9 million). United Kingdom and Germany maintained their export values with the small export growths. In 2004, most of the export destinations faced negative growth except for United Kingdom and Italy compared to 1999. The declining export of Malaysian plywood reflected the world economic crisis from 2001 to 2002. Year 2004 witnessed that the export of Malaysian plywood did not yet recover from the crisis. However, the Malaysian plywood export started to regain its position in European countries after 2005. Among all, the export to the United Kingdom market was the most resilient with steady increase over the years. In 2008, the export to the United Kingdom reached the highest peak amounting to USD133.4 million. Overall, the United Kingdom has leverage power on Malaysian plywood compared with other European markets.

Mouldings

Figure 22 depicts the exports of mouldings from Malaysia to Europe in real term (1970=100) from 1994 to 2008. From the data, the major destinations for Malaysian mouldings were the United Kingdom, Netherlands, Germany, France and Ireland. In 1989, mouldings were exported to several countries in Europe especially Spain with export value amounting to USD986 thousand. However after five years, there was increasing demand for Malaysian mouldings in the United Kingdom, Netherlands, Germany, France and Ireland with exports totalling to USD10.1 million, USD4.8 million, USD1.9 million, USD659 thousand and USD632 thousand respectively. In 1998, there was a remarkable export growth to Ireland with 291 percent increase with export value of USD2.5 million compared with 1994. The United Kingdom and the Netherlands gave positive export growths with 49 percent and 6 percent increases respectively.

On the other hand, exports to France and Germany were gloomy with reductions of 51 percent and 32 percent respectively. However, in 2004 France received the highest export value at USD 36 thousand. Though the export value did not surpass that of the major player which was the Netherlands, it shed some light on the French market. Other export markets such as the Netherlands and Germany had steady growths of mouldings export except for Ireland. In 2008, with the effect of global financial crisis, the major export markets faced declining exports from Malaysia. Nonetheless, the Netherlands performed strikingly well with increasing export value of 180 percent with mouldings exports value of USD25.9 million.

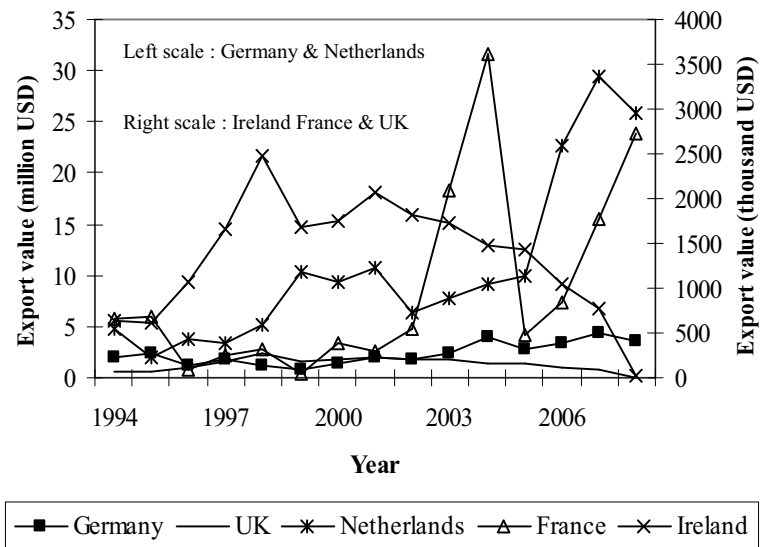


Figure 22: Exports of mouldings from Malaysia to Europe (by major destinations), 1994-2008 [United Nations Commodity Trade Statistics 2010]

Veneer

For veneer, no graph on the export data could be drawn due to insufficient information. However, the contribution of veneer to the Malaysian export earnings (in real term, 1970=2000) can still be seen. In 1989, the total export of veneer to Europe amounted to USD1.6 million with the Netherlands leading the export market at USD964 thousand, followed by the United Kingdom at USD579 thousand. The remaining export value was shared by the other European markets. In 1994, the total export of veneer declined by 48 percent to USD860 thousand. The reduction in export value reflected the global recession from 1990 until 1993. In 1999, the export value further declined being impacted by the Asian financial crisis with the total export to Europe at less than USD300 thousand. Moreover, in 1997 the production of veneer for export dropped because most of the companies had converted their veneer to plywood and panel products. The export to the Netherlands experienced a serious decline to USD182 thousand. However, in 2004 the total export of veneer climbed up to USD456 thousand. Germany had the biggest export share compared with other markets with export value amounting to USD181 thousand. The export value totalling to USD1.2 million showed positive sign for Malaysian veneer in 2008.

Changes in pattern of wood export to Europe

In the early 1980s, the export of wooden furniture was insignificant compared with major timber products in the European market. Nonetheless in 2004, the wooden furniture export increased significantly and surpassed the export of major timber products with value of USD263 million (in real term, 1970=100) (Figure 23).

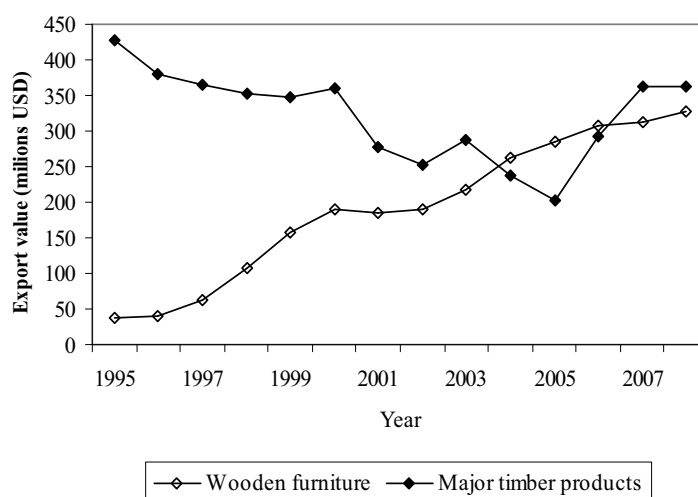


Figure 23: Exports of major timber products and wooden furniture export from Malaysia to Europe, 1995-2008 (in USD) [United Nations Commodity Trade Statistics 2010]

*Wooden furniture export data were extracted from Maskayu (1995, 1996...2008). Each value had been divided by the estimated actual exchange rate published by Central Bank of Malaysia.

**Data on furniture export to Europe were only available for Belgium, Denmark, France, Germany, Ireland, Italy, Netherlands, Russia, Spain, Sweden, and UK

*** Major timber products are summations of sawntimber, plywood, mouldings and veneer (UN Comtrade, 2010)

It is remarkable that wooden furniture export continued to escalate rapidly to USD307 million in 2006. From the Malaysian perspective, the Industrial Master Plan (IMP) which emphasized downstream processing activities for primary timber products anyhow had promoted the product mix. With this policy, improvement in the product quality and the enhancement of new technologies such as computerized numerical control (CNC), computer aided manufacturing (CAM) and computer aided design (CAD) contributed to the furniture product design. The production capabilities in manufacturing furniture with own design and brands that are aesthetic and functional, incorporating ergonomic features and durability had ultimately escalated the wooden furniture export after 1995. In 2005, furniture mills accounted for about half (2636

mills) of the total mills producing timber products in operation (4549 mills) with 1774 mills operating in Peninsular Malaysia (Ministry of International Trade and Industry Malaysia, 2006). The industry has diversified into the production of composite and engineered wood products including laminated veneer lumber, medium density fibreboard and particleboard. The products such as fibreboard (20.3 percent), particleboard and chipboard (19.4 percent) as well as wooden furniture (13.3 percent) registered the highest average annual growth rates from 1996 to 2005 (Ministry of International Trade and Industry Malaysia, 2006). In fact, from 1996 to 2005, there were 403 projects approved (RM 1122.4 million) for wooden furniture and components which made them products that received the highest local and foreign investments. The implementation of the policy has given rise to the increase in wooden furniture export to the global market including Europe.

On the European side, the booming construction sector, specifically the housing industry had indirectly increased the demand for wooden furniture. The European construction sector is estimated to account directly for 70 percent of all European consumption of wooden products. In fact, residential construction was the main focus with Euro 642 milliard spent, 47.7 percent out of the total construction industry in Europe for year 2005 (Gluch, 2007). Furthermore, the European consumer taste towards lighter wood colour, as in rubberwood, has increased the demand for this “Malaysian oak”. The natural colour of rubberwood is one of the principal reasons for its popularity. Indeed, almost 70 percent of Malaysian furniture is made from rubberwood. Its favourable qualities and light colour enable rubberwood to be substituted or used as an alternative to Ramin which is banned in Europe. That rubberwood is obtained from a renewable resources and is being replanted complies with the issue of sustainable forest management which is especially pertinent in Europe.

2.5 Issues and Challenges Influencing Malaysian Timber Trade in Europe

Being export-oriented industry, the Malaysian timber sector is vulnerable to market dynamics. The trade not only depends on the demand for the products, but some other factors such as supply of raw materials, the emergence of competing producers and non-tariff barriers were among the major factors that played an important role in shaping the development of the Malaysian timber trade in Europe.

Raw materials supply

In tandem with the Malaysian government policy on emphasizing downstream activities, upstream activities have faced a shortage in raw material supply. The decline in Malaysian log production has been attributed mainly to the reduction in annual coupes resulting from the Rio Convention whereby Malaysia needed to achieve ITTO 2000 objective¹⁵ and certification standards in attaining the goal of Sustainable Forest Management (SFM). The total log production from the natural forest in Malaysia had declined from about 23.1 million m³ in 2000 to 21.9 million m³ in 2006. This resulted from the conservation strategy to ensure sustainable timber production with declining annual coupes. To overcome the shortage, forest plantation programmes have been developed seriously and logs have been imported from other tropical countries. Fast growing forest plantations species such as *Acacia mangium*, *Gmelina arborea* and *Paraserianthes falcataria* are expected to be the major contributors to the log production in the future (Ministry of Plantation Industries and Commodities Malaysia, 2009).

The emergence of other competing producers

Malaysia is competing with China and Brazil to increase its market share in Europe. Undoubtedly, China has emerged as the world's top exporter of wood products. The growing demand in the world including the European communities for low-cost wooden products has contributed to the greater market access for Chinese wood products in the region. Being advantaged by low labour cost and mass production factors has placed China over other world producers. Also, Brazilian wood products are gaining prominence in the European region. The effort of the Brazilian industrial association to implement the national certification scheme as early as 1991 has benefited their wood-based industry, hurdling over the trade barriers in Europe (May, 2004).

Being driven by the export to the European market, the Brazilian rationale for the certification is to maintain markets conquered and to open up new market prospects in the European region. However, the major challenges faced by the Brazilians were the financing cost of conversion to certified standards, labour and managerial training as well as organizational capacity building needs for the project management in realizing the certification process in Brazil. Figure 24 shows

¹⁵ In 1990, ITTO members agreed to strive for an international trade in tropical timber from sustainably managed forests by the century's end. This commitment is known as the Year 2000 objective.

that the total wood exports of Malaysia, has being surpassed by those of China and Brazil in the last few years.

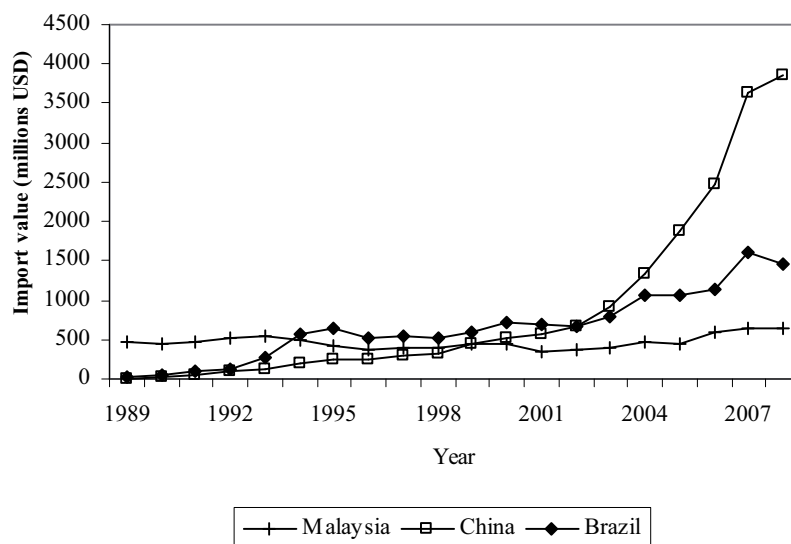


Figure 24: Imports of wood products from Malaysia, China and Brazil to Europe, 1989-2008 (in USD) [United Nations Commodity Trade Statistics 2010]

Non-tariff measures

There are rising numbers of non-tariff measures (NTMs) in tropical timber trade including laws, regulations and practices designed to control trade. NTMs vary by country, by product and even over time. The NTMs in the European region on timber products are summarized in Table 6.

Non-tariff measure	Products affected
Prevention of using borates for wooden products	Wood products especially rubberwood
Government procurement policies favouring FSC-certification or any single standard	Especially wooden construction products
International Standards for Phytosanitary Measures (SPS ISPM 15)	Packaging and creating lumber
CE marking based on Construction Products Directive	Construction products

Table 6: Non-tariff measures for Malaysian timber trade in the European region [Compiled from WTO studies]

A sensitive market such as Europe is very concerned with the sources and the production processes of timber and wood products. For instance, the use of borates in paperboard products, veneer sheets, pressed panels and rubberwood has been increasingly debated in the European Commission (EC). In specifics, borates are used as stabilizer for wooden panel products, and have been utilized in professional and industrial wood preservation to avoid insect and fungal attacks on wood. Borates have been widely used in furniture manufacturing especially involving rubberwood in Malaysia to protect the colour of the wood. Specifically, in early 2007 the EC had notified the World Trade Organization Technical Barriers to Trade Committee on the issue of borates in wood that may affect human health and environment (World Trade Organization, 2009). However, it was the view that the proposed EC measures were more to restrict trade than to protect health, safety and the environment. These measures would result in trade barriers which could impair Malaysia's ability to market rubberwood products in the European region.

Besides, in recent years the issues of certification of timber products have been widely debated. The environmentally conscious markets such as Germany, the Netherlands and the United Kingdom have strongly demanded that forest products relative to other countries in the region be certified. Indeed, the national governments of the European market including the United Kingdom, France, Germany and Denmark have communicated public procurement policies, favouring the purchase of certified forest products from tropical countries. According to Islam and Siwar (2009) in their study of timber certification in tropical timber trade in Malaysia, the negative impact of certification is costly to Malaysian producers. In detail, Wong (2004) analysed the cost of certification based on the experience of the Malaysia Timber Certification Council (MTCC). He reported that the cost to carry out the main assessment of forest management and chain of custody range from RM48,000 to RM124,400. In addition, surveillance audit by the Forest Management Unit (FMU) to ensure continuous compliance with the certification standard range from RM26,600 to RM45,000. Also, the professional fees for conducting the assessment varied from RM1,200 to RM2,260 per man day. As for chain-of-custody certification, the cost of the main assessment varied from RM4,000 to RM6,000. The cost of surveillance audit was about RM3,000. All the costs incurred to maintain the certification process were very high for the small and medium enterprises of timber producers in Malaysia.

Furthermore, the issues of Sanitary and Phytosanitary measures which aim to protect human life from plant or animal carried diseases are also the concern of European countries. Wooden packaging materials made of unseasoned (green) wood have been claimed to provide a pathway for the introduction and spread of the pest species. There has been increasing concern about the spread of pests such as the Asian longhorn beetle in the European region (United Nations Committee on Trade and Development, 2008). Indeed, the European Union has implemented the International Standards for Phytosanitary Measures (ISPM 15) since March 2005. Among the European Union (EU) requirements are i) the wood must be either heat treated or fumigated with methyl bromide, ii) the wood must be officially marked with ISPM15 stamp, iii) from March 2006, all wood packaging materials imported into the EU will have to be free of bark (European Commission, 2006). However, the verification procedures are likely to have large impact on the use of unprocessed wood for the exporting countries including Malaysia.

For the European Union, technical barriers to trade (TBT) are mostly related to panel products that are used in structural applications. Starting in April 2004, structural wood panels sold within Europe must be certified and carry the European Conformity (CE) marking based on the Construction Products Directive (United Nations Committee on Trade and Development, 2008). Manufacturers need to install quality-control system in their factories for the regular testing of products and use certified testing laboratory with third party auditing (Tissari et al., 2003). Thus, the mounting cost to comply with and the technology to provide the CE marking for small and medium enterprise manufacturer in Malaysia may hinder the export development of the wooden products.

In May 2003, the European Union Commission adopted Forest Law Enforcement Governance and Trade (FLEGT) to address illegal logging in the trade between timber importers and exporters.. This plan promotes voluntary partnership agreement and eliminates illegal timber trade from within the European region. Currently, Malaysia is negotiating on FLEGT in ensuring the legal status and sustainability of the timber products to enter the European market. The concluding of open FLEGT agreement is expected to bring new dimensions to Malaysian timber products and better market access in the European region. However, those non-tariff barriers indirectly may impede the development of timber trade from Malaysia to the European region.

2.6 Conclusion

The wood-based sector in Malaysia has been driven mainly by resource supply advantage. The availability of raw materials supply with relatively low labour cost and high technology created a positive environment for the industry to grow. The policies for forest management and promotion of value-added products have drastically changed the pattern of Malaysian timber export. For the European market, Malaysian wooden furniture export has increased significantly and surpassed the exports of other major timber products and it is expected to further grow in the coming years. However, the issues facing Malaysian producers such as shortage in timber supply, emergence of competitive producers and non-tariff barriers may pose challenges to the sector. Though the European market is not a leverage market for Malaysian wood products, the efforts for market penetration are still important.

CHAPTER 3

COMPARATIVE ADVANTAGE OF MALAYSIAN WOODEN PRODUCTS IN THE EUROPEAN MARKET

3.1 Introduction

In this chapter, the evaluation of Malaysian wooden products will be analysed using the Balassa approach. It is to identify the comparative advantage of twenty-one types of wooden products exported to the European market based on the harmonization code (HS) of the products. The results will illustrate the competitiveness of Malaysia in relative to other world producers that export the wooden products to Europe.

3.2 Comparative Advantage

Comparative advantage involves the concept of opportunity cost either in producing or exporting a particular good (Mohd Arif, 2008). According to Mohd Arif (2008), the comparative advantage of one country against others may be reflected from the difference of the domestic cost and the world price. The higher the cost differential, the higher is the advantage for the country in producing that good. Some other factors such as abundance of resources, technology, telecommunication, fuel subsidy and road development (including low transportation cost) could play their role in the comparative advantage. Additionally, Hunt and Morgan (1995) believe that the efficient use of existing resources and innovation in the production may lead to the comparative advantage of the products. Other factors such improvement in road infrastructure may reduce the trade costs and facilitate the movement of goods and services between places (Bhattacharyay, 2009). The demand pattern also plays an important role in influencing the comparative advantage of the products.

Literature on the comparative advantage is extensive. However, only few studies have been done on the comparative advantage of Malaysian exports. Some related studies on Malaysian exports were comparative advantage of manufactured products (Amir, 2000; Mahani and Wai, 2008) as well as electrical and electronic products (Nik Maheran and Haslina, 2008). They used the Balassa approach to identify the export performance of the products. As far as this study is concerned, there has been no specific research done on the comparative advantage of Malaysian wooden products as a whole.

3.3 Malaysian Wood products in the European Market

Malaysia is one of the developing countries in Southeast Asia which have experienced remarkable economic growth and industrialization in the past decade. Exports of commodities and related products as well as manufactured goods have contributed to the development of the Malaysian economy. Besides that, with the fact that 60 percent of Malaysia is covered with natural forest, it is difficult to ignore the important role the forest products industry plays in further developing the economy. Malaysia is currently one of the world's top tropical timber producers. The Malaysian wood industry has grown tremendously since past decades. It provides a wide range of activities from sawmilling, secondary processing to tertiary processing. Malaysia is also the largest exporter of sawn timber and the second largest supplier of plywood as well as the 10th largest exporter of furniture in the world. According to the International Tropical Timber Organization (2008), producer countries exported nearly 13 million m³ of tropical logs worth USD3.0 billion in 2007, with Malaysia being the largest exporter accounting for almost 35 percent of exported volume. The exports of Malaysian timber and related products in 2008 amounted to RM22.5 billion. For many decades Europe has been a major market for the export of wooden products in Malaysia. Malaysian wood products exported to the EU15 have shown increasing trends from 2001 to 2006 (Figure 25).

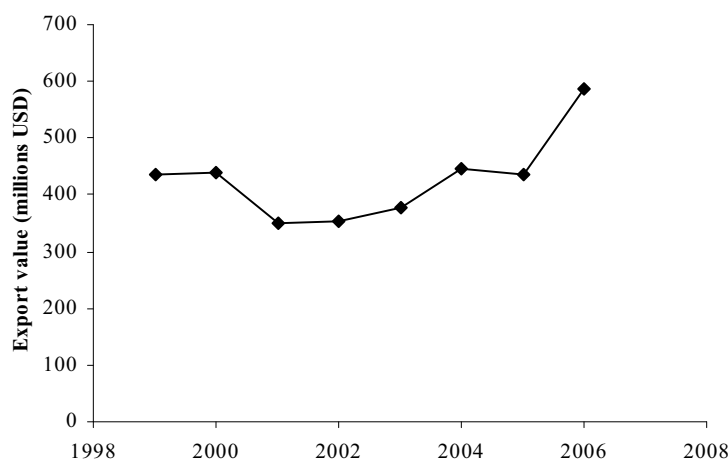


Figure 25: The trade values of Malaysian wood products exported to EU15 from 1999 to 2006 [United Nations Commodity Trade Statistics 2009]

Malaysia's annual wood products export to the European Union (EU) currently stands in the region of RM2.8 billion (600 million euro). Furthermore, the biggest importers of Malaysian wood products to the EU are Germany, Italy, the United Kingdom, France, Spain and the Netherlands (United Nations Comtrade, 2009) (Figure 26).

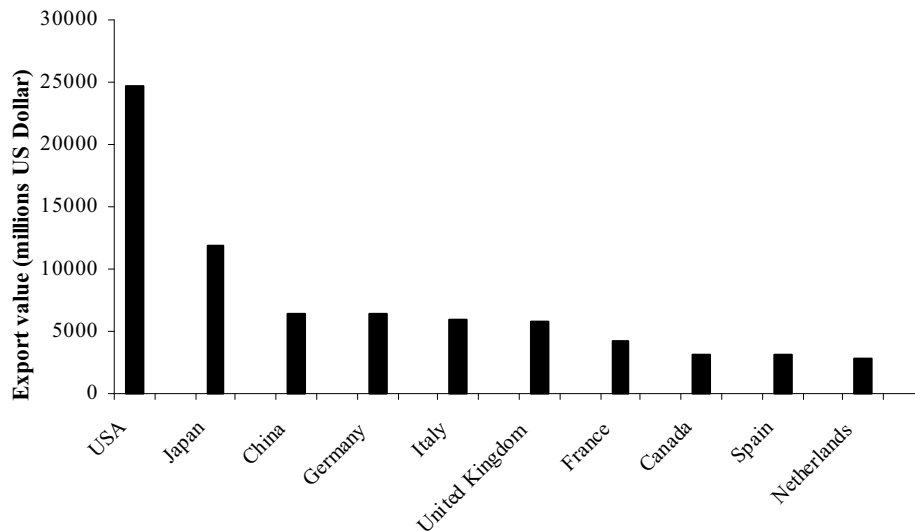


Figure 26: Major importers of Malaysian wood products in 2006
[United Nations Commodity Trade Statistics 2009]

Hence, it will be interesting to measure the Malaysian export performance of wood products in those countries. Consequently, this work will analyse the comparative advantage of Malaysia as a producer of wood products in the global market. This work was carried out to determine the current status of Malaysian wooden products in the European market. Extensively, the comparative advantage of the Malaysia will be assessed as well.

3.4 Balassa Approach

This work employed the Balassa approach to evaluate the comparative advantage of the Malaysian wood products industry. Balassa (1965) suggested that the comparative advantage of a country or sector can be measured using observed trade patterns. He assumed that the true pattern of comparative advantage can be estimated from the post-trade data. Thus, he named it as Revealed Comparative Advantage (RCA). The RCA has a role to quantify the commodity's specific degree of comparative advantage. The formula for the RCA is:

$$RCA_{jkt} = \frac{(X_{kt}^j / X_{Kt}^j)}{(X_{kt}^W / X_{Kt}^W)}$$

Referring to the formula, X is the export of a country for a particular good or commodity, j, k and t denote a country, good or commodity and time period respectively. K denotes the total of all exports from country j or the world (W). If the index exhibits a value greater than one (RCA index > 1), the sector or product has a comparative advantage in the production of the good and if the index less than one (RCA index < 1), it indicates a comparative disadvantage in the production of the good. This work analysed the trade between two partners, namely Malaysia and Europe. Fifteen countries, namely Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom, were chosen. The reason of choosing these 15 countries was based on their consistent good performance on imports and exports of wood products from Malaysia. This work used the United Nations Commodity Trade Statistics data (UN Comtrade) to calculate the indices of comparative advantage of the Malaysian export in timber products.

Purposely, the UN Comtrade data were used to cross-check the imported and exported values of the selected products. Besides, the Harmonized System (HS) code was used as it gives a precise breakdown of the products' categories of the wood. This analysis will refer to wood products (HS44s - refers to all wood products) in the UN Comtrade data. The 8-year time span (1999-2006) was employed for this work. Twenty-one types of wood products classified under this HS code (UN Comtrade, 2009) have been evaluated. However, seven categories of the wood products were dropped from the analysis due to the inconsistent data in the UN Comtrade database. The unavailability of data is assumed to be caused by either the product being not exported or the data being not been recorded for that particular year. The remaining wood products will be discussed further in the result (Table 8)¹⁶.

¹⁶ Throughout the results and discussion, the short descriptions will be used instead of the long descriptions of the products prescribed by the United Nations Commodity Trade Statistics. For the details, please refer to Table 8.

Harmonization code	Description	Short description of the products
44	Wood and articles of wood, wood charcoal	Wood products
4401	Fuel wood, wood in chips or particles, wood waste	Fuel wood
4402	Wood charcoal (including shell or nut charcoal)	Charcoal
4403	Wood in the rough or roughly squared	Logs
4407	Sawn wood, chipped lengthwise, sliced or peeled	Sawn wood
4408	Veneers and sheets for plywood etc <6mm thick	Veneers
4409	Wood continuously shaped along any edges	Wooden mouldings
4412	Plywood, veneered panels and similar laminated wood	Plywood
4413	Densified wood, in blocks, plates, strips or profile	Densified wood
4414	Wooden frames for paintings, photographs, mirrors etc	Wooden frames
4415	Wooden cases, boxes, crates, drums, pallets, etc	Wooden cases
4418	Builders joinery and carpentry, of wood	BJC
4419	Tableware and kitchenware of wood	Wooden tableware
4420	Ornaments of wood, jewel, cutlery caskets and cases	Wooden ornaments
4421	Articles of wood, nes	Wooden articles

Table 8: Types of wood products based on the United Nations Commodity Trade Statistics [United Nations Commodity Trade Statistics 2009]

3.5 Results and Discussion

Malaysia has high comparative advantage in Europe in comparison with other world producers of wooden products. Figure 27 shows that Malaysia gained three times advantage (on average) in exporting the total wood products to the market. Among all, five products gave high comparative advantage with RCA indices more than 3 (Figure 28). They were wooden mouldings, sawn wood, plywood, builder joinery and carpentry (BJC) and wood charcoal. This indicates that Malaysia has an advantage in exporting these five products relative to other exporters. The remaining products were grouped into two, i.e. the products with less comparative advantage and those with comparative disadvantage.

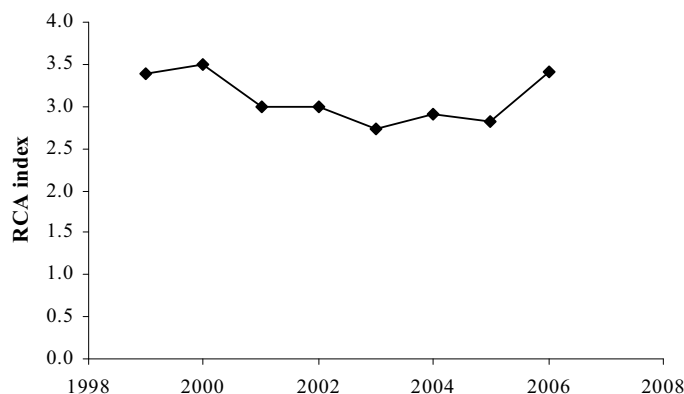


Figure 27: Revealed comparative advantage (RCA) indices of overall Malaysian wooden products in the European market (1999-2006) [Calculated based on data from the UN Commodity Trade Statistics 2009]

The products with RCA indices between one and three are referred to as having less comparative advantage and the products with RCA indices less than one as having comparative disadvantage. Figure 29 shows that, veneer has less comparative advantage in the market. Finally, the comparative disadvantage products are logs, densified wood, wooden cases, wooden ornaments, wooden articles, fuel wood, wooden tableware and wooden frames (Figure 30).

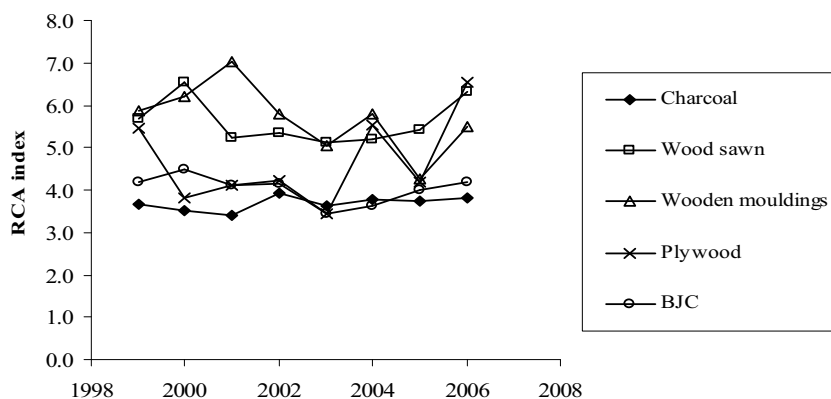


Figure 28: Malaysian wood products with high comparative advantage in the European market (1999-2006) [Calculated based on data from the UN Commodity Trade Statistics 2009]

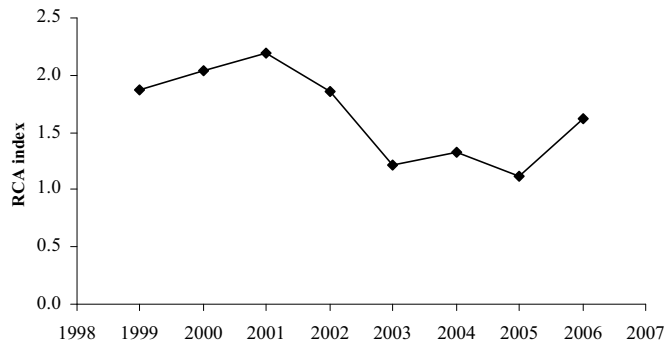


Figure 29: Veneer with low comparative advantage in the European market (1999-2006) [Calculated based on data from the UN Commodity Trade Statistics 2009]

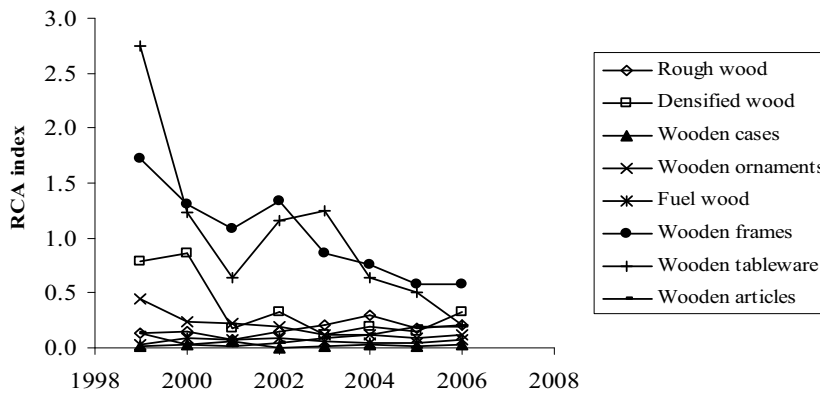


Figure 30: Eight Malaysian wood products with comparative disadvantage in the European market (1999- 2006) [Calculated based on data from the UN Commodity Trade Statistics 2009]

The high comparative advantage in selling mechanized mass market products

Among several Malaysian wooden products, five have comparative advantage to be sold in Europe in comparison with similar products produced in the rest of the world. The products are wood charcoal, sawn wood, wooden mouldings, plywood as well as builders’ joinery and carpentry. All these products, except charcoal, were traded in large volumes in Europe. They are also produced with relatively standard mechanized processes. Those products (which have high traded volumes and produced through a mechanized process) will be referred as mechanized mass market products (MMMP). Additionally, there is another product which export has a positive comparative advantage, i.e. veneer with RCA indices between one and three. This

product is directly and indirectly linked to the value-chain products of plywood, veneered panel products, block board, lamin board, laminated veneer lumber (LVL) and overlaid panels. Furthermore, all these comparative advantage products (except charcoal), are being used for end-products such as furniture, flooring, doors, building and transport. The high comparative advantage products were traded in uniform quality (standard size) and are MMMP. In addition, most of the high comparative advantage products are from value added commodity with a higher unit prices. These products were not sold by species, instead sold by specific use such as for construction industry, buildings, and home improvements. Our results of analysis have been supported by the statistics from Malaysian Timber Industrial Board (MTIB) on the export values of Malaysian wooden products to Europe.

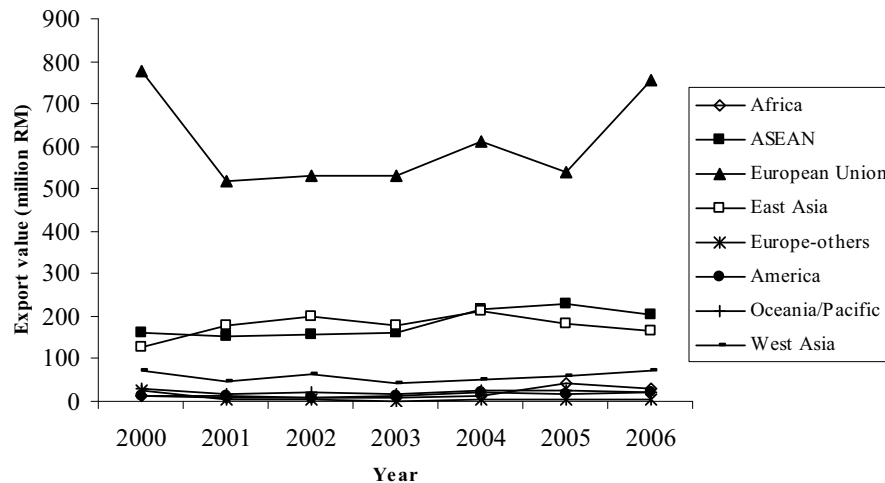


Figure 31: Values of sawn wood from Peninsular Malaysia exported to the world, 2000-2006 (in RM) [Malaysian Timber Industrial Board 2006]

Figure 31 illustrates the export values of sawn wood from Peninsular Malaysia to the world. It shows that the EU received the highest export values of sawn wood for many years. In 2004, Malaysia exported about 17,479 m³ of Malaysian Timber Certification Council (MTCC)-certified timber to Europe which was higher by about 207 percent from the volume in 2003 (The International Tropical Timber Organization, 2006).

Additionally, Figure 32 gives the values of the exports of plywood from Peninsular Malaysia to the EU from 2000 until 2006. There was a sharp increase in export value in 2006. In fact,

according to the International Tropical Timber Organization (2006), Malaysian exporters enjoyed the EU's reduction of import duty on plywood from 7 percent to 3.5 percent. That reduction gave Malaysia a competitive edge over Indonesian and Chinese plywood on which a 7 percent import duty was still levied.

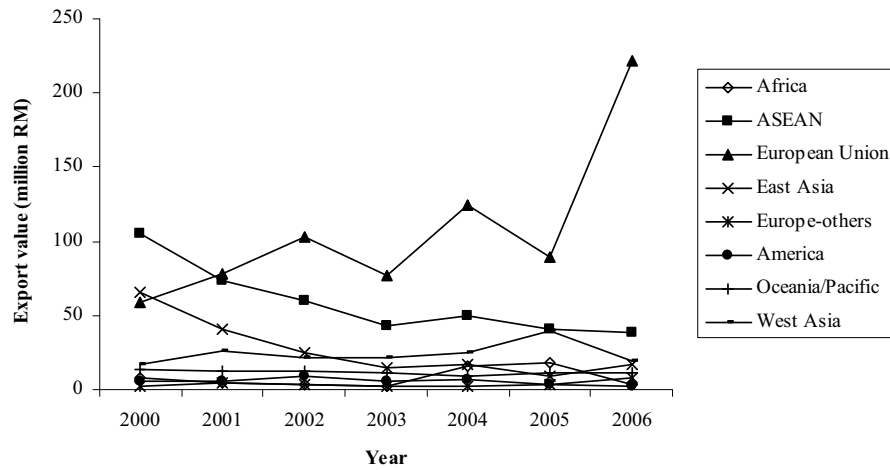


Figure 32: Values of plywood from Peninsular Malaysia exported to the world, 2000-2006 (in RM) [Malaysian Timber Industrial Board 2006]

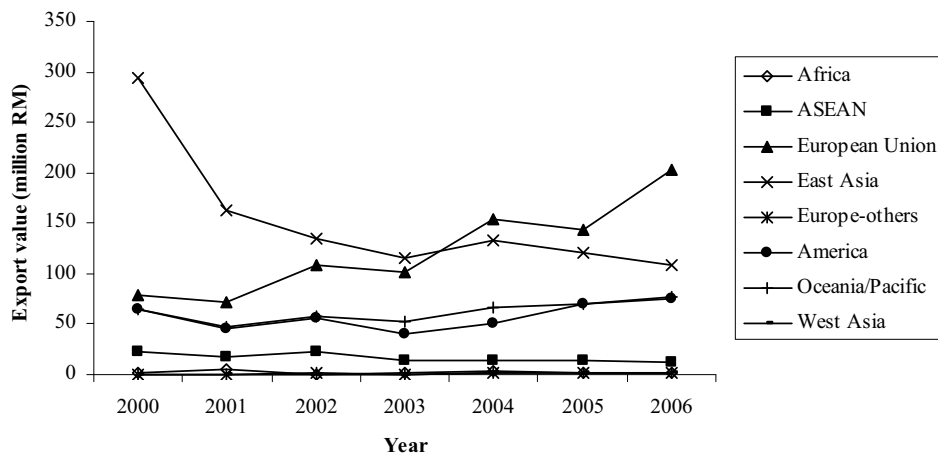


Figure 33: Values of wooden mouldings from Peninsular Malaysia exported to the world, 2000-2006 (in RM) [Malaysian Timber Industrial Board 2006]

Recently, in 2008 the export of Malaysian plywood increased by 14 percent compared to 2007 with large boost in sales to Belgium, the Netherlands and Italy. Furthermore, the statistics on

exported values of veneer and wooden mouldings from the Malaysian Timber Industrial Board (MTIB) proved that the EU gave the highest export values in these products from Peninsular Malaysia compared with other regions (Figures 33 and 34).

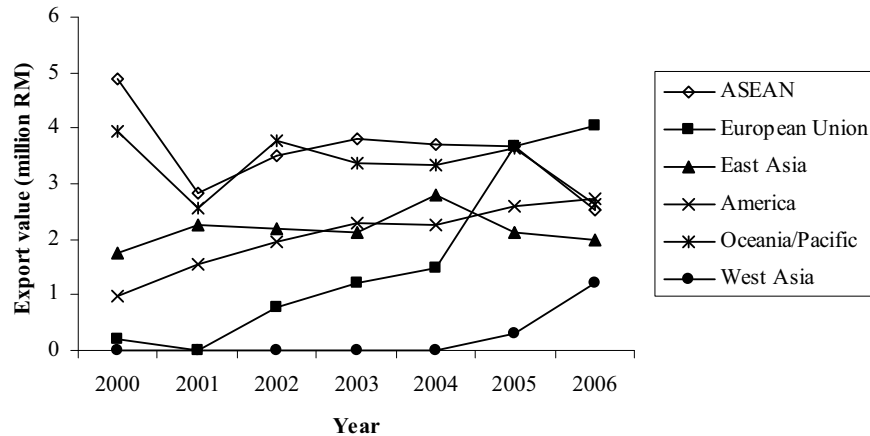


Figure 34: Values of veneer from Peninsular Malaysia exported to the world, 2000-2006 (in RM) [Malaysian Timber Industrial Board 2006]

The low comparative advantage in selling niche market products

The remaining Malaysian wood products have a low comparative advantage to be sold in the market. Most of the products consist mainly of home interior accessories and represent small items, or objects sold in peculiar niche markets. Most of the Europe's wooden gifts and handicrafts are presumably imported from China due to the latter's low labour cost. Moreover, laws and regulations also contribute to the low comparative advantage for certain products in the market. For instance, logs are severely regulated in Europe. Furthermore, Peninsular Malaysia has also banned the export of this product. According to the Food and Agriculture Organization (1997), the export of logs from Malaysia declined starting from 1985 (from 65 percent in 1985 to 18 percent in 1995) due to the log export ban from Peninsular Malaysia. In addition, an import licence is required for products under the heading "logs" to enter the European market. The importers should also present a certificate of origin along with the application form required by the MTIB. Indeed, the wood imported with the heading "logs" should be inspected by the Malaysian Forestry Department as well. Hence, it is believed the conditions to produce logs for the European market could be better elsewhere than in Malaysia. Thus, such reasons would

explain why all these products command a low comparative advantage in the European market. In fact, the analysis shows that all these products were traded in low quantities and value. Some of these products were wooden frames for paintings, tableware and kitchenware, ornaments of wood and other related items.

The special case of one niche- market product

Malaysia has a high comparative advantage in MMMP. However, the MMMP are not the only reason for the high comparative advantage. Another reason lies in certain niche-market products. This raises the question, why does one niche market product have a good comparative advantage, while the other niche market products have a low comparative advantage? In the case of Malaysian charcoal, even though the traded volume is low, the traded value is high because of the peculiarity of its industrial uses. The price of charcoal is relatively high in comparison with other niche market products due to a specific charcoal produced from palm kernel and coconut shells. It is likely that the ability to get these raw materials in abundance at low production cost contributes to the comparative advantage in the charcoal production. According to the Malaysian Palm Oil Board (2007), Malaysia experienced a steady increase in the production of the palm kernel from 1999 to 2007. In 1999, the production of palm kernel was 3.0 million tonnes and increased to 3.3 million tonnes in 2002, 3.7 million tonnes in 2004 and 4.1 million tonnes in 2006 (Malaysian Palm Oil Board, 2007). Thus, with this resource abundance in the country, the low-cost raw materials can be converted to a value-added product such as charcoal.

Comparative advantage in exporting Malaysian wooden exports

This work supports the idea of Uusivuori and Tervo (2002) that a country which has richer forest assets will have larger net exports of forest products. Furthermore, a country with a larger forest endowment exhibits comparative advantages in their exports in comparison with countries with lesser forest endowments. Thus, the availability of resources in a country may provide a source of a comparative advantage for that particular good or commodity. According to Reinhardt (2000), Malaysia has comparative advantage in abundant resources from which the resource-based products have an important role in the country's export growth. Moreover, it is believed

that the development of Malaysian FSC¹⁷-certified combi-plywood, PEFC¹⁸ endorsement of the Malaysian Timber Certification System (MTCS) and PEFC-certified sawn wood products may produce advantages compared with other producers.

3.6 Conclusion

This work examined the revealed comparative advantages of exporting Malaysian wood products to the European market. The analysis was based on twenty-one types of exported Malaysian wood products to Europe. It was found that Malaysia has advantage in exporting the wooden products to this market. Among all, Malaysia has a high comparative advantage in five products. The products are wooden mouldings, sawn wood, plywood, BJC and wood charcoal. These products were traded in high volume with standard size and are MMMP. Moreover, the comparative advantage of the products is a result of the volume or the quantity traded, but the quantity itself does not imply the comparative advantage of the product. Factors such as abundance of resource, communication and technology, production cost, and indeed, demand pattern are also essential in influencing the comparative advantage of the products. Above all, we expect a country's comparative advantage of these products to vary over time due to changes in any of the above factors.

¹⁷ Forest Stewardship Council (FSC) is a certification system that provides standard setting, trademark assurance and accreditation services to companies, organizations and communities interested in responsible forestry.

¹⁸ Programme for the Endorsement of Forest Certification Schemes (PEFC) is an independent, non-profit, non-governmental organization, founded in 1999 which promotes sustainably managed forests through independent third party certification.

CHAPTER 4

WILLINGNESS TO PAY FOR WOODEN FLOORING: CASE STUDY OF FRANCE

4.1 Introduction

The objective of this chapter is to value willingness to pay (WTP) for different attributes of sustainable forest management by using a choice experiment on wood flooring in the French market. Choice experiment is becoming more frequently applied to the valuation of non-market goods as it allows simultaneously valuing different attributes. This method gives the value of a certain good by separately evaluating the preferences of individuals for the relevant attributes that characterize that good (Lancaster, 1966). The methodology provides “*a wealth of information on the willingness of the respondents to make trade-offs between the individual attributes and their likely responses to different product circumstances*” (Bennett and Blamey, 2001). It constitutes an attractive tool to understand how sustainable managed wood could be marketed, in other words which “social, ecological and/or economic” aspects of wood should be signalled to increase the perceived product value. This study chose the methodology to be applied to the French wood flooring market. The wood flooring industry in France is growing regularly and in relatively good shape among the European markets (Doucet et al., 2003). It seems to offer promising prospects for the foreign exporters to enter the French market (Maine International Trade Center, 2005). For this reason, the attributes selected were not only related to sustainable forest management but also attributes that could be used in an international trade context. Without being exclusive, the sustainable management has been divided into three parts: ecological, sociological and landscape of the forest. In an international trade perspective, two factors might influence consumer behavior: fair trade and the origin of the product.

Sustainable development has become a debatable issue for economic development which highlights the need to preserve an ‘acceptable’ level of environmental quality and to conserve nature’s assets. From the conventional economic perspective, sustainability issues such as externality, cost of depletion and undervalued of natural capital may cause market failure (Bateman and Turner, 1994). Thus, its correction via proper resource pricing is needed through intertemporally efficient allocation of environmental resources based on individual preferences. As far as the conventional economic theory is concerned, the value of all environmental assets can be measured by the preferences of individuals for the conservation of the commodities

(Bateman and Turner, 1994). To arrive at an aggregate value (total economic value), economists begin by distinguishing user values from non-user values. According to Bateman and Turner (1994), use values are derived from the actual use of the environment. Nevertheless, slightly more complex are values expressed through options to use the environment (option values) in the future. They are essentially expressions of preference (willingness to pay) for the conservation of environmental systems or components at a later date. However, non-use values are more problematic. These values are still anthropocentric but may include recognition of the value of the very existence of certain species or whole ecosystem. Thus, according to Bateman and Turner, (1994), the total economic value is made up of actual-use value plus option value plus existence value. During the 1980s, more extensive use of monetary valuation methods was combined with technical improvements in techniques.

4.2 Valuation of Non-market Goods

The research on valuation of non-market goods has developed into two branches: revealed preference and stated preference methods. In general, the revealed preference method infers the value of a non-market good by analysing its actual behaviour in a closely related market. The most well-known sub-categories of these methods are the hedonic pricing and travel cost methods (Figure 35).

The revealed preference method has the advantage of being based on actual choices made by individuals. However, there are also a number of drawbacks in these methods; the valuation is conditioned on current and previous levels of the non-market good and the impossibility of measuring non-use values, i.e. the values of non-market goods not related to usage such as existence value, altruistic value and bequest value (Alpizar et al., 2001). On the other hand, stated preference methods assess the value of non-market goods by using the individual's stated behaviour in a hypothetical setting.

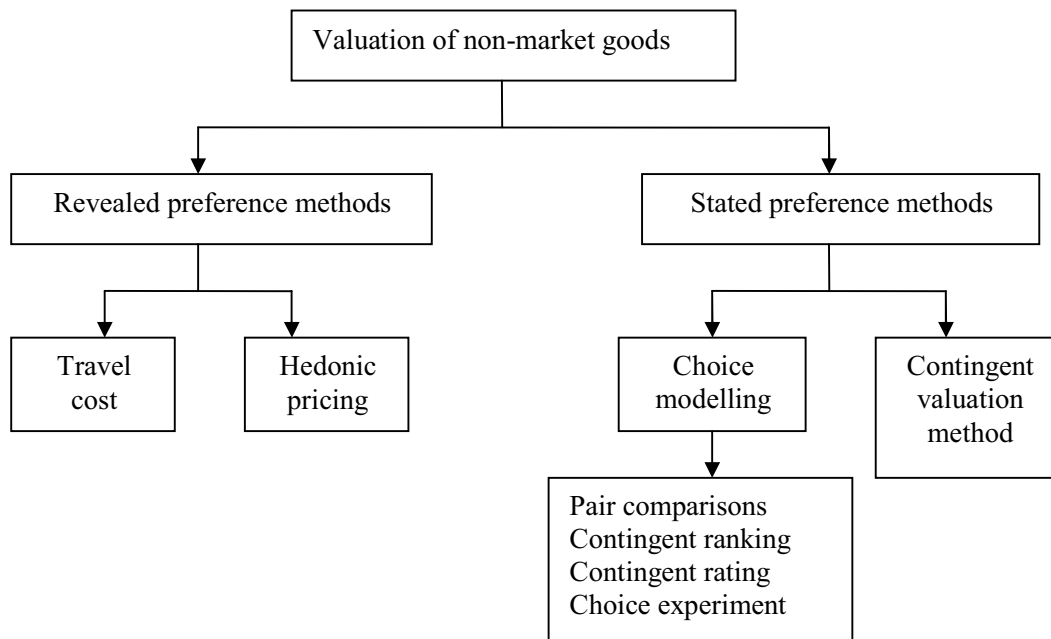


Figure 35: Valuation of non-market goods [Mohd Rusli et al. 2008]

4.3 Stated Preferences Approach

A stated preference method examines the value of non-market goods by using the individual's stated behaviour in a hypothetical setting (Alpizar et al. 2001). The method includes a number of different approaches such as contingent valuation method and choice modelling.

Contingent valuation method (CVM)

The CVM method was originally proposed by Ciriacy-Wantrup in 1947 on the opinion that the prevention of soil erosion generates some extra market benefits that are public good in nature (Venkatachalam, 2003). Since then, the CVM method has been one of the most commonly used methods for valuation of non-market goods. The CVM method uses the approach where respondents are asked their maximum willingness to pay (WTP) for a predetermined increase or decrease in environmental quality. The CVM has been used to estimate a variety of values of environmental resources. However, its use has been subject to criticism in its ability to deliver reliable and accurate estimates of WTP (Mogas et al., 2006). In the CVM, there are four types of elicitation techniques used, namely bidding game, payment card, open ended and dichotomous choice.

a. Bidding game

The bidding game is the oldest elicitation format for all the techniques. This approach has been widely used in a relatively larger number of contingent valuation studies conducted in developing countries (Mohd Rusli et al., 2008). The respondent in a contingent valuation study is randomly assigned a particular bid from a range of predetermined bids. The main advantage of this technique is that it is quite familiar to the respondent because it is just like an auction and provides relatively better results since it creates a real market situation (Cummings et al., 1986). However, the major disadvantage of the bidding game is related to the starting point bias. If the starting bids are well above the true WTP, they tend to overstate the revealed WTP and vice versa.

b. Open-ended

It involves asking the respondent on the maximum amount that he/she is willing to pay. This approach is convenient to apply, but the main disadvantage is that the respondent cannot provide a value for environmental goods spontaneously.

c. Payment card

The payment card contains a range of WTP values for the public good and the respondent has to choose the maximum WTP value. The advantage of this approach is that respondent only has to bid once from the range provided and is able to elicit the maximum WTP (Mohd Rusli et al., 2008). Nevertheless, this approach has limited use especially in rural areas where people have very limited experience using payment cards.

d. Dichotomous choice

According to Mohd Rusli et al. (2008), this is the most frequently recommended form for CVM questionnaire. The respondent is required to state a monetary value on their WTP. The main advantage of this method relies on the present situation similar to the purchasing of the ordinary goods and services. It used the approach of “take it or leave it”.

Choice modelling approach (CM)

The CM was initially developed in the marketing and transport literature by Louviere and Hensher as well as Louviere and Woodworth in 1982 and 1983 respectively (see Mogas et al.,

2006). In the CM approach, respondents will be presented with a series of choice sets, combination of several attributes. The attributes used are common across all alternatives. Choice modelling has four approaches; pair-wise comparison (PC), contingent ranking (CR), contingent rating (CRt) and choice experiment (CE) (Bateman et al., 2002). However, only CE is consistent with regard to utility maximizing behaviour and consumer theory in which a compensating variation of WTP can be derived for each attribute (Hanley et al. (2001). Among the advantages of CEs compared with the other choice modelling approaches is that the value and statistical significance of all parameters are easily reported (Bateman et al., 2002).

Pair comparisons

In the pair comparison approach, respondents are required to choose their preferred alternatives from a set of two choices. They are also asked to indicate the strength of their preferences in numeric or semantic scale. The pair comparison approach is popular amongst marketing practitioners. In this approach, most researchers approve the potential econometrics complexity of this method. This method shares the disadvantages of metric bias such as in the contingent rating.

Contingent ranking (CR)

This approach was originally developed by marketing practitioners to approximate the value of individual product attributes or performance in hypothetical situations where these attributes are not available in the market (Mohd Rusli et al., 2008). This approach allows the researcher to model certain environmental goods and services as a functional requirement where the consumers will consider substitutability among the environmental goods and services as they express their ranking among different hypothetical choices. This method does not force the respondent to report the exact numbers, but it only requires the respondent to rank the available options. Contingent ranking has been widely applied to valuation of environmental goods and services. Despite its use, the application of this method is likely to be prone to some of the biases found in CVM applications. Other biases such as embedding effect, hypothetical bias and part-whole bias also appear with this method (Mohd Rusli et al., 2008).

Contingent rating (CRt)

In this approach, respondents are presented with a number of scenarios one at a time and are required to rate each one individually on numeric scale. This approach has been extensively applied in psychology and marketing. Nevertheless, it also has been applied in environmental and agricultural economics. There are some distinct disadvantages of application of contingent rating for non-market goods. This method suffers from metric bias. It occurs due to the use of rating scales. This bias is related to the difficulty of cardinal measurement of utility and the problem of interpersonal comparison of cardinal measurement of utility (Mohd Rusli et al., 2008). Metric bias may result in biased parameter estimates and lead to increased variance. This method also suffers from estimation bias due to OLS procedures being inefficient for discrete data.

Choice experiment (CE)

The choice experiment approach is based on surveying individuals using a variety of instruments (such as pencil and paper, computer aided personal survey instrument (CAPI), internet based survey) to assess a set of analyst-defined alternatives and express their preferences (Hensher, 2010). The CE approach involves the analysis of choice data through the construction of a hypothetical market using survey (Hoyos, 2010). The CE consists of several choice sets, each containing a set of mutually exclusive choices from which respondents are asked to choose their preferred one. The alternatives are defined by a set of attributes and the attributes taking one or more levels. A monetary value is included as one of the attributes along with other attributes of importance (Alpizar et al., 2001). According to Hoyos (2010), the individual's choice reflects the trade-offs between the levels of the attributes in the different alternatives included in the choice set. In addition, the integrated cost as an attribute in the CE may be easily converted to estimates of willingness to pay (WTP) for changes in the attribute levels.

CE is becoming ever more frequently applied to the valuation of non-market goods. This method gives the value of a certain good by separately evaluating the preferences of individuals for the relevant attributes that characterize that good and it also provides a large amount of information that can be used in determining the preferred design of the good (Alpizar et al. 2001). Choice experiment originated in the fields of transport and marketing, and they have only recently been applied to non-market goods in environmental and health economics. According to Alpizar et al.

(2001), the first study to apply non-market valuation was by Adamowicz et al. in 1994. Since then, there have been an increasing number of studies related to environment and health. However, there are several reasons for the increased interest in choice experiments such as i) reduction of some of the potential limitations of CVM, ii) more information being elicited from each respondent compared to CVM, and iii) the possibility of testing the internal consistency (Alpizar et al., 2001).

4.4 Sustainable Management and Willingness to Pay

Sustainable management, in general, has become an increasing phenomenon in the market place. However, in the forest sector, it is observed a relative low WTP for labels that promote sustainable management of forest and the number of people who are willing to pay is still low (see for example Jensen et al. 2003, Anderson et al. 2004). The explanation for these results can either be found in the lack of knowledge consumers have on the existing ecolabels (FSC and PEFC) or on the low interest and WTP for public good attributes.

Sustainable forest management can be defined as *“the stewardship and use of forests and forest lands in a way, an at a rate, that maintains their biological diversity, productivity, regeneration capacity, vitality and their potential to fulfill, now and in the future, relevant ecological economic and social functions, at local, national and global levels, and that does not cause damage on other ecosystems”* (FAO Forest Resources Assessment 2000 definition). This means that sustainable forest management includes a wide variety of attributes with non-market values. The large complexity of the forest eco-system and its functions such as wildlife, flowing-river, recreational side, fishing and farming may highly contribute to biodiversity preservation and/or may be appreciated by communities in their social activities. Also landscape features are significant from aesthetic, ecological, social and subconscious perspectives (Willis et al., 2000). Forests can constitute low cost outdoor recreation. Due to the complexity of forest as a global ecosystem, its management will influence either in a positive or a negative way the sustainability of forests.

In general, sustainable management increases costs either through the use of more expensive tools or through less intensive harvesting. Therefore, to implement sustainable management an

increase of wood prices is necessary. Nevertheless, the willingness to pay (WTP) for sustainable management features by consumers seem still very limited.

In most literature works, WTP is measured by proposing certificated wood products. Jensen et al. (2003) tested the willingness to pay for certified oak shelving board through a telephone survey. The data set of 700 respondents evidenced that 43.2% of respondents supported certification and were willing to pay higher prices for certified products whereas 45.5% supported certification but were not willing to pay higher prices. 11.3% did not support certification regardless of costs. Anderson et al. (2004) conducted a survey in Home Depot Stores in the United States on plywood products, and showed that a majority of respondents preferred certified plywood to uncertified plywood as long as they did not have to pay a premium. However, for equal pricing, the presence of the certified label was associated with greater sales. In a more recent study, Ozanne and Vlosky (2007) found a more significant WTP for environmental certification; about 10 to 25% premiums for certified wood-based furniture products. It is noticed that data were collected through face to face interviews and constituted stated preferences.

The disparity between results can be explained by the methods of data collection but also by the complexity of the notion of sustainable management. Hansmann et al. (2006) made a first attempt to distinguish the different aspects of sustainable forest management. Economic, social and ecological aspects of forest were assessed through 18 questions to describe the individual sustainability orientation. They found that respondents considered ecological and social aspects to be of higher importance than economic ones.

4.5 Materials and Methods

This study estimates the WTP for sustainable forest management, fair trade and French origin attributes on wood flooring. A choice experiment was used to elicit the consumers' WTP through an internet survey and a conditional logit model for econometric analysis of the data. Before discussing in detail the econometric analysis employed, the important part should entail the data collected. The data were collected through internet survey.

Attribute	Description	Level
Ecology	The presence of dead wood residues favours the existence of many insects, birds, plants and fungi. Therefore they are very important in protecting biodiversity. However, these reservoirs of deadwood will reduce the profits for forest owners.	Presence of reservoirs (1), Absence of reservoirs (0)
Sociology	Special arrangements made to access forests allow the public to enjoy recreational and social functions of the forest such as hiking, cycling or riding, picking berries or mushrooms. However, such arrangements (road construction, special tree cutting, ...) incurs extra costs to the forest owners	Forest path development (1), Inaccessibility to forest (0)
Landscape	The presence of several species of trees in a forest improves the identity and variety of landscape. A forest with one tree species (monoculture) has the advantage of lower exploitation costs but also impoverishes the soil, puts at risk the natural generation.	More than three different species (1), Monoculture (0)
Fair trade	The distributor of wooden flooring can ensure that, throughout the production and transformation chain of flooring, all workers have decent and safe working conditions. The corresponding traceability increases considerably costs, particularly if the wood comes from long-haul destinations (Brazil, Indonesia, Malaysia...)	Compliance with working conditions (1), Working conditions not mentioned (0)
Origin of the wood	The country of origin of wood will be mentioned on the product which incurs additional costs.	France (1), Origin not indicated (0)

Table 9: Attributes of the products

The survey was arranged into four parts:

1. The first part focused on the general attitudes of consumers towards the environmental preservation.
2. The second part presented hypothetical purchase decisions on wood flooring to respondents. In every choice set, a respondent had the choice between two hypothetical products with different attributes (see Table 9) at different prices and the possibility of not to buy anything. Each respondent had to answer one to eight different choice sets. The additional price of 1 euro for the presence of each attribute was considered.
3. In the third part of the questionnaire, the respondents' knowledge of eco-certification and forest labels FSC and PEFC was tested.
4. The last part constituted demographic and socio-economic information.

4.8 Econometric model of choice experiment

The choice experiment approach involves the analysis of choice data through the construction of a hypothetical market using survey (Hoyos, 2010). This methodology consists of several choice sets, each containing a set of mutually exclusive choices from which respondents are asked to choose their preferred one. The alternatives are defined by a set of attributes and the attributes taking one or more levels. The choice experiment was designed with the combination of theoretical foundation from Lancaster's (1966) model of consumer choice and the econometrics basis of the Random Utility Theory (McFadden, 1974). According to Lancaster's approach, consumers derive utility from a bundle of attributes rather than the good itself as it can maximize their satisfaction (Karaousakis and Birol, 2006). The biggest advantage of Lancaster's approach is that it focuses on the attributes of the product and analyses the price of the goods based on the attributes it possess (Hurley and Kliebenstein, 2005). The utility function of the respondents is presented in equation 1:

$$U_{ij} = V(Z_j) + e(Z_j) \quad (1)$$

In other words, for any respondents i , each alternative j corresponds to a given utility U which is not directly observed. The utility gained from the good depends on the attributes (Z) proposed in each of the choice set. In tandem with Lancaster's approach, random utility theory has advanced in integrating economic valuation with human behavior (Karaousakis and Birol, 2006). This theory proposes that the individual is considered to choose between groups of choice set on the basis to maximize the personal utility. The utility level that an individual obtains from a particular choice is actually a combination of the weighted attributes based on the relative importance of each of them (Garcia, 2003). Thus, some discrete choice models can be designed to reflect consumers' behavior with respect to choices between different baskets of goods (choice set). According to the theory, the utility of a choice is composed of two components: deterministic component (V) and error component (e). The error component indicates that expectation cannot be made with certainty (Karaousakis and Birol, 2006). It is assumed that the relationship between attributes and utility is linear and that the error terms are identically and independently distributed. Hence the conditional indirect utility (V) function can be estimated as below:

$$V_{ij} = \beta_1 Z_1 + \beta_2 Z_2 + \dots + \beta_n Z_n \quad (2)$$

β_i are vector coefficients corresponding to each attribute (Z_i) considered in the choice set. Indirect utility function allows us to provide information about the trade-off between the different attributes, i.e. marginal rates of substitution (MRS). The ratio between the price and selected attributes represents the marginal implicit price of the attributes. In other words, this ratio corresponds to the change in implicit price of the attributes relative to the status quo situation (Mohd Rusli et al., 2008). The formula indicates the willingness to pay between the monetary attributes and non-monetary attributes in the choice experiment referred to as:

$$\text{Implicit price} = - \frac{\beta_{\text{non-monetary attributes}}}{\beta_{\text{monetary attributes}}}$$

In this study, LIMDEP, Nlogit 3.0 was used to estimate the econometric model. The standard maximum likelihood method was employed to assess the parameters of the conditional logit model.

4.7 Data and results

In January 2009, an internet survey was conducted on a representative and randomly selected sample of 12,500 French individuals. The turned-up questionnaires amounted to 445 (i.e. 3.56%). However, only 329 surveys (2.63%) were completed and found appropriate to be analysed. Summary statistics for the socio-economic and demographic characteristics of the sample are presented in Table 10. It was observed that men with low education as well as older people were under-represented in the sample and also that 10% of respondents were not willing to reveal their incomes.

Variable		Sample average	French average*
Gender	Male	21.6	48.41
	Female	78.4	51.59
Age	Below 20 years	2.1	24.7 ¹⁹
	Between 20-59 years	97.3	52.7
	More than 60 years	0.6	22.9
Education	No diploma	3.6	13.8
	Technical certificate	24.3	19
	High school diploma	20.7	22.8
	BA or BSc	27.7	11.2
	Masters degree or PhD	23.7	21.4
Children	No children	24.9	47.4
	1 child	20.6	22.5
	2 children	37.1	20.3
	3 children or more	17.3	7.4
Household income	Less than 600 euros	2.1	n.a
	Between 600 and 1500 euros	17.3	n.a
	Between 1500 and 3000 euros	44.7	n.a
	Between 3000 and 6000 euros	23.4	n.a
	More than 6000 euros	2.4	n.a
	Not willing to reveal income	10.0	n.a
Living area	Big city (more than 100,000 habitants)	19.8	n.a
	Small city (between 10,000 and 100,000 habitants)	34.3	n.a
	Countryside	45.9	n.a

Table 10: Socio-demographic data of respondents

* Data collected from the National Institute of Statistics and Economic Studies of France (2010)

Approximately 78.4 percent of the respondents were female with the majority age among 34-48 years old. Almost 26.4 percent had professional degree with women constituting 74 percent of them, while 24.9 percent had diplomas followed by certificate holders at about 22.5 percent. With regard to employment, that 33.7 percent worked as employees. The main group of the respondents had two children (33.1 percent) in the family. For monthly income, the majority belonged to income group of between €2300 and €3000. Almost 46 percent of the respondents lived in the countryside.

¹⁹ Notice that the population under 18 is represented in the French average. The study considered only respondents over 18 years old.

Furthermore, data were collected on the general attitudes of consumers towards environmental preservation as well as respondents' knowledge of forest labels. The perceptions of the respondents towards environmental preservation were tested through five statements (Table 11). Respondents had to choose on a 5-Lickert scale whether they agreed or not with the statements (1=completely disagree to 5=completely agree).

Statement	Completely disagree	Disagree	Indifferent	Agree	Completely agree
CCSE= "change consumption mode to show example to others"	1	1	6	30	62
MUI= "more urgent issues than environmental protection"	21	28	30	12	7
EPSR= "environment protection is the State's responsibility"	9	13	38	23	16
EPER= "environment protection is every one's responsibility"	6	11	13	29	41
CCBF= "change consumption mode for better future generations"	1	1	5	27	65

Table 11: General attitudes of consumers towards environmental preservation (in percentages)

The respondents' knowledge of FSC and PEFC was also assessed. They were shown both labels and asked two types of questions: "Do you know these labels?" and "Have you seen these labels in the market place?". It was observed that 79.3% (respectively 84.5%) did not know the FSC (respectively PEFC) label. A large number of respondents also had never seen these labels in the market place: 77.8% for the FSC label and 84.4% for the PEFC label.

Preservation of the environment

The respondents were asked about their behaviour on "greener purchase" of the products. About 73.6 percent of the total respondents with approximately 81 percent of them being female purchased the "green products" for the last six months during the survey (Figure 36). Among them, 46 percent lived in the countryside. They rated that "greener" maintenance of the house (57 percent) was the highest ranking consumer product that was respectful of the environment. It was followed by the consumption of food and organic farming (52 percent) as well as paper recycling habit (35 percent) (Figure 37).

Consumer buying eco-products during last six month

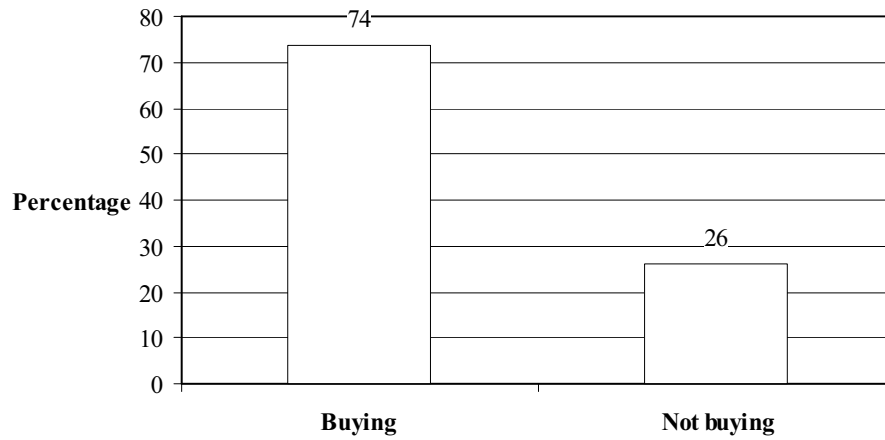


Figure 36: Respondents buying eco-products

Consumer products that respect the environment

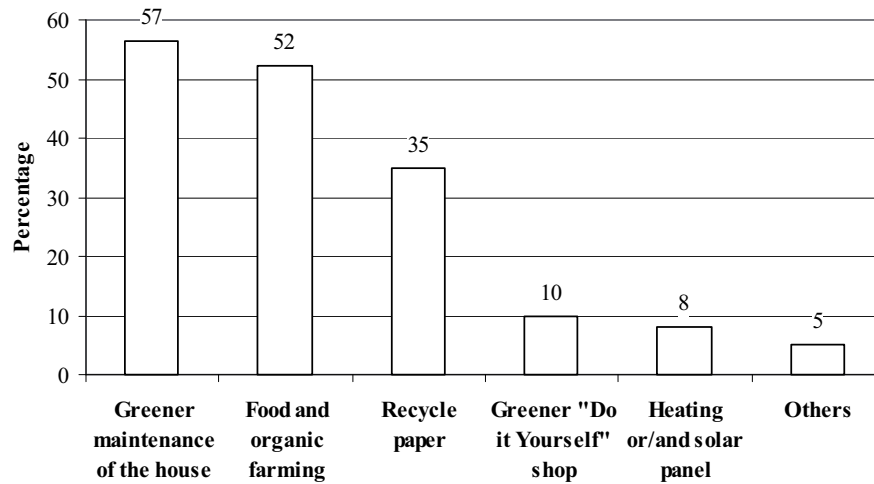


Figure 37: Consumer products that respect the environment

Furthermore, about 62 percent considered that protecting the environment as very important and it would be a good example to other people also (refer to annex). Approximately 65 percent of the respondents completely agreed that they should change their consumption pattern towards “greener products” to preserve the environment for future generations. In addition, 41 percent of

respondents completely agreed that environmental protection was everyone's responsibility. However, most of the respondents neither agreed nor disagreed with the perception that environmental protection was the state responsibility as well as preserving the environment was very urgent and important.

Evaluation of the preservation of the environment

In the questionnaire, respondents were asked about the importance of preserving of the environment with regard to the specific statement (refer to annex). From the results represents that 88 percent of the respondents believed that recycling of waste was very important in preserving the environment. Furthermore, 73 percent of the respondents viewed the prevention of risk of chemical use in planting was very important in conserving the environment. The respondents also perceived that the reduction with the use of pesticides and other chemicals in agriculture, buying ampoules which consumed less electrics as well as reducing travel by car were very important in contributing to the conservation of the environment. However, the majority of the respondents considered that buying bio-food (78 percent) and fair trade products (72 percent) as not very important to them.

Stewardship and ecolabelling

As seen from the survey, almost 100 percent of the total respondents agreed that the stewardship of the environment in a forest was important (Figure 38). Among them, 96 percent would pay attention to the information on forest management in the near future. They believed that stewardship in a forest would not damage the quality of the forest (85 percent). Surprisingly, about 79 percent and 85 percent of the respondents never knew about the Forest Stewardship Council (FSC) and Programme for the Endorsement of Forest Certification (PEFC) labels respectively (refer annex).

In addition, about 78 percent and 85 percent never saw the FSC and PEFC labels in the shops or supermarket. However, they completely agreed that stewardship would preserve the resources for the future generation (71 percent), protect the flora and fauna (69 percent), and reduce global warming (43 percent).

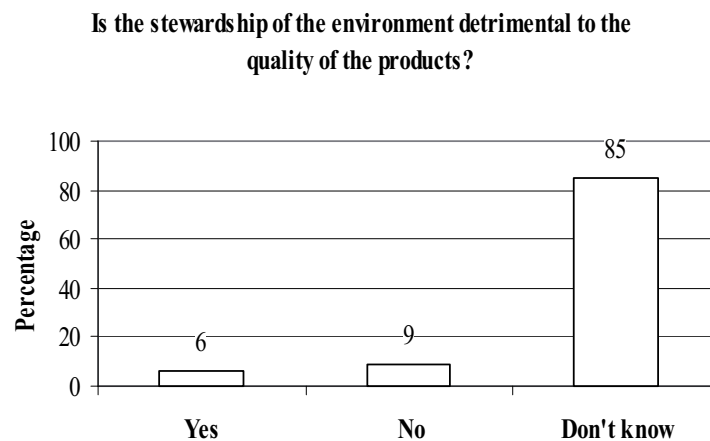
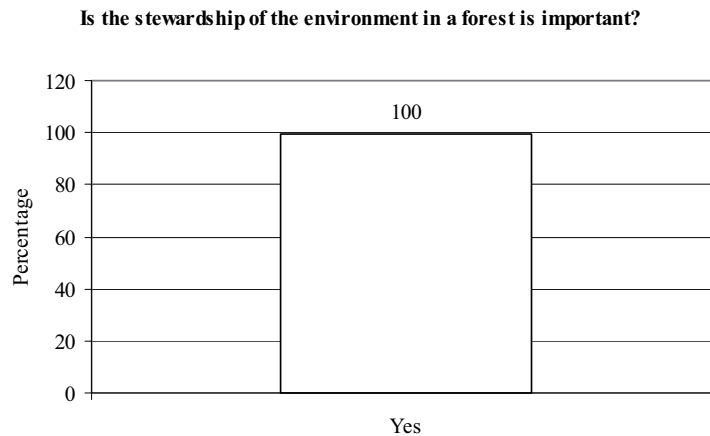


Figure 38: The important of the stewardship to the environment

4.7.1 Conditional Logit Model Results

This section begins with the priori expectations about the signs of the attributes. The theoretical expectations of the results are presented in Table 12.

Result from the simple conditional logit model

This section presents the simple conditional logit model for wooden flooring in France. According to Han et al. (2008), in a simple model, the observable deterministic component of an indirect utility (V_{ij}) can be expressed as a linear function of a vector of attributes without an

intercept, $Z=Z_n$ where Z_1 =Ecology, Z_2 =Sociology, Z_3 =Landscape, Z_4 =Fair trade, and Z_5 =France Origin and Z_6 =Price. Therefore, the simple model is as follows:

$$V_{ij} = \beta_1 Z_{1ij} + \beta_2 Z_{2ij} + \beta_3 Z_{3ij} + \beta_4 Z_{4ij} + \beta_5 Z_{5ij} + \beta_6 Z_{6ij} + \varepsilon \quad (3)$$

where, β_1 to β_6 are the coefficients of the attributes that can influence respondents' utility. The estimated coefficients, standard error and t-value is presented in Table 13. A likelihood ratio test²⁰ of joint significance of the included variables strongly rejects the null hypothesis that the marginal effects (β s) are jointly zero with a likelihood ratio statistic value of 4256.27 with the critical chi-squared value at 1 percent level of significance and 5 degrees of freedom. The R^2 of this model is 0.13 (represented by Pseudo R^2).

Variables	Expected sign	Explanation
Ecology	+	The utility for ecology is expected to increase positively with greater protection of forest biodiversity. Consumers prefer to enjoy themselves with the protection of the environment.
Sociology	+	The utility for sociology of the forest will increase positively with better forest management as they can enjoy the recreational and social activities of the forest.
Landscape	+	The utility for landscape of forest will increase positively with the presence of several species of trees and a variety of landscape.
Fair trade	+	The utility for fair trade will increase positively with better working conditions throughout the chain of manufacture of flooring products.
French origin	+	The utility for France origin will increase positively with the products using French labels. It is expected that consumers prefer local products compared with others.
Price	-	It is expected that price will have negative effects on demand for the product, ceteris paribus. In other words, people prefer higher utilities but are not willing to pay more.

Table 12: The theoretical expectations of explanatory variables

According to Rusli et al. (2008), a Pseudo R^2 in the range of 0.2 to 0.4 in conditional logit model is considered extremely good model fit and equivalent to 0.7 to 0.9 for linear function in OLS regression. All explanatory variables were significant at 1 percent level. All the attributes

²⁰ The generalized likelihood ratio criterion is of the form $\ln L^* = \max L^R - \max L^{UR}$ where L^* is the likelihood ratio, L^R is the maximum of the log-likelihood function in which M elements of the parameter space are restricted by the null hypothesis and L^{UR} is the unrestricted maximum of the log-likelihood function (Yacob et al,2008).

exhibited positive signs indicating that wooden flooring exhibited the attributes of ecology, sociology, landscape, fair trade and French origin with more utility relative to products without these attributes. The highest utility increment was due to the fair trade attribute of the product. The negative coefficient for the price reflects the negative relationship between the price and utility of the product as expected. It means that, increment in the price decreases the combined utility level provided by the choice. The willingness to pay for this model is presented as the marginal value for the attributes. It was calculated on the basis of marginal rate of substitution (MRS)²¹.

Variable	Coeff (B)	Std. Error	t-value
Ecology (β_1)	0.5827	0.6295	9.257***
Sociology (β_2)	0.6373	0.6320	10.083***
Landscape (β_3)	0.5795	0.6293	9.208***
Fair trade (β_4)	1.2453	0.6738	18.481***
France origin (β_5)	0.9709	0.6471	15.005***
Price (β_6)	-0.1160	0.5470	-21.207***
Marginal value for attributes; -Bij/Bik=p			
Ecology	5.0233	0.4631	10.846***
Sociology	5.4938	0.4594	11.958***
Landscape	4.9957	0.4634	10.781***
Fair trade	10.7348	0.4539	23.651***
France origin	8.3701	0.4596	18.213***
<i>Summary statistics</i>			
No.of observations	2576		
Log Likelihood (L(B))	-2451.0532		
Log Likelihood (L(0))	-2830.0253		
Pseudo-R ²	0.1339		
Adjusted Pseudo-R ²	0.1329		

Table 13: Results from the simple conditional logit model
Note: *** Significant at 1%, **Significant at 5% and *Significant at 10%

On average, the respondents were willing to pay between 4.9€/m² to 10.7€/m² for the presence of attributes. The results indicate that all the listed attributes had positive value, with the highest WTP for fair trade (about 10.7€/m² of wood flooring). This implies that, on average respondents

²¹ The marginal rate of substitution (MRS) between all the attributes and monetary attributes were analysed using WALD procedure in the LIMDEP program.

placed the greatest concern about and willingness to pay more for the presence of fair trade compared to other attributes. The WTP for the presence of French origin attribute was about 8.4€/m² of wooden flooring. Nevertheless, on average respondents were willing to pay about 5.5€/m² for sociology, 5.2€/m² for ecology and 4.9€/m² for landscape, hold other factors constant. Our result that respondents were willing to pay more for fair trade than environmental protection is consistent with the findings of Loureiro and Lotade (2005) on coffee products in Colorado, and Ivarsson (2008) on white shirts in Sweden. Loureiro and Lotade (2005) showed that respondents were willing to pay the most for fair trade coffee compared to shade grown and organic coffee. Ivarsson (2008) found that respondents were willing to pay a slightly higher price for a white t-shirt with a fair trade label (37 SEK) compared to one with an environmental label (33 SEK).

French origin was an important factor for which consumers seemed willing to pay. Aguilar and Cai (2010) also suggested the effect of indicating wood origin on consumer preferences. Their study found a positive impact correlated with the information regarding temperate forest while they detected a negative impact on consumer choices identified from tropical forest. However, the study only stated “French origin and otherwise” without particular information concerning the type of forest. This finding can have significant market implications for preferences for local wood products relative to imported wood products. Another study that revealed the importance of origin indication is the work of Loureiro and Hein (2001). A comparison in terms of WTP for organic, GMO-free and “Colorado” grown potatoes showed that consumers were willing to pay more for home-grown products compared with environmental friendly products.

Nevertheless, the sustainability aspects of forest were not ignored by the respondents in the sense that they were willing to pay positive value for “sustainable forest management”. The results suggest that, among the sustainability aspects of forest, respondents placed the highest importance on sociology aspects of forest as seen in the coefficient (0.6373) and WTP (5.5€/m²). However, respondents also valued ecology higher than landscape of the forest. This finding is consistent with the result of Hansmann et al. (2006) who assessed the WTP of consumers on the sustainability aspect of the forest (sociology, ecology and economic aspects of forest). They found that social and ecological aspects of the forest were more important to the respondents than economic aspects. They proposed that ecological and social information on the wood labels

resulted in increase of 5% (on average) WTP among their respondents. As expected, the respondents who were concerned more about these aspects were willing to pay more for the attributes.

4.7. 2 Results from the conditional logit interaction model

The socio-economic variables were introduced to interact with the main attributes. These interactions helped to generate a rich data set about the specific influences of the choice among the respondents. Only significant variables are presented in Table 14. The extension of the simple model into an interaction conditional logit model allowed to analyze the impact of individual characteristics on the WTP for the five attributes. We estimated a model with covariates such as the respondents' gender, date of birth, number of children, number of family members in the household of the respondent, level of education, type of employment, monthly income, living area, the respondent's knowledge of FSC and PEFC labels, the respondent's views of the FSC and PEFC labels in the market, and general attitudes of consumers towards environmental preservation which comprised CCSE= "change consumption mode to show example to others", MUI= "more urgent issues than environmental protection", EPSR= "environment protection is the State's responsibility", EPER= "environment protection is every one's responsibility" and CCBF= "change consumption mode for better future generations". Following Han et al. (2008), it is approximated that the interaction model by multiplying the respondent's socio-demographic and related data by individual level with all listed attributes.

From Table 15, the WTP was still highest for fair trade (10.2€/m²) and French origin (8.2€/m²), price premiums were slightly reduced compared to results of the conditional simple logit model. Globally, the WTP for sustainable management aspects increases by considering interaction with other variables. The WTP for ecology (i.e. presence of dead wood in forests) is increased as well as the WTP for landscape (i.e. presence of several tree species in forests). The respondents gave the lowest WTP for the sociology variable (i.e. forest path development) even if the amount remained similar to the one observed in the conditional logit model (simple model=5.5€/m², interaction model=5.7€/m²).

Variable	Coeff (B)	Std. Error	t-value
Ecology	0.8567	0.1651	5.189***
Sociology	0.6766	0.7819E-01	8.653***
Landscape	1.0039	0.1361	7.375***
FairTrade	1.2045	0.8009E-01	15.040***
FrenchOrigin	0.9764	0.6619E-01	14.750***
Price	-0.1178	0.5606E-02	-21.017***
Ecology_EPER	-0.78934E-01	0.3847E-01	-2.052*
Ecology_Bigcity	0.2143	0.1178	1.819*
Sociology_PEFCKnow	-0.9667	0.4171	-2.318*
Sociology_PEFCSec	0.8703	0.4137	2.104*
Landscape_PEFCKnow	-0.6996	0.2549	-2.745**
Landscape_FSCSec	0.6050	0.2609	2.318*
Landscape_MUI	-0.7273E-01	0.4131E-01	-1.760*
Landscape_Smallcity	-0.3333	0.1017	-3.277**
Landscape_NWTA	-0.6495	0.1732	-3.748***
FairTrade_FSCKnow	-0.3479	0.1420	-2.449*
Fairtrade_FSCSec	0.3900	0.1290	3.023**
Fairtrade_NoDiploma	-0.6473	0.2441	-2.651**
Fairtrade_Housewife	0.2515	0.1511	1.665*
<i>Summary statistics</i>			
No.of observations	2568		
Log Likelihood (L(B))	-2356.3803		
Log Likelihood (L(0))	-2759.7141		
Pseudo-R ²	0.14615		
Adjusted Pseudo-R ²	0.14291		

Table 14: Results of interaction conditional logit model

Note: *** Significant at 1%, **Significant at 5% and *Significant at 10%

Besides certain socio-economic and demographic factors, conviction attitudes of consumers towards environmental preservation and knowledge of FSC (or PEFC) had significant impact on the willingness to pay for sustainable forest management aspects as well as fair trade and French origin of wooden flooring. Some factors increased the willingness to pay, others decreased the willingness to pay.

The attitudes of respondents towards environmental preservation influenced the WTP for forest sustainability. The respondents who believed that the environment was “everyone’s responsibility” would pay less for the presence of reservoirs within the forest (ecology). It can be interpreted as free-riding behavior. Respondents who believed that there were more urgent issues than environmental protection would pay less for tree species within forests (landscape).

Variable	Coeff (B)	Std. Error	t-value
Ecology	7.2710	1.3656	5.324***
Sociology	5.7421	0.5906	9.721***
Landscape	8.5202	1.1083	7.687***
FairTrade	10.2227	0.5730	17.839***
FrenchOrigin	8.2865	0.4638	17.864***
Ecology_EPER	-0.6699	0.3273	-2.046*
Ecology_Bigcity	1.8193	1.0024	1.815*
Sociology_PEFCKnow	-8.2047	3.5510	-2.311*
Sociology_PEFCSec	7.3860	3.5200	2.098*
Landscape_PEFCKnow	-5.9375	2.1729	-2.732**
Landscape_FSCSec	5.1349	2.2225	2.310*
Landscape_MUI	-0.6172	0.3512	-1.757*
Landscape_Smallcity	-2.8288	0.8685	-3.257**
Landscape_NotRevealIncome	-5.5121	1.4826	-3.718***
FairTrade_FSCKnow	-2.9524	1.2107	-2.439*
Fairtrade_FSCSec	3.3099	1.1007	3.007**
Fairtrade_NoDiploma	-5.493609147	2.0825304	-2.638**
Fairtrade_Housewife	2.135189536	1.2844169	1.662*

Table 15: Marginal value for attributes; $-B_{ij}/B_{ik=p}$
Note: *** Significant at 1%, **Significant at 5% and *Significant at 10%

Socio-demographic variables also gave interesting results. The respondents who lived in a big city were more sensitive to the presence of reservoirs that would preserve biodiversity within forest. On the other hand, respondents who lived in small cities would pay less for landscape i.e. presence of tree species. Scarcity of natural resources can explain this phenomenon i.e. different valuation of environmental attributes. Fair trade was valued more by housewives and less by respondents who possessed no diploma. It might be identification to empathy (child labour is prohibited) that explains this result. Awareness of such issues can also be an explanation why people with no diploma will pay less. The result is consistent with the study of Loureiro and Lotade (2005), who showed that educated consumers were willing to more for the fair trade coffee compared to paying for other types of coffee.

Clearly, these results suggest that on average, the respondents' WTP for fair trade was higher compared to that for sustainable forest management attributes in the simple and interaction conditional logit model. This result supports the finding of the European Fair Trade Association (1998), in which 37 percent of the French general public was prepared to pay more for products which were being traded fairly. Ojea and Loureiro (2007) conducted a study on the WTP of

consumers in consideration of altruistic, egoistic and biospheric value orientations²² on wildlife recovery. They found that egoistic and altruistic value orientations were positively related to WTP attitudes. They indicated that environmental egoistic orientation increased the WTP by 5.12% (*ceteris paribus*) and altruistic orientation resulted in increasing the WTP by about 6.27% of the wildlife recovery.

Knowledge of wood forest labels (FSC and PEFC) was also an important factor that modified the WTP. Interestingly if the respondents said that they knew the labels, the WTP would be reduced for the sociology, landscape and fair trade attributes and contrarily if the respondents stated that they had already seen the labels on the product. People who have seen the labels on the product might be much concerned as they can observe in detail the characteristics of the products when purchasing, which is not necessarily true for people who have only seen the labels somewhere.

In other words, knowledge of the labels does not necessarily contribute to the WTP for the sustainable management aspects. In this case, it raises several questions: Are consumers correctly informed about the significance of the forest labels? And is the information transmitted via these labels an efficient way to promote sustainable forest management? Credibility of a label is a determining factor in the WTP of consumers (Teisl, 2003). For ecolabelling on forest products to be a success, Teisl (2003) stated that consumers not only care about the specific information presented to them, but also have to understand and believe the information.

The effectiveness of environmental labelling also depends on the presentation of the information and wording approaches on labelling (Teisl, 2003). In other words, it is important to understand the reasons of consumers to pay for social and environmental issues, for example, altruism, social distinction or recognition or just warm-glow feeling. The explanation that consumers are not willing to pay more for ecolabelled products because they do not really care is not necessarily true. Teisl argues that the current state of labelling actually slows down the green market development. Based on his finding, consumers prefer labels that offer detailed information on the specific environmental benefits connected with the product rather than more

²² Ojea and Loureiro (2007), defined biospheric orientation as the pro-environmental attitudes that emerge to avoid consequences over nature. However, if the action occurs because of the consequences incurred on oneself, they termed the person to have egoistic orientation, while altruistic orientation would emerge if the action is motivated by the consequences on other people.

global labels like those of the FSC. Nevertheless, a report on market research conducted by the Leopold Center for Sustainable Agriculture (2003) found that too much information on the ecolabels would confuse people and too simple design would not inspire trust in the average consumers. Even so, Boer (2003) presumed that the label's impact highly depends on the consumers' understanding, trust and values it claims with regard to other choice criteria. It is recommended that for ecolabelling to be effective in altering consumer behavior towards the sustainable forest management, people should be educated to look better at and comprehend the label's information. Occasionally consumers do not have an adequate knowledge to enable them to understand the detailed information of the labels.

The findings also reveal that those who have seen the labels in the markets are willing to pay more for the presence of the labels in promoting sustainable management of the forest. In the same way, the study of Aguilar and Vlosky (2007) proposed that those who are willing to pay more are associated with having a better knowledge of certification, more available information and better exposure to the ecolabelled and certified products. Aguilar and Vlosky (2007) suggested that the increase in willingness to pay for the environmentally certified wooden products is connected to the respondents who already seek certified products in the market, holding other factors constant. This has been supported by the finding of Vlosky et al. (1999), who observed a significant positive relationship between consumer involvement in certification and the WTP for environmentally certified wooden products. Additionally, the results of O'Brien and Teisl (2007) suggest that respondents who have seen and understand the significance of a label will translate their action into effective WTP. So providing detailed information about the criteria used in the certification substantially alters the importance that consumers place on social and environmental attributes.

4.8 Conclusion

This study used a choice experiment to estimate the preferences and WTP of French consumers towards hypothetical purchase of wooden flooring. Generally, the findings showed a positive WTP for the presence of reservoirs (ecology), forest path development (sociology), the presence of more than one tree species within forests (landscape), fair trade as well as French origin. The results of the study, i.e. the WTP for all the listed attributes, are altered depending on the

respondents' knowledge of forest products labelling, their attitudes towards environmental preservation, their living area, education level, type of job and income level. Globally, respondents place the highest concern on fair trade compared to other attributes.

However, the results still raise some questions. Sustainable forest management (sociology, ecology, and landscape) are three attributes together, so does this mean that French consumers will pay the sum of all the attributes to determine the global WTP for forest certification? If that is the case, the WTP for sustainable forest management will be higher compared with that for fair trade and French origin aspects. If not, do consumers possess an environmental budget? In other words, is there a financial limit in consumer behavior towards social and environmental protection?

Furthermore, should French wood producers insist on the environmental aspects of wood or indicate the local origin when competing with foreign wood importers? Nevertheless, this study highlights the existence of the WTP for sustainable forest management, ethical aspects and indication of origin on wooden flooring. Would behavior be similar for other wooden products? It would be interesting to analyse not only the consumers in the European region, but also those from developing countries who also play an important role in determining the WTP for sustainable forest management, fair trade and indication of origin especially on tropical wooden products.

CHAPTER 5
DISCUSSION AND CONCLUSION OF THE THESIS

This chapter synthesizes the findings from the previous four chapters. It respectively deals with the importance of environmental issues on trade, Malaysian timber exports to Europe, the comparative advantage of Malaysian wood products in European markets, and finally the willingness to pay for sustainable forest management with reference to French consumers.

An attempt was made to organize the different ideas and results into one coherent framework. In this framework, the relationships that link different concepts together are presented. The identification of the patterns and relationships between the various components of the economy, which have been discussed earlier, will be synthesized as a production system. A diagram that constitutes a conceptual model of the production system, functionally inspired by the Porter's diagram in competitive advantage theory is given in Figure 39.

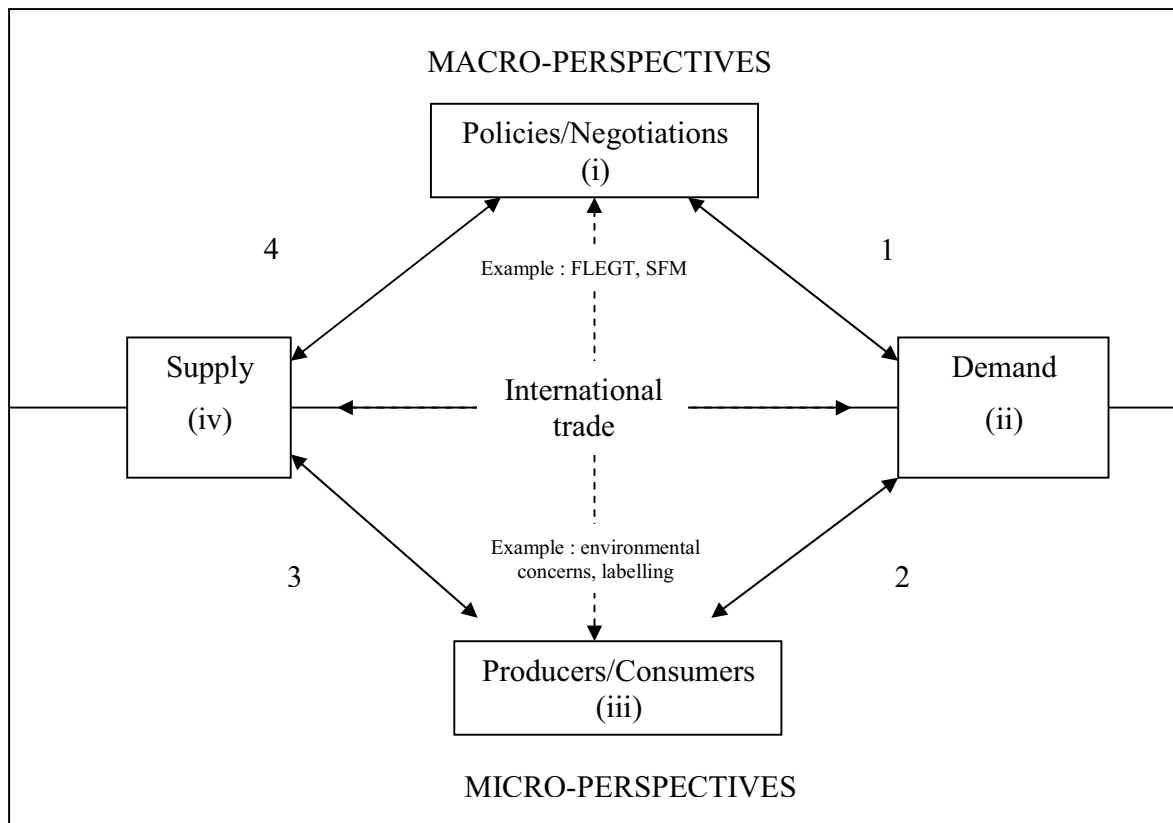


Figure 39: Systemic diagram of timber trade between Malaysia and Europe

The systemic diagram is built upon four major perspectives that shape the trade of timber products between Malaysia and Europe. The perspectives are supply, demand, microeconomics (producers or consumers), and macroeconomics (policies or trade and environmental negotiations). Several retroaction processes are at work in this system. These concepts, perspectives, and processes are described and analyzed as follows.

Where to start?

The timber trade between Malaysia and Europe is influenced by supply and demand considerations, Malaysia being a supplier and Europe being a consumer of tropical timbers and timber products. It is also influenced by macroeconomic factors (the geopolitics of Europe which needs to satisfy its public opinions with strong actions on environment as well as to protect its domestic economy, and the economics development in Malaysia which needs to ensure a strong economic growth rate through exports. Finally it is influenced by microeconomic factors (marketing and strategies of enterprises and effective preferences of the individuals).

The synthesis starts with the discussion on the macroeconomic perspective, and then following clockwise the elements of the systemic diagram in Figure 39.

Macro-perspectives

In general, developed countries place high importance on the environment. This awareness has resulted into efforts to examine the environmental impacts of trade and review the policies concerning this matter. In forestry issues, developing countries believe that the mounting numbers of ecolabelling schemes by various countries generate a lot of confusion and uneasiness for producers and exporters alike (Centre for International Trade, Economics and Environment, 2009). In meeting the standards set by the developed countries, developing countries claim that this may lead to higher amounts of prohibitive costs and insufficient technology skills which could disadvantage them. For Malaysia, the introduction of new regulations on environmental aspects of natural resources (certification and labelling), the European policies on public procurement of “green products” and the pressure of legality on timber products are perceived as trade barriers for the Malaysian forest industry.

In moving towards a green market, there is guidelines established on sustainability wood purchasing in EU that might shaped the mode for total demand and influences all the market segments (public procurement, retail sectors and households) for wood products including the one imported from Malaysia. It is supposed that public procurement can very much influence the demand for Malaysian timber products. The EU green public procurement (GPP) policy for the purpose of reducing the environmental impact caused by public sector consumption has directly shaped the public's purchasing behavior towards wooden products. On average, it is estimated that public authorities spend about 16 percent (of total GDP) on purchasing goods and services in Europe which can create significant impact on the consumption pattern of green wood products and affect demand for imported wood products from Malaysia. To create mass movement in green consumption, the European Commission has designed the policy on Sustainable Consumption and Production (SCP) together with the Sustainable Industrial Policy (SIP) to help the industrial and retail sectors in purchasing and producing sustainable wooden products. With the recognition of the influential role played by the public authorities, industry and retail sectors in the EU, the promotion of sustainable consumption in wood products will significantly shape the demand for wood products from other countries.

Demand perspective

The demand for green consumption in the European market, however, pushes producers to modify their wood products accordingly. Thus, the European demand for green consumption should drive the Malaysian producers to modify and move towards sustainable wood products. Malaysia is not only pursuing SFM to improve its forest reputation, but is also increasing its efforts towards developing legality issues on certification. The Malaysian Timber Certification Council (MTCC) has established the national timber certification scheme to assess the forest management practices and deliberately meet the demand for certified timber products. In further efforts, Malaysia has signed many "green" agreements at the international level such as the Convention on Biological Diversity (CBD), the Convention on International Trade in Endangered Species of Fauna and Flora (CITES) and the International Tropical Timber Agreement (ITTA). To date, the Malaysian Timber Certification Scheme (MTCS) has been endorsed by the Programme for Endorsement of Certification scheme (PEFC), one of the leading international initiatives on forest certification.

However, the study proposes the claim on legality of timber by the MTCC as not being adequate and should be redefined through the Voluntary Partnership Agreement (VPA). The conclusion of this agreement will see the licensing for legality of timber production and only certified products will be allowed to access Europe. Once Malaysia and the EU sign the agreement, Malaysian timber products will have a clear competitive edge over other countries without a VPA by which the Malaysian products will be exempted from the diligence requirement. It is anticipated that the agreement will give greater market access benefit for Malaysian wood products into the EU. All the policies and efforts made by the Malaysian forest industry and related agencies will not only be good for the country's image, but will also indirectly improve the market access and enhance the comparative advantage of Malaysian wood products at the international level. Malaysia needs to compete with Chinese and Brazilian exporters, having each having their own strength in the European market. Having FLEGT and forest certification can be beneficial as a tool to compete with Brazilian exporters in gaining market access. Araujo et al. (2009) found in their study that Brazilian companies certify their forest not for the return of a better price for their certified products, but overall for better market access especially to Europe.

Micro-perspectives

At the micro-level, the households in Europe were also demanding sustainable forest products in their purchasing behavior. In the willingness to pay study, the consumers were willing to pay more for the wood product that possessed SFM attributes. The attributes such as presence of reservoirs (ecology), forest path development (sociology) and the presence of more than one tree species within the forest (landscape) represented the SFM aspect in the study. Though the consumers were willing to pay higher for fair trade and the origin of the wood product, the positive willingness to pay for the SFM attributes cannot be ignored as it shows that wood from sustainable source is among the important criteria for wood purchasing decision.

Also, the consumer purchasing behavior in the importing countries to some extent will shape the production specification of Malaysian wood products. It is generally known that consumers in the northwest European countries such as Germany, the Netherlands and the United Kingdom are more demanding for environmentally certified forest products compared with those in the southern European countries whereby the issues of certification and sustainable management are considered the centre attributes of the forest products. The strong drive of the consumers'

demand for sustainability should push the producers to modify their wood products. Since green labelling on wood products is insisted on by certain markets, Malaysian producers interested to export to the Europe believe that installation of green criteria in their wood products will enhance their image and help gain a market advantage. However, a specific market such as France seems more concerned about fair trade and local origin (the study referred to French origin) rather than sustainable forest management. This poses new challenges facing Malaysian producers to meet the demand in the European market.

Previously, fair trade issues mainly involved certain products such as coffee, banana, cotton and cocoa but not on wood products. Nevertheless, in this study French consumers ascribed “ethical consumption” to wood products higher than “green consumption” in their willingness to pay. This suggests that some market segments are moving towards ethical consumption in which sustainable forest management will be given less priority in the purchasing decision of wood products. The study also proves that French consumers are willing to pay more for local wooden products than for imported ones. This was considered the most important factor that resulted in the choice due to the different tastes for colours between temperate and tropical woods. According to the ITTO (2004), French wood consumption is concentrated mainly on oak, cherry and pine while tropical species are little utilized. In addition, French furniture production which strongly leans on its old traditional classic designs with its touch of uniqueness is believed to be difficult for Malaysian producers to follow. Moreover, the concept of protected designation of origin (PDO)²³ may combine with the specific qualities of the products that cannot be found in any place other than that of the origin. It is believed to assign a complex advantage to domestic over imported products.

Besides, it is assumed that emotional attachment such as home country bias could be another factor in the WTP more for domestic products over the imported ones. The study did not go into detail in analysing this factor, but to some extent the emotional attachment for their country might produce a result of biasness for certain consumers. Nevertheless, other researchers have

²³ The protected designation of origin (PDO) identifies a processed product which draws its specificity from its geographical indications. It guarantees a close link between the product and the place of origin, which is defined the geographical area with its own physical attributes as soil and climate and particular rules self-imposed by the people to get best out of their land and resources. Protected geographical indication (PGI) identifies a relationship between the product and its origin which give a reputation to the products.

shown that consumers' emotions might contribute to their decision to select the products in the market. For instance, Zieba and Ertmanski (2006), found that consumers make many decisions based not only on the rational attributes of the products, but also on their emotions and their standpoint towards the products will change when the country of origin is revealed to them. A consumer's emotional attachment to any one country (their own country or foreign country) may result in his or her selecting a product that originates from that nation, regardless of its quality evaluations or intrinsic and extrinsic attributes (Dmitrovic and Vida, 2010). Also Winit and Gregory (2009) observed that consumers faced with local and foreign brands with equivalent quality would appraise the local brand more positively which better suited the local cultural tastes and needs. This situation would pose an obstacle for Malaysian wood products to penetrate the specific French market and European consumers (as a whole). Though this assumption was not supported by the specific analysis related to consumer behavior, it cannot be ignored that consumers' home product bias may have some consequence on Malaysian wood product in the European market.

The important factor that puts pressure on the production of timber in Malaysia is the striking a balance between the commitment SFM which reduces the annual coupes of logging, and the increased costs of production induced by such a commitment. In applying the allowable cutting rates, Malaysia has seen the wood industry considerably affected at the upstream level. As a result of resource constraint, Malaysia is moving from upstream to downstream activities for higher value-added products as evidenced by the Malaysian wooden furniture export increasing significantly and surpassing the export of major timber products to European market. In tandem with the new policies in concentrating on value-added wood products, we expect that Malaysia in some way has effectively overcome the non-tariff barriers related to the forest industry. The policies in deliberately focusing on value-added products have indirectly lessened the non-tariff barriers centred mostly on raw timber.

To compete with China, Malaysia should emphasize on capital-intensive wood products through economies of scale and mechanized production. This strategy that indirectly reduces the production cost of the wood would give a reasonable market advantage to Malaysian exporters over Chinese exporters in Europe. In fact, the finding of the study proves that Malaysia has the highest comparative advantage in exporting mass mechanized wood products as seen in that

technology oriented products can compete with those products of other world exporters in the European market. Some analysts have forecast that furniture manufacturing will slowly move out from China as labour and other costs increase due to the rapidly improving Chinese economy. Therefore, Malaysian exporters can advance their product competitiveness in Europe by taking advantage of Malaysia's national timber policies on green and legal timber as well as focusing on the mass mechanized wooden products.

At the same time, with the reduction in the production level induced by more sustainable practices, the Malaysian Government has set up a policy to operate the industry by shifting the focus from upstream to higher value-added downstream activities thereby indirectly changing the export pattern of Malaysian wood products.

Supply perspective

The strong policy on green wood products which emphasizes on certification as proof of sustainability has committed the Malaysian producers' to the SFM goal. In harmony with the sustainability requirement, Malaysia is committed to achieving ITTO 2000 target on SFM by reducing the annual coupes of harvest which has resulted in the shortage of timber supply to meet domestic and international demands for timber products; Malaysia is obligated to maintain at least 50 percent of her land area under forest cover, implemented under Permanent Forest Reserve. To ensure sustainable timber production, commercial logging is practised on rotational cycle by which 7 to 12 mature trees per hectares are chopped down (Abdul Rahim et al., 2009). Furthermore, Malaysia is progressively developing its criteria and indicators (C&I) at the national level by covering not only for the purpose of SFM but also for forest resource security, forest ecosystem health and condition, continuity of flow of forest produce, biological diversity, soil and water, socio-economic and cultural aspects.

Though Malaysia strongly puts the efforts in promoting the sustainability aspects of wooden products, the legality criteria then become another issue of concern by the European market which again affects the Malaysian supply side. The efforts take place at the national level to prove the legality of Malaysian timber products throughout the certification process by the Malaysian Timber Certification Council. In fact, companies are now encouraged to obtain certification from the Malaysian Timber Certification Council to promote the legality of their

wood products. Malaysia has advanced her cooperation with the Forest Stewardship Council (FSC). However, the FSC does not recognize the MTCC because the MTCC is controlled by the government and not by an NGO. Malaysia nonetheless hopes that the MTCC certification could be a strong tool for Malaysian wood products to penetrate the European market.

For the European market, the concluded agreement on FLEGT becomes an additional point to provide the evidence for the legality of Malaysian timber products. Once the agreement is concluded, the European Union will consider whether the products holding the FLEGT label are harvested legally and exempted from other proofs of legality to enter the European Union. To date Malaysia is pursuing negotiation on the FLEGT. Malaysian stakeholders still fear that new European policies might surface again to reshape the demand and supply of wood products in the Europe-Malaysia market, with more non-tariff barriers imposed.

Closing the loop: back to macro-perspectives

Developing and developed countries do not similarly value environmental issues; developing countries favour economic growth whereas developed countries place a high importance on the environment. The World Trade Organization agreements stipulated that environmental standards should not be used as trade barriers. The World Trade Organization has advised countries with high environmental standards not to use these standards to impose entry barriers on the exporting products even though the same requirements are applied on their domestic products. In fact, environmental policies can become incentives to improve the environmental standards of exporting countries and enhance sustainable forest management. Simultaneously, the market access concerns should not lower the environmental standards, but should incite exporters to meet them. Theoretically, this should be designed as a win-win situation for developed and developing countries. To some extent and regardless of all the efforts made to fulfill the criteria of “sustainability and legality”, the process of replacing one measure by another may continue to protect domestic economies and hinder foreign products to expand their comparative advantage in the local market. Such mechanisms and logic are not new and have been observed at least since the mercantilist period.

Conclusion

For a country like Malaysia, the abundance of natural resources such as forests and existence of good infrastructures are considered an advantage to be exploited by the export sector. However the rising interest in the preservation and sustainable management of forest at international level puts an important pressure on Malaysia in her drive for the export market. The findings of the study suggest that the raising of environmentally related standards as non-tariff barriers indirectly shapes the export of Malaysian wooden products. Malaysia has enhanced mechanization and production technology to move towards value-added products rather than focusing primarily on the upstream activities for the export market. This study indicates that Malaysia has adapted to the trade barriers by going into value-added products to lessen the impact of the trade barriers. In complying with the European requirements and policies on “sustainable and legal products” Malaysia is taking one step further in pursuing national certification (Malaysian Timber Certification) and negotiating the European regulation for FLEGT agreement. Moreover, Malaysia has improved her reputation by being committed to SFM to maintain the forest ecosystem goods and services. Malaysia has successfully customized her wood products to the “sustainability and legality” requirement of the European market. However, the rising interest in fair trade wood among consumers will give rise to new challenges to Malaysian wood exporters in the near future. Nevertheless, information on the country of origin also plays an important role in European consumers’ purchasing the imported wood products.

Though Malaysia believes that the competitiveness of the tropical forest products in the European market rests strongly on her displaying proofs of sustainability and legality, as seen in the continuous decrease in market share of Malaysian wood and forest products in Europe compared with other countries, it is clear that the market attraction of Europe fails to create real motivation despite the efforts of Malaysia through its MTCC or its involvement in FLEGT process. While the volume of sales to Europe from Malaysia is not decreasing, the shrinkage in relative sales of total timber export from around 10-18 percent to less than 6 percent in 2008 shows that Europe is not the only market, but that other growing markets are now creating new opportunities for Malaysia, allowing only a few market niches still being “Euro-centered”. The evolution of “green” taste in the European forest sector has in fact a marginal effect on Malaysian exporters compared to the other market segments (products). Due to the declining

trend of export share in wooden products from Malaysia to Europe, it is observed that Europe is becoming less important to Malaysian exporters of forest products. Despite that, the relative competitiveness of forest products from Malaysia has improved for some categories after the Malaysian Timber Certification Scheme was launched.

Possible further research

This research still has some questions to ponder upon. Are all non-tariff barriers justifiable in the setting up of environmental standards? Should Malaysian exporters pay greater attention to the fair trade attribute in wood products to gain market share in Europe? Generally, are European consumers moving towards ethical consumption which emphasizes more on decent working condition rather than environmental issues? Or is it a fuzzier emotional/instinctive protectionist attitude of European buyers? If they feel under siege by the process of globalization and perceive South-East Asians as the winners of the process, then why should they feel compelled to help them by buying tropical timbers and timber products? Besides, are the results of willingness to pay for the hypothetical flooring product applicable to all market segments and other countries apart from the French? By how much does the indication of wood origin play a significant role in the market to affect Malaysian exporters? To answer the above questions stemming from the study undertaken in the French context, further studies are needed to cover such an extensive scope.

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APPENDICES

Annex 1

Declaration of the United Nations Conference on the Human Environment in Stockholm 1972.

Principle 1

Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment for present and future generations. In this respect, policies promoting or perpetuating apartheid, racial segregation, discrimination, colonial and other forms of oppression and foreign domination stand condemned and must be eliminated.

Principle 2

The natural resources of the earth, including the air, water, land, flora and fauna and especially representative samples of natural ecosystems, must be safeguarded for the benefit of present and future generations through careful planning or management, as appropriate.

Principle 3

The capacity of the earth to produce vital renewable resources must be maintained and, wherever practicable, restored or improved.

Principle 4

Man has a special responsibility to safeguard and wisely manage the heritage of wildlife and its habitat, which are now gravely imperiled by a combination of adverse factors. Nature conservation, including wildlife, must therefore receive importance in planning for economic development.

Principle 5

The non-renewable resources of the earth must be employed in such a way as to guard against the danger of their future exhaustion and to ensure that benefits from such employment are shared by all mankind.

Principle 6

The discharge of toxic substances or of other substances and the release of heat, in such quantities or concentrations as to exceed the capacity of the environment to render them harmless, must be halted in order to ensure that serious or irreversible damage is not inflicted upon ecosystems. The just struggle of the peoples of all countries against pollution should be supported.

Principle 7

States shall take all possible steps to prevent pollution of the seas by substances that are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.

Principle 8

Economic and social development is essential for ensuring a favorable living and working environment for man and for creating conditions on earth that are necessary for the improvement of the quality of life.

Principle 9

Environmental deficiencies generated by the conditions of under-development and natural disasters pose grave problems and can best be remedied by accelerated development through the transfer of substantial quantities of financial and technological assistance as a supplement to the domestic effort of the developing countries and such timely assistance as may be required.

Principle 10

For the developing countries, stability of prices and adequate earnings for primary commodities and raw materials are essential to environmental management, since economic factors as well as ecological processes must be taken into account.

Principle 11

The environmental policies of all States should enhance and not adversely affect the present or future development potential of developing countries, nor should they hamper the attainment of better living conditions for all, and appropriate steps should be taken by States and international organizations with a view to reaching agreement on meeting the possible national and international economic consequences resulting from the application of environmental measures.

Principle 12

Resources should be made available to preserve and improve the environment, taking into account the circumstances and particular requirements of developing countries and any costs which may emanate- from their incorporating environmental safeguards into their development planning and the need for making available to them, upon their request, additional international technical and financial assistance for this purpose.

Principle 13

In order to achieve a more rational management of resources and thus to improve the environment, States should adopt an integrated and coordinated approach to their development planning so as to ensure that development is compatible with the need to protect and improve environment for the benefit of their population.

Principle 14

Rational planning constitutes an essential tool for reconciling any conflict between the needs of development and the need to protect and improve the environment.

Principle 15

Planning must be applied to human settlements and urbanization with a view to avoiding adverse effects on the environment and obtaining maximum social, economic and environmental benefits for all. In this respect projects which are designed for colonialist and racist domination must be abandoned.

Principle 16

Demographic policies which are without prejudice to basic human rights and which are deemed appropriate by Governments concerned should be applied in those regions where the rate of population growth or excessive population concentrations are likely to have adverse effects on the environment of the human environment and impede development.

Principle 17

Appropriate national institutions must be entrusted with the task of planning, managing or controlling the nine environmental resources of States with a view to enhancing environmental quality.

Principle 18

Science and technology, as part of their contribution to economic and social development, must be applied to the identification, avoidance and control of environmental risks and the solution of environmental problems and for the common good of mankind.

Principle 19

Education in environmental matters, for the younger generation as well as adults, giving due consideration to the underprivileged, is essential in order to broaden the basis for an enlightened opinion and responsible conduct by individuals, enterprises and communities in protecting and improving the environment in its full human dimension. It is also essential that mass media of communications avoid contributing to the deterioration of the environment, but, on the contrary,

disseminate information of an educational nature on the need to protect and improve the environment in order to enable to develop in every respect.

Principle 20

Scientific research and development in the context of environmental problems, both national and multinational, must be promoted in all countries, especially the developing countries. In this connection, the free flow of up-to-date scientific information and transfer of experience must be supported and assisted, to facilitate the solution of environmental problems; environmental technologies should be made available to developing countries on terms which would encourage their wide dissemination without constituting an economic burden on the developing countries.

Principle 21

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.

Principle 22

States shall cooperate to develop further the international law regarding liability and compensation for the victims of pollution and other environmental damage caused by activities within the jurisdiction or control of such States to areas beyond their jurisdiction.

Principle 23

Without prejudice to such criteria as may be agreed upon by the international community, or to standards which will have to be determined nationally, it will be essential in all cases to consider the systems of values prevailing in each country, and the extent of the applicability of standards which are valid for the most advanced countries but which may be inappropriate and of unwarranted social cost for the developing countries.

Principle 24

International matters concerning the protection and improvement of the environment should be handled in a cooperative spirit by all countries, big and small, on an equal footing. Cooperation through multilateral or bilateral arrangements or other appropriate means is essential to effectively control, prevent, reduce and eliminate adverse environmental effects resulting from activities conducted in all spheres, in such a way that due account is taken of the sovereignty and interests of all States.

Principle 25

States shall ensure that international organizations play a coordinated, efficient and dynamic role for the protection and improvement of the environment.

Principle 26

Man and his environment must be spared the effects of nuclear weapons and all other means of mass destruction. States must strive to reach prompt agreement, in the relevant international organs, on the elimination and complete destruction of such weapons.

Annex 2

The Doha Ministerial Declaration

Paragraph 6

We strongly reaffirm our commitment to the objective of sustainable development, as stated in the Preamble to the Marrakesh Agreement. We are convinced that the aims of upholding and safeguarding an open and non-discriminatory multilateral trading system, and acting for the protection of the environment and the promotion of sustainable development can and must be mutually supportive. We take note of the efforts by members to conduct national environmental assessments of trade policies on a voluntary basis. We recognize that under WTO rules no country should be prevented from taking measures for the protection of human, animal or plant life or health, or of the environment at the levels it considers appropriate, subject to the requirement that they are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised

restriction on international trade, and are otherwise in accordance with the provisions of the WTO Agreements. We welcome the WTO's continued cooperation with UNEP and other inter-governmental environmental organizations. We encourage efforts to promote cooperation between the WTO and relevant international environmental and developmental organizations, especially in the lead-up to the World Summit on Sustainable Development to be held in Johannesburg, South Africa, in September 2002.

Paragraph 28

In the light of experience and of the increasing application of these instruments by members, we agree to negotiations aimed at clarifying and improving disciplines under the Agreements on Implementation of Article VI of the GATT 1994 and on Subsidies and Countervailing Measures, while preserving the basic concepts, principles and effectiveness of these Agreements and their instruments and objectives, and taking into account the needs of developing and least-developed participants. In the initial phase of the negotiations, participants will indicate the provisions, including disciplines on trade distorting practices that they seek to clarify and improve in the subsequent phase. In the context of these negotiations, participants shall also aim to clarify and improve WTO disciplines on fisheries subsidies, taking into account the importance of this sector to developing countries. We note that fisheries subsidies are also referred to in paragraph 31.

Paragraph 31

With a view to enhancing the mutual supportiveness of trade and environment, we agree to negotiations, without prejudging their outcome, on:

- (i) The relationship between existing WTO rules and specific trade obligations set out in multilateral environmental agreements (MEAs). The negotiations shall be limited in scope to the applicability of such existing WTO rules as among parties to the MEA in question. The negotiations shall not prejudice the WTO rights of any Member that is not a party to the MEA in question;
- (ii) Procedures for regular information exchange between MEA Secretariats and the relevant WTO committees, and the criteria for the granting of observer status;
- (iii) The reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services.

Paragraph 32

We instruct the Committee on Trade and Environment, in pursuing work on all items on its agenda within its current terms of reference, to give particular attention to:

- (i) The effect of environmental measures on market access, especially in relation to developing countries, in particular the least-developed among them, and those situations in which the elimination or reduction of trade restrictions and distortions would benefit trade, the environment and development;
- (ii) The relevant provisions of the Agreement on Trade-Related Aspects of Intellectual Property Rights; and (iii) labelling requirements for environmental purposes.

Work on these issues should include the identification of any need to clarify relevant WTO rules. The Committee shall report to the Fifth Session of the Ministerial Conference, and make recommendations, where appropriate, with respect to future action, including the desirability of negotiations. The outcome of this work as well as the negotiations carried out under paragraph 31(i) and (ii) shall be compatible with the open and non-discriminatory nature of the multilateral trading system, shall not add to or diminish the rights and obligations of Members under existing WTO agreements, in particular the Agreement on the Application of Sanitary and Phytosanitary Measures, nor alter the balance of these rights and obligations, and will take into account the needs of developing and least-developed countries.

Paragraph 33

We recognize the importance of technical assistance and capacity building in the field of trade and environment to developing countries, in particular the least-developed among them. We also encourage that expertise and experience be shared with Members wishing to perform environmental reviews at the national level. A report shall be prepared on these activities for the Fifth Session.

Paragraph 51

The Committee on Trade and Development and the Committee on Trade and Environment shall, within their respective mandates, each act as a forum to identify and debate developmental and environmental aspects of the negotiations, in order to help achieve the objective of having sustainable development appropriately reflected.

Survey question: Consumption of wood and the uses of the forest

Purchase of products: Did you buy the products that respect the environment (for example organic food, green maintenance products, car hybrid engine, ..) during the last 6 months?

Please select only one answer:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No

Answer this question only if you answered 'yes' to question on the purchase of products'

Consumer products respectful of the environment were primarily? (Several choices)

Select all suitable answers:

<input type="checkbox"/>	Food and organic farming
<input type="checkbox"/>	"Greener" maintenance of the house
<input type="checkbox"/>	"Greener" DIY
<input type="checkbox"/>	A car engine hybrid
<input type="checkbox"/>	Recycle paper
<input type="checkbox"/>	Heating and/or solar panel
<input type="checkbox"/>	Others

Going to craft shop: Do you regularly go to DIY stores?

Please select only one answer:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No

Responsible for craft purchases: Who is responsible for procurement of DIY in your household?

Please check the appropriate box.

Select all suitable answers:

<input type="checkbox"/>	Yourself
<input type="checkbox"/>	You and your spouse (or other person) has more or less equal
<input type="checkbox"/>	Your spouse (or other person)

Evaluation of preservation of environment: How would you rate the importance of preserving the environment, referring to the following statement?

Check the corresponding number for each line. The scale of 1 to 5 or 1=not important and 5=very important.

Choose the appropriate response for each element.

	1=Not important	2	3	4	5=very important	Don't know
Recycling of waste						
Buying food (bio)						
Buying fair trade to provide fair income to farmers						
Buying ampoules low light and consume less electricity						
The reduction on the use of pesticides and other chemicals in agriculture						
The prevention of risk of chemical plant accidents like Seveso						

Reducing travel by car						
------------------------	--	--	--	--	--	--

Agreement: Do you completely disagree, disagree, indifferent, agree, completely agree, don't know with the following statement: Choose the appropriate response for each element						
	Completely disagree	Disagree	Indifferent	Agree	Completely agree	Don't know
Protecting the environment is important. By changing behavior to the environment, it shows example for others						
There are more pressing problems and/or more severe that the preservation of the environment						
Environmental protection is a matter for the State						
Environmental protection is everyone's business						
Unfortunately the change of attitude towards the environment of an individual will not solve the problem						
It is important to change consumption patterns to ensure a future for coming generations						

As follows, we will ask you to purchase parquet, giving the situation below. It is only a simulation to know your preferences. The parquet is used to cover the floor of your home. The differences between this type of parquet and others that we shall propose are the source of timber and the management applied in the forest. The impacts of these differences will be explained in the next two pages we shall ask you to read.

This is a solid wood flooring pine (with a blade width of 120mm and thickness of 20mm slides). The life of this parquet is estimated about 25 years. For example, the average price per/m² of floor of this type is 20euro/m² specified in stores.

Please read carefully the following information related to the wood used for flooring.

The forest is an ecosystem that can simultaneously meet economic functions such as production and wood processing, functions such as environmental protection of biodiversity or social functions such as the beauty of the landscape and the existence of spaces for recreation. According to the management practices in the forest, these functions are more or less satisfied, and they affect the price of wood used for flooring. Thus the timber may be affected with the following features.

Maintenance of reservoirs of biodiversity

The presence of dead wood helps to preserve the existence of many insects, birds, plants and fungi. They are therefore very important in protecting biodiversity. However, these reservoirs of deadwood reduce profits for forest owners.

Development of access roads in the forest

The arrangement of the forest and its access allow the public to enjoy recreational and social functions of the forest such as hiking, cycling or riding, picking berries or mushrooms. Forest management increases the costs of managing the forest owners.

Many species of trees

The presence of several species of trees in a forest improves identity and variety of landscape. A forest with one tree species (monoculture) has the advantage of lower costs to exploit but also impoverishes the soil, putting at risk the natural generation.

Responsible

The distributor of flooring can ensure that, throughout the chain of manufacture of flooring, all workers have decent working conditions and work in the safest possible way. The traceability of wood needed to supply charge increases the cost of prosecution, particularly if the wood comes from long-haul destinations (Brazil, Indonesia, Malaysia...)

Origin of Wood

The country of origin of wood can be mentioned which implies additional cost of the products.

Table 1 Choice:

From the previous information, you have the choice between different types of flooring. Enter the product you would like to buy.

Check one box on the last line

Choice 1/8

Features of wood flooring	Product A	Product B	You are not interested in products A and B
Maintaining reservoirs of biodiversity	Presence of reservoirs	Absence of reservoirs	
Development of path	Inaccessible of forest	Development of path	
Many species of trees in the forest	More than 3 different species	Monoculture	
Responsible	Conditions of work not mentioned	Compliance with working conditions	
Origin of wood	Not indicated	France	
Total price per euro/m ²	22 euro	23 euro	

Choose the appropriate response for each element

Your choice :

Product A Product B None

Table 2 Choice

From the previous information, you have the choice between different types of flooring. Enter the

product you would like to buy.

Check one box on the last line

Choice 2/8

Features of wood flooring	Product C	Product D	You are not interested in products C and D
Maintaining reservoirs of biodiversity	Absence of reservoirs	Presence of reservoirs	
Development of path	Development of path	Inaccessible of forest	
Many species of trees in the forest	More than 3 different species	Monoculture	
Responsible	Conditions of work not mentioned	Compliance with working conditions	
Origin of wood	Not indicated	France	
Total price per euro/m ²	22 euro	23 euro	

Choose the appropriate response for each element

Your choice :

Product C Product D None

Table 3 Choice

From the previous information, you have the choice between different types of flooring. Enter the product you would like to buy.

Check one box on the last line

Choice 3/8

Features of wood flooring	Product E	Product F	You are not interested in products E and F
Maintaining reservoirs of biodiversity	Presence of reservoirs	Absence of reservoirs	
Development of path	Development of path	Inaccessible of forest	
Many species of trees in the forest	Monoculture	More than 3 different species	
Responsible	Conditions of work not mentioned	Compliance with working conditions	
Origin of wood	Not indicated	France	
Total price per euro/m ²	22 euro	23 euro	

Choose the appropriate response for each element

Your choice :

Product E Product F None

Table 4 Choice

From the previous information, you have the choice between different types of flooring. Enter the product you would like to buy.

Check one box on the last line

Choice 4/8

Features of wood flooring	Product G	Product H	You are not interested in products G and H
Maintaining reservoirs of biodiversity	Presence of reservoirs	Absence of reservoirs	
Development of path	Development of path	Inaccessible of forest	
Many species of trees in the forest	More than 3 different species	Monoculture	
Responsible	Compliance with working conditions	Conditions of work not mentioned	
Origin of wood	France	Not indicated	
Total price per euro/m ²	25 euro	20 euro	

Choose the appropriate response for each element

Your choice :

Product G Product H None

Table 5 Choice

From the previous information, you have the choice between different types of flooring. Enter the product you would like to buy.

Check one box on the last line

Choice 5/8

Features of wood flooring	Product I	Product J	You are not interested in products I and J
Maintaining reservoirs of biodiversity	Absence of reservoirs	Presence of reservoirs	
Development of path	Inaccessible of forest	Development of path	
Many species of trees in the forest	Monoculture	More than 3 different species	
Responsible	Conditions of work not mentioned	Compliance with working conditions	
Origin of wood	France	Not indicated	
Total price per euro/m ²	21 euro	24 euro	

Choose the appropriate response for each element

Your choice :

Product I Product J None

Table 6 Choice

From the previous information, you have the choice between different types of flooring. Enter the product you would like to buy.

Check one box on the last line

Choice 6/8

Features of wood flooring	Product K	Product L	
Maintaining reservoirs of biodiversity	Presence of reservoirs	Absence of reservoirs	
Development of path	Inaccessible of forest	Development of path	

Many species of trees in the forest	More than 3 different species	Monoculture	You are not interested in products K and L
Responsible	Conditions of work not mentioned	Compliance with working conditions	
Origin of wood	France	Not indicated	
Total price per euro/m ²	23 euro	22 euro	

Choose the appropriate response for each element

Your choice :

Product K Product L None

Table 7 Choice

From the previous information, you have the choice between different types of flooring. Enter the product you would like to buy.

Check one box on the last line

Choice 7/8

Features of wood flooring	Product M	Product N	You are not interested in products M and N
Maintaining reservoirs of biodiversity	Absence of reservoirs	Presence of reservoirs	
Development of path	Inaccessible of forest	Development of path	
Many species of trees in the forest	More than 3 different species	Monoculture	
Responsible	Compliance with working conditions	Conditions of work not mentioned	
Origin of wood	Not indicated	France	
Total price per euro/m ²	22 euro	23 euro	

Choose the appropriate response for each element

Your choice :

Product M Product N None

Table 8 Choice

From the previous information, you have the choice between different types of flooring. Enter the product you would like to buy.

Check one box on the last line

Choice 8/8

Features of wood flooring	Product O	Product P	You are not interested in products O and P
Maintaining reservoirs of biodiversity	Absence of reservoirs	Presence of reservoirs	
Development of path	Development of path	Inaccessible of forest	
Many species of trees in the forest	More than 3 different species	Monoculture	

Responsible	Conditions of work not mentioned	Compliance with working conditions	
Origin of wood	France	Not indicated	
Total price per euro/m ²	23 euro	22 euro	

Choose the appropriate response for each element

Your choice : Product O Product P None

Is stewardship of the environment in a forest important?

Choose appropriate response for each element

Yes No Don't know

Is stewardship of the environment in a forest detrimental to the quality of a prosecution?

Choose appropriate response for each element

Yes No Don't know

In the future, will you pay attention to information on how the forest has been managed?

Please select only one answer

Yes
 No

Do you think that stewardship of the environment in a forest can:

Check the box if you're totally agree, somewhat agree, neither agree nor disagree, somewhat disagree totally disagree with the following statements:

Choose the appropriate response for each element

	Completely disagree	Disagree	Indifferent	Agree	Completely agree	Don't know
Protect flora and fauna						
Reduce global warming						
Preserve this resource for our children						
Develop the timber industry						
Develop leisure activities						
Limit urban development						

Do you know this label?



The mark of responsible forestry
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- Yes
 No

Have you ever seen the label in the stores?

- Yes
 No

In your opinion, what does this label guarantee first? If multiple proposals are right for you, arrange them in order of importance (starting with the most relevant):

(Please number each box in the order of your preferences from 1 to 3)

- A quality environment
 Strict management of resources
 Decent income for farmers

Do you know this label?



Please select only one answer

- Yes
 No

Have you ever seen the label in the stores?

- Yes
 No

In your opinion, what does this label guarantee first? If multiple proposals are right for you, arrange them in order of importance (starting with the most relevant):

(Please number each box in the order of your preferences from 1 to 3)

- A quality environment
 Strict management of resources
 Decent income for farmers

Gender: You are?

- Female
 Male

Birth year: Your year of birth in 4 digits:

Example: 1960

Please write the answer here: _____

Persons: How many people live with you, including yourself?

Please write the answer here: _____

Children: How many children do you have? Please tick

Please select only one answer

- No children
- 1 child
- 2 children
- 3 children and more

Level of education: What is the highest education do you have?

Please select only one answer

- No diploma/ primary
- Degree
- Masters
- PhD
- Professional

Are you currently.. please tick.

Please select only one answer

- Farmer
- Patron of industry and commerce, craftsmen, traders, head of enterprise
- Framework, higher intellectual professions
- Intermediate occupation
- Employee
- Worker
- Student
- Male/female at home
- Searching for employment/ unemployed
- Others _____

Can you indicate the portion corresponding to the net monthly income of your household (taking into account all salaries, allowances and all other resources from home)?

Please tick and select only one answer

- Less than 600euro (less than 4.000F)
- Between 600euro to 900euro (between 4.000F to 6.000F)
- Between 900euro to 1200euro (between 6.000F to 8.000F)
- Between 1200euro to 1500euro (between 8.000F to 10.000F)
- Between 1500euro to 2300euro (between 10.000F to 15.000F)
- Between 2300euro to 3000euro (between 15.000F to 20.000F)
- Between 3000euro to 6000euro (between 20.000F to 40.000F)
- Between 6000euro and more (between 40.000F and more)
- Don't want to answer

Where do you live?

Please select only one answer:

- In a big city (+100 000 people)
 In a city (+10 000 people)
 In a countryside
-

The postcode of your place of residence

Please write the answer here: _____

Optional information

Thank you and please leave us your email address

Please write it here: _____

FINAL: This questionnaire is now complete

Thank you very much for answering this questionnaire, do not forget to click the submit button to validate your answers.

*The original questionnaire has been set up in French language

Data from survey: Wood Consumption in France

Frequencies of data

Purchase_of_product

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
N	86	26.1	26.1	26.4
Y	243	73.6	73.6	100.0
Total	330	100.0	100.0	

Q1P1_ALB

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	158	47.9	47.9	47.9
Y	172	52.1	52.1	100.0
Total	330	100.0	100.0	

Q1P1_PECM

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	144	43.6	43.6	43.6
Y	186	56.4	56.4	100.0
Total	330	100.0	100.0	

Q1P1_PB

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	298	90.3	90.3	90.3
Y	32	9.7	9.7	100.0

Q1P1_PB

	Frequency	Percent	Valid Percent	Cumulative Percent
Y	298	90.3	90.3	90.3
	32	9.7	9.7	100.0
Total	330	100.0	100.0	

Q1P1_VMH

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	326	98.8	98.8	98.8
Y	4	1.2	1.2	100.0
Total	330	100.0	100.0	

Q1P1_PR

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	215	65.2	65.2	65.2
Y	115	34.8	34.8	100.0
Total	330	100.0	100.0	

Q1P1_ACPS

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	303	91.8	91.8	91.8
Y	27	8.2	8.2	100.0
Total	330	100.0	100.0	

Q1P1_Autre

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	313	94.8	94.8	94.8
alimenta	1	.3	.3	95.2
ampoule	1	.3	.3	95.5
appartem	1	.3	.3	95.8
boule de	1	.3	.3	96.1
boule la	1	.3	.3	96.4
combusti	1	.3	.3	96.7
cosmetiq	1	.3	.3	97.0
cosmétiq	2	.6	.6	97.6
ECLAIRAG	1	.3	.3	97.9
eolienne	1	.3	.3	98.2
gaz	1	.3	.3	98.5
lessive	1	.3	.3	98.8
produits	2	.6	.6	99.4
utilisat	1	.3	.3	99.7
voiture	1	.3	.3	100.0
Total	330	100.0	100.0	

frequent_magBrico

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
N	98	29.7	29.7	30.0
Y	231	70.0	70.0	100.0
Total	330	100.0	100.0	

resp_achatBrico_achv

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	220	66.7	66.7	66.7
Y	110	33.3	33.3	100.0
Total	330	100.0	100.0	

resp_achatBrico_ache

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	176	53.3	53.3	53.3
Y	154	46.7	46.7	100.0
Total	330	100.0	100.0	

resp_achatBrico_achc

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	263	79.7	79.7	79.7
Y	67	20.3	20.3	100.0
Total	330	100.0	100.0	

preserve_env_P2RD

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Imp_1	2	.6	.6	.9
Imp_2	3	.9	.9	1.8
Imp_3	9	2.7	2.7	4.5
Imp_4	25	7.6	7.6	12.1
Imp_5	290	87.9	87.9	100.0

preserve_env_P2RD

	Frequency	Percent	Valid Percent	Cumulative Percent
	1	.3	.3	.3
Imp_1	2	.6	.6	.9
Imp_2	3	.9	.9	1.8
Imp_3	9	2.7	2.7	4.5
Imp_4	25	7.6	7.6	12.1
Imp_5	290	87.9	87.9	100.0
Total	330	100.0	100.0	

preserve_env_P2AB

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Imp_1	20	6.1	6.1	6.4
Imp_2	55	16.7	16.7	23.0
Imp_3	121	36.7	36.7	59.7
Imp_4	78	23.6	23.6	83.3
Imp_5	49	14.8	14.8	98.2
Imp_S	6	1.8	1.8	100.0
Total	330	100.0	100.0	

preserve_env_P2PC

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Imp_1	10	3.0	3.0	3.3
Imp_2	35	10.6	10.6	13.9
Imp_3	96	29.1	29.1	43.0
Imp_4	105	31.8	31.8	74.8

Imp_5	73	22.1	22.1	97.0
Imp_S	10	3.0	3.0	100.0
Total	330	100.0	100.0	

preserve_env_P2AL

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Imp_1	4	1.2	1.2	1.5
Imp_2	8	2.4	2.4	3.9
Imp_3	26	7.9	7.9	11.8
Imp_4	90	27.3	27.3	39.1
Imp_5	200	60.6	60.6	99.7
Imp_S	1	.3	.3	100.0
Total	330	100.0	100.0	

preserve_env_P2RU

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Imp_1	3	.9	.9	1.2
Imp_2	3	.9	.9	2.1
Imp_3	18	5.5	5.5	7.6
Imp_4	64	19.4	19.4	27.0
Imp_5	239	72.4	72.4	99.4
Imp_S	2	.6	.6	100.0
Total	330	100.0	100.0	

preserve_env_P2PR

	Frequency	Percent	Valid Percent	Cumulative Percent
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preserve_env_P2RU

	Frequency	Percent	Valid Percent	Cumulative Percent
	1	.3	.3	.3
Imp_1	3	.9	.9	1.2
Imp_2	3	.9	.9	2.1
Imp_3	18	5.5	5.5	7.6
Imp_4	64	19.4	19.4	27.0
Imp_5	239	72.4	72.4	99.4
Imp_S	2	.6	.6	100.0
Valid	1	.3	.3	.3
Imp_1	2	.6	.6	.9
Imp_2	2	.6	.6	1.5
Imp_3	21	6.4	6.4	7.9
Imp_4	56	17.0	17.0	24.8
Imp_5	240	72.7	72.7	97.6
Imp_S	8	2.4	2.4	100.0
Total	330	100.0	100.0	

preserve_env_P2DV

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Imp_1	7	2.1	2.1	2.4
Imp_2	15	4.5	4.5	7.0
Imp_3	75	22.7	22.7	29.7
Imp_4	112	33.9	33.9	63.6
Imp_5	117	35.5	35.5	99.1
Imp_S	3	.9	.9	100.0
Total	330	100.0	100.0	

p4_accordPE

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Acc_1	2	.6	.6	.9
Acc_2	3	.9	.9	1.8
Acc_3	20	6.1	6.1	7.9
Acc_4	99	30.0	30.0	37.9
Acc_5	204	61.8	61.8	99.7
Acc_s	1	.3	.3	100.0
Total	330	100.0	100.0	

p4_accordPU

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Acc_1	70	21.2	21.2	21.5
Acc_2	93	28.2	28.2	49.7
Acc_3	100	30.3	30.3	80.0
Acc_4	41	12.4	12.4	92.4
Acc_5	24	7.3	7.3	99.7
Acc_s	1	.3	.3	100.0
Total	330	100.0	100.0	

p4_accordAE

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Acc_1	29	8.8	8.8	9.1
Acc_2	44	13.3	13.3	22.4
Acc_3	125	37.9	37.9	60.3

Acc_4	77	23.3	23.3	83.6
Acc_5	53	16.1	16.1	99.7
Acc_s	1	.3	.3	100.0
Total	330	100.0	100.0	

p4_accordAT

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Acc_1	20	6.1	6.1	6.4
Acc_2	35	10.6	10.6	17.0
Acc_3	44	13.3	13.3	30.3
Acc_4	94	28.5	28.5	58.8
Acc_5	136	41.2	41.2	100.0
Total	330	100.0	100.0	

p4_accordGF

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Acc_1	3	.9	.9	1.2
Acc_2	3	.9	.9	2.1
Acc_3	18	5.5	5.5	7.6
Acc_4	89	27.0	27.0	34.5
Acc_5	215	65.2	65.2	99.7
Acc_s	1	.3	.3	100.0
Total	330	100.0	100.0	

Choice1_PCH1

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
NoPro	129	39.1	39.1	39.4
Pro_A	37	11.2	11.2	50.6
Pro_B	163	49.4	49.4	100.0
Total	330	100.0	100.0	

Choice2_PCH1

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
NoPr2	141	42.7	42.7	43.0
Pro_C	34	10.3	10.3	53.3
Pro_D	154	46.7	46.7	100.0
Total	330	100.0	100.0	

Choice3_PCH1

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
NoPr3	158	47.9	47.9	48.2
Pro_E	28	8.5	8.5	56.7
Pro_F	143	43.3	43.3	100.0
Total	330	100.0	100.0	

Choice4_PCH1

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	1	.3	.3	.3
Nopr4	66	20.0	20.0	20.3
Pro_G	247	74.8	74.8	95.2
Pro_H	16	4.8	4.8	100.0
Total	330	100.0	100.0	

Choice5_PCH1

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
NoPr5	114	34.5	34.5	34.8
Pro_I	38	11.5	11.5	46.4
Pro_J	177	53.6	53.6	100.0
Total	330	100.0	100.0	

Choice6_PCH1

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
NoPr6	159	48.2	48.2	48.5
Pro_K	91	27.6	27.6	76.1
Pro_L	79	23.9	23.9	100.0
Total	330	100.0	100.0	

Choice7_PCH1

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
NoPr7	168	50.9	50.9	51.2
Pro_M	71	21.5	21.5	72.7

Pro_N	90	27.3	27.3	100.0
Total	330	100.0	100.0	

Choice8_PCH1

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
NoPr8	167	50.6	50.6	50.9
Pro_O	94	28.5	28.5	79.4
Pro_P	68	20.6	20.6	100.0
Total	330	100.0	100.0	

P17Q1_R

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
R_NON	1	.3	.3	.6
R_NSP	1	.3	.3	.9
R_OUI	327	99.1	99.1	100.0
Total	330	100.0	100.0	

P17Q2_Q

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
R_NON	280	84.8	84.8	85.2
R_NSP	29	8.8	8.8	93.9
R_OUI	20	6.1	6.1	100.0
Total	330	100.0	100.0	

P18Q1

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
N	12	3.6	3.6	3.9
Y	317	96.1	96.1	100.0
Total	330	100.0	100.0	

P18T1_PFF

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Acc_1	2	.6	.6	.9
Acc_2	2	.6	.6	1.5
Acc_3	6	1.8	1.8	3.3
Acc_4	91	27.6	27.6	30.9
Acc_5	228	69.1	69.1	100.0
Total	330	100.0	100.0	

P18T1_RRC

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Acc_1	5	1.5	1.5	1.8
Acc_2	10	3.0	3.0	4.8
Acc_3	38	11.5	11.5	16.4
Acc_4	111	33.6	33.6	50.0
Acc_5	143	43.3	43.3	93.3
Acc_s	22	6.7	6.7	100.0

P18T1_RRC

	Frequency	Percent	Valid Percent	Cumulative Percent
	1	.3	.3	.3
Acc_1	5	1.5	1.5	1.8
Acc_2	10	3.0	3.0	4.8
Acc_3	38	11.5	11.5	16.4
Acc_4	111	33.6	33.6	50.0
Acc_5	143	43.3	43.3	93.3
Acc_s	22	6.7	6.7	100.0
Total	330	100.0	100.0	

P18T1_PRE

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Acc_1	2	.6	.6	.9
Acc_2	2	.6	.6	1.5
Acc_3	8	2.4	2.4	3.9
Acc_4	82	24.8	24.8	28.8
Acc_5	235	71.2	71.2	100.0
Total	330	100.0	100.0	

P18T1_DIB

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Acc_1	5	1.5	1.5	1.8
Acc_2	12	3.6	3.6	5.5
Acc_3	73	22.1	22.1	27.6

Acc_4	119	36.1	36.1	63.6
Acc_5	101	30.6	30.6	94.2
Acc_s	19	5.8	5.8	100.0
Total	330	100.0	100.0	

P18T1_DAL

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Acc_1	3	.9	.9	1.2
Acc_2	16	4.8	4.8	6.1
Acc_3	80	24.2	24.2	30.3
Acc_4	128	38.8	38.8	69.1
Acc_5	91	27.6	27.6	96.7
Acc_s	11	3.3	3.3	100.0
Total	330	100.0	100.0	

P18T1_LDU

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
Acc_1	9	2.7	2.7	3.0
Acc_2	22	6.7	6.7	9.7
Acc_3	72	21.8	21.8	31.5
Acc_4	107	32.4	32.4	63.9
Acc_5	105	31.8	31.8	95.8
Acc_s	14	4.2	4.2	100.0
Total	330	100.0	100.0	

P19_Q1

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
N	261	79.1	79.1	79.4
Y	68	20.6	20.6	100.0
Total	330	100.0	100.0	

P19_Q2

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
N	256	77.6	77.6	77.9
Y	73	22.1	22.1	100.0
Total	330	100.0	100.0	

P19Q3_C1

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	12	3.6	3.6	3.6
GEQ	139	42.1	42.1	45.8
GRR	162	49.1	49.1	94.8
GRDE	17	5.2	5.2	100.0
Total	330	100.0	100.0	

P19Q3_C2

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	30	9.1	9.1	9.1
GEQ	122	37.0	37.0	46.1

GRR	92	27.9	27.9	73.9
GRDE	86	26.1	26.1	100.0
Total	330	100.0	100.0	

P19Q3_C3

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	42	12.7	12.7	12.7
GEQ	46	13.9	13.9	26.7
GRR	52	15.8	15.8	42.4
GRDE	190	57.6	57.6	100.0
Total	330	100.0	100.0	

P20_Q1

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
N	278	84.2	84.2	84.5
Y	51	15.5	15.5	100.0
Total	330	100.0	100.0	

P20_Q2

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
N	279	84.5	84.5	84.8
Y	50	15.2	15.2	100.0
Total	330	100.0	100.0	

P20_Q3_C1

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20	6.1	6.1	6.1
GEQ2	180	54.5	54.5	60.6
GGRR2	114	34.5	34.5	95.2
GRDE2	16	4.8	4.8	100.0
Total	330	100.0	100.0	

P20_Q3_C2

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	46	13.9	13.9	13.9
GEQ2	87	26.4	26.4	40.3
GGRR2	135	40.9	40.9	81.2
GRDE2	62	18.8	18.8	100.0
Total	330	100.0	100.0	

P20_Q3_C3

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	60	18.2	18.2	18.2
GEQ2	31	9.4	9.4	27.6
GGRR2	42	12.7	12.7	40.3
GRDE2	197	59.7	59.7	100.0
Total	330	100.0	100.0	

Gen

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3

F	258	78.2	78.2	78.5
M	71	21.5	21.5	100.0
Total	330	100.0	100.0	

		Annee_N			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1932	1	.3	.3	.3
	1945	2	.6	.6	.9
	1946	2	.6	.6	1.5
	1949	2	.6	.6	2.1
	1950	3	.9	.9	3.0
	1951	1	.3	.3	3.3
	1952	3	.9	.9	4.3
	1953	11	3.3	3.3	7.6
	1954	12	3.6	3.6	11.2
	1955	7	2.1	2.1	13.4
	1956	11	3.3	3.3	16.7
	1957	12	3.6	3.6	20.4
	1958	9	2.7	2.7	23.1
	1959	8	2.4	2.4	25.5
	1960	11	3.3	3.3	28.9
	1961	12	3.6	3.6	32.5
	1962	3	.9	.9	33.4
	1963	10	3.0	3.0	36.5
	1964	12	3.6	3.6	40.1
	1965	5	1.5	1.5	41.6
1966	13	3.9	4.0	45.6	
1967	6	1.8	1.8	47.4	
1968	13	3.9	4.0	51.4	
1969	8	2.4	2.4	53.8	

1970	8	2.4	2.4	56.2
1971	19	5.8	5.8	62.0
1972	14	4.2	4.3	66.3
1973	7	2.1	2.1	68.4
1974	11	3.3	3.3	71.7
1975	11	3.3	3.3	75.1
1976	12	3.6	3.6	78.7
1977	15	4.5	4.6	83.3
1978	8	2.4	2.4	85.7
1979	5	1.5	1.5	87.2
1980	9	2.7	2.7	90.0
1981	9	2.7	2.7	92.7
1982	3	.9	.9	93.6
1983	5	1.5	1.5	95.1
1984	2	.6	.6	95.7
1985	4	1.2	1.2	97.0
1986	5	1.5	1.5	98.5
1987	1	.3	.3	98.8
1989	1	.3	.3	99.1
1990	2	.6	.6	99.7
2102	1	.3	.3	100.0
Total	329	99.7	100.0	
Missing System	1	.3		
Total	330	100.0		

Enfants

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
ENF0	88	26.7	26.7	27.0
ENF1	71	21.5	21.5	48.5

ENF2	109	33.0	33.0	81.5
ENF3	61	18.5	18.5	100.0
Total	330	100.0	100.0	

Diplome

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
bac	74	22.4	22.4	22.7
bac2	82	24.8	24.8	47.6
bac3	40	12.1	12.1	59.7
bac5	33	10.0	10.0	69.7
bepc	87	26.4	26.4	96.1
Nodip	13	3.9	3.9	100.0
Total	330	100.0	100.0	

P22_Q1

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	38	11.5	11.5	11.5
AGRI	2	.6	.6	12.1
CADRE	44	13.3	13.3	25.5
EMPL	111	33.6	33.6	59.1
ETUD	6	1.8	1.8	60.9
FOYE	30	9.1	9.1	70.0
INTER	43	13.0	13.0	83.0
OUVR	8	2.4	2.4	85.5
PATR	12	3.6	3.6	89.1
SANS	36	10.9	10.9	100.0
Total	330	100.0	100.0	

P22_Q1_Autre

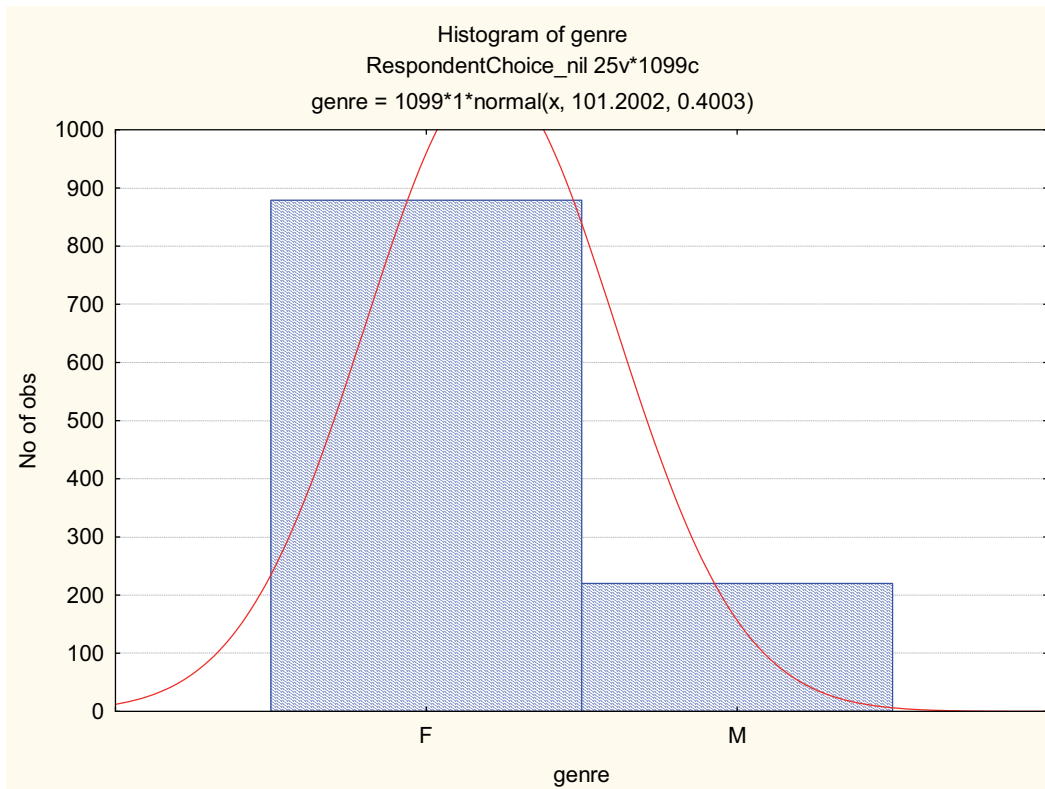
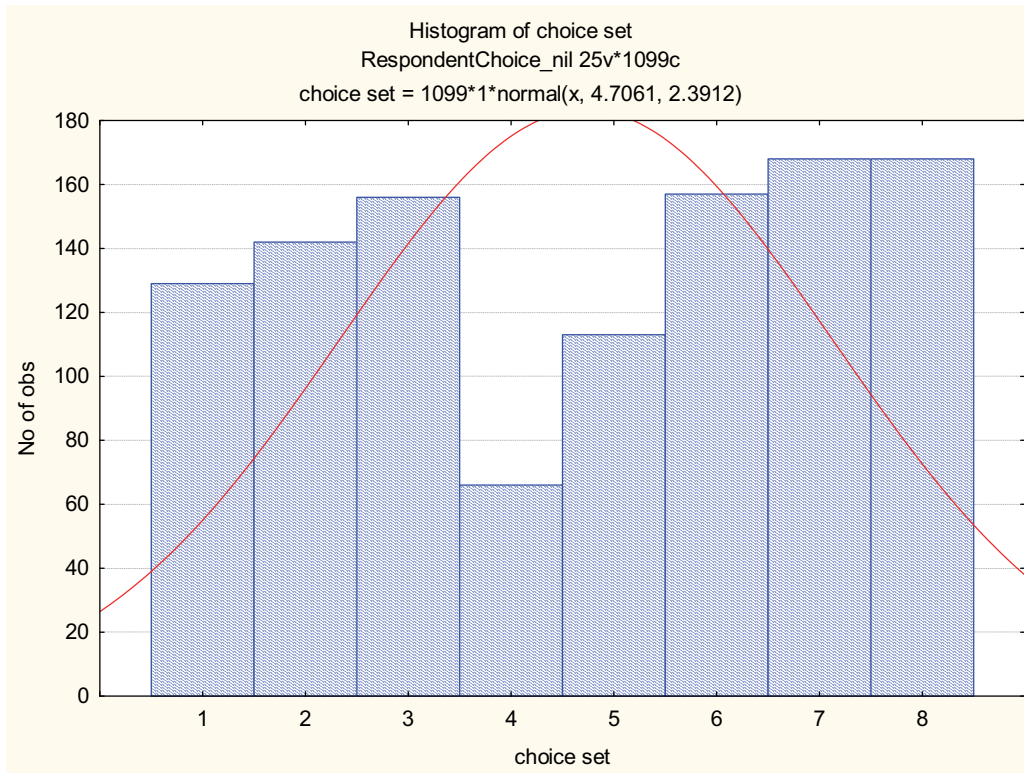
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	297	90.0	90.0	90.0
agent de	1	.3	.3	90.3
arrêt ma	1	.3	.3	90.6
Assistan	1	.3	.3	90.9
cadre de	1	.3	.3	91.2
Congé pa	1	.3	.3	91.5
créatric	1	.3	.3	91.8
en créat	1	.3	.3	92.1
en inval	1	.3	.3	92.4
fonction	3	.9	.9	93.3
Fonction	1	.3	.3	93.6
futur re	1	.3	.3	93.9
Gendarme	1	.3	.3	94.2
indépend	1	.3	.3	94.5
infirmie	1	.3	.3	94.8
invalidi	2	.6	.6	95.5
maman d'	1	.3	.3	95.8
mere au	1	.3	.3	96.1
professe	1	.3	.3	96.4
professi	1	.3	.3	96.7
retraite	1	.3	.3	97.0
retraité	8	2.4	2.4	99.4
serveuse	1	.3	.3	99.7
technici	1	.3	.3	100.0
Total	330	100.0	100.0	

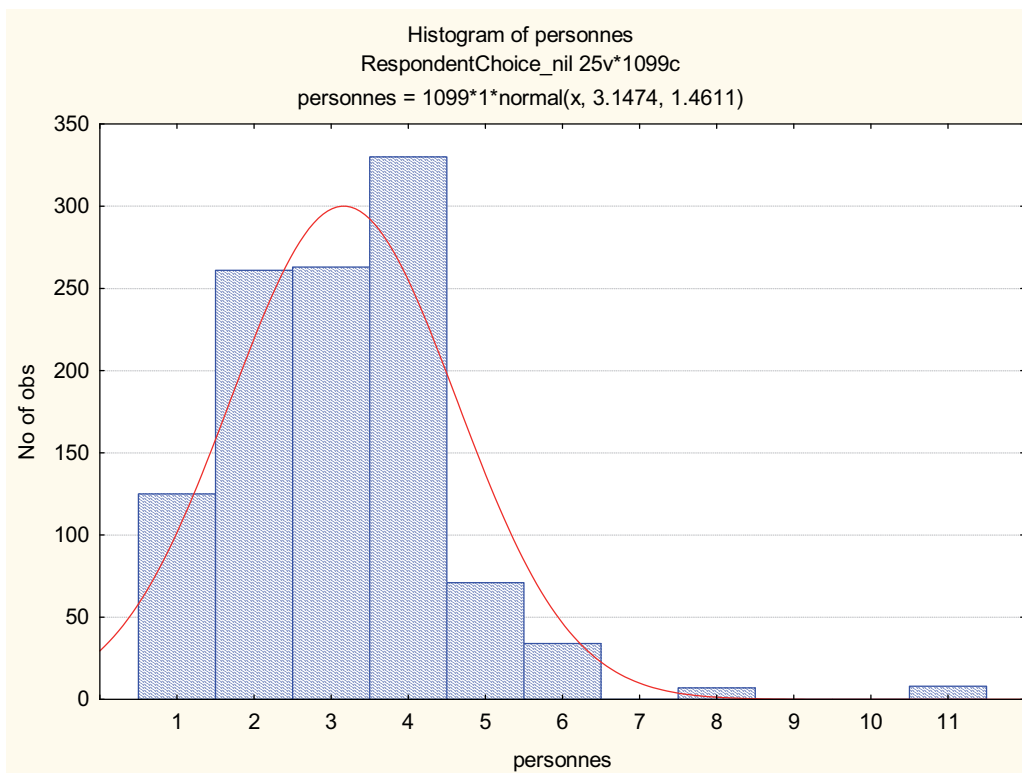
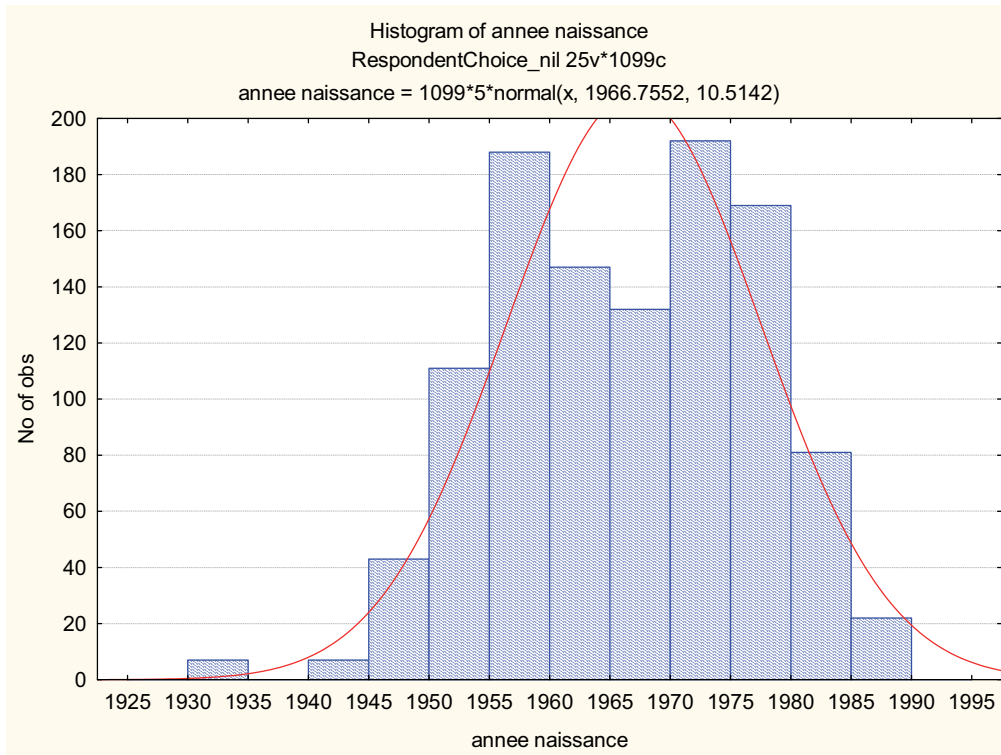
P23_Q1

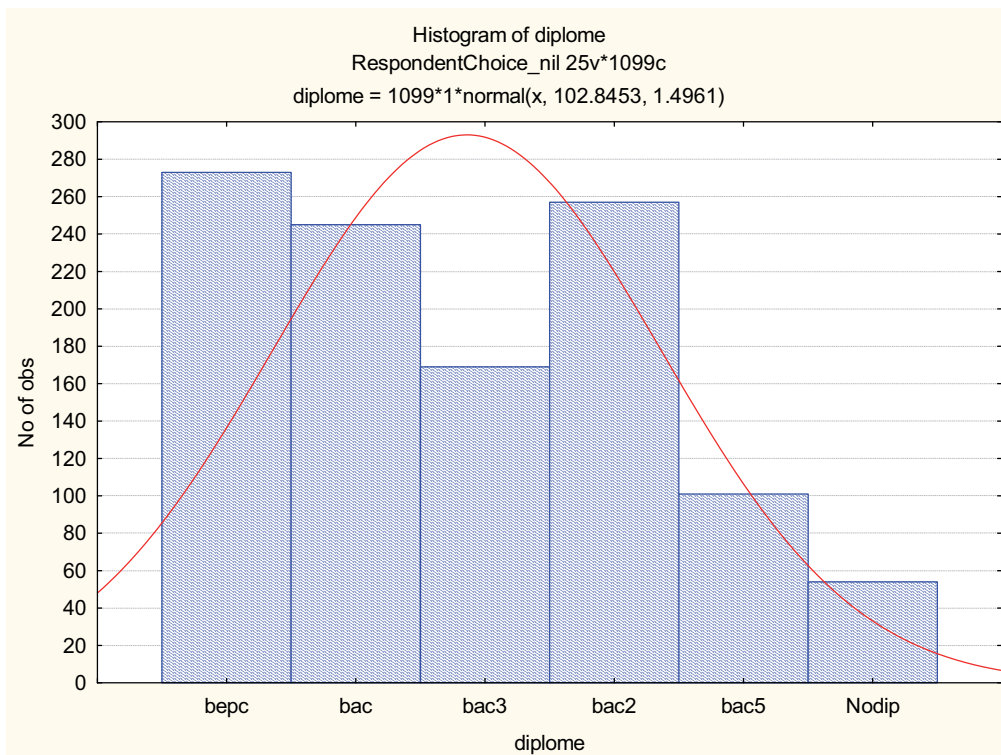
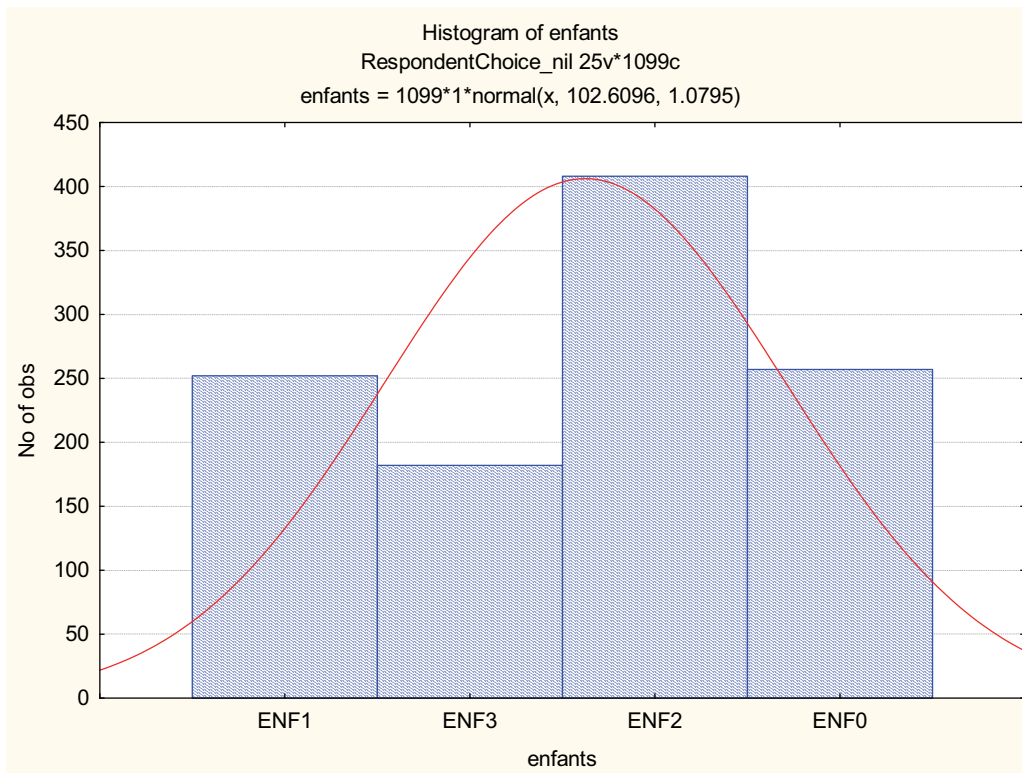
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
m1200	23	7.0	7.0	7.3
m1500	27	8.2	8.2	15.5
m2300	74	22.4	22.4	37.9
m3000	73	22.1	22.1	60.0
m600	7	2.1	2.1	62.1
m6000	77	23.3	23.3	85.5
m900	7	2.1	2.1	87.6
nvpr	33	10.0	10.0	97.6
p6001	8	2.4	2.4	100.0
Total	330	100.0	100.0	

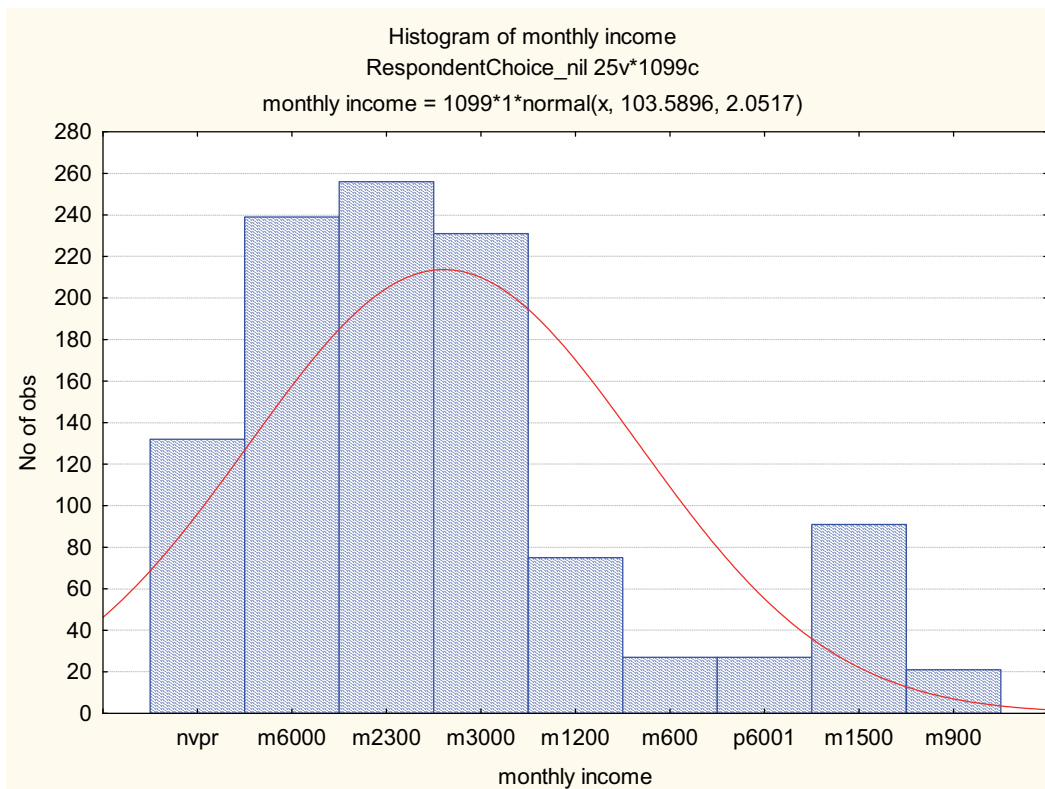
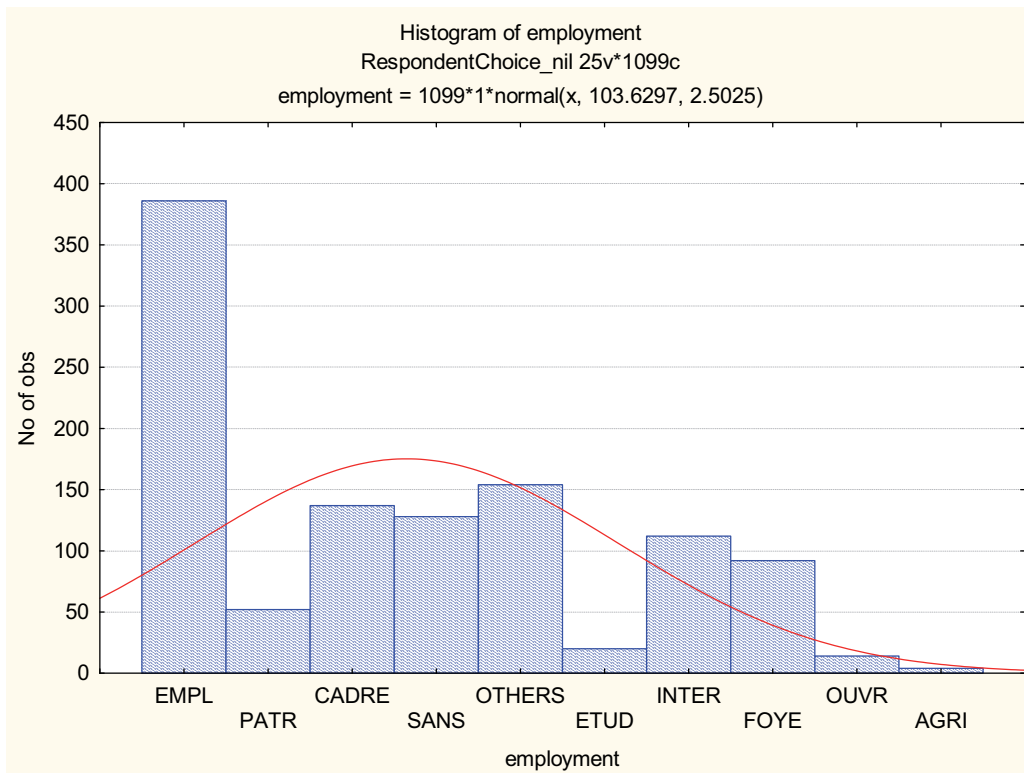
P24_Q1

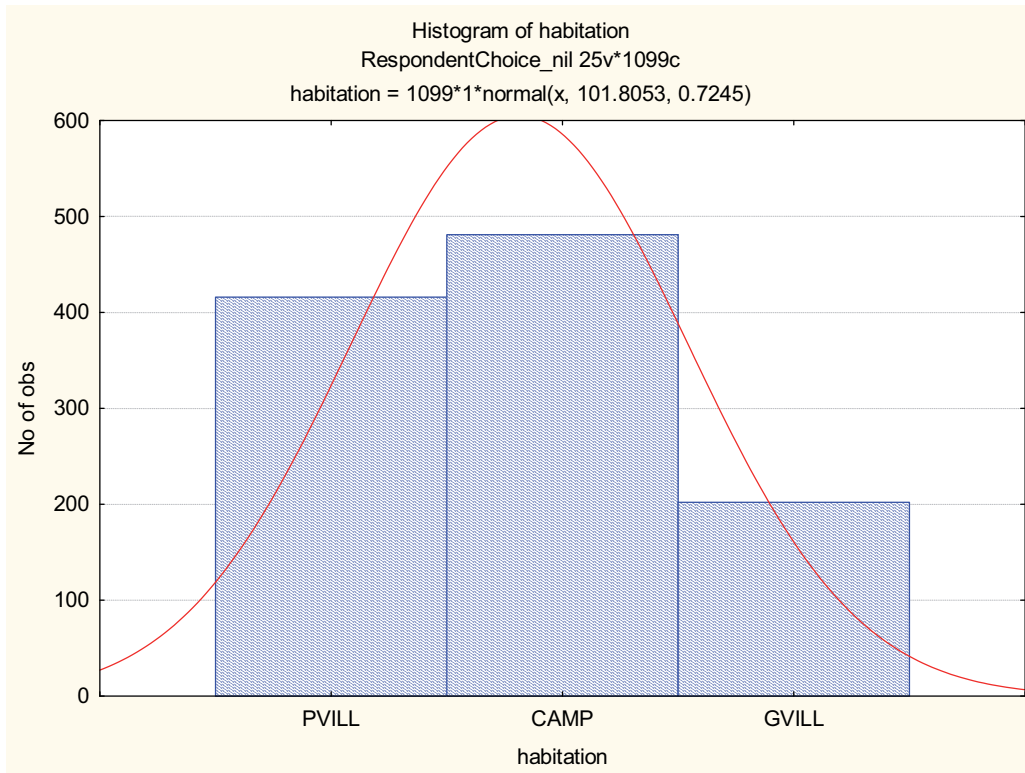
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.3	.3	.3
CAMP	151	45.8	45.8	46.1
GVILL	65	19.7	19.7	65.8
PVILL	113	34.2	34.2	100.0
Total	330	100.0	100.0	











LIMDEP

Simple conditional logit model

Command

```
CREATE ; OPTION1=(CHOSET=1)
        ; OPTION2=(CHOSET=2)
        ; OPTION3=(CHOSET=3) $

NLOGIT ; LHS = RESPCHOI, CSET, CHOSET
        ; CHOICES = OPTION1,OPTION2,OPTION3
        ; RHS = BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE$

? ***** CALCULATION OF MARGINAL VAULE OF ATTRIBUTE YSING WALD TEST

WALD ; LABELS =MVBIOD,MVCHEM,MVESPEC,MVRESP,MVORI,MVPRICE
      ; START = B
      ; VAR = VARB
      ; FN1 = -MVBIOD/MVPRICE
      ; FN2 = -MVCHEM/MVPRICE
      ; FN3 = -MVESPEC/MVPRICE
      ; FN4 = -MVRESP/MVPRICE
      ; FN5 = -MVORI/MVPRICE$
```

Results

```
+-----+
| Discrete choice (multinomial logit) model |
| Maximum Likelihood Estimates             |
| Dependent variable                       | Choice |
| Weighting variable                       | ONE   |
| Number of observations                    | 2576  |
| Iterations completed                     | 6     |
| Log likelihood function                   | -2451.053 |
| Log-L for Choice model =                 | -2451.0532 |
| R2=1-LogL/LogL* Log-L fncn R-sqrd RsqAdj |
| No coefficients                          | -2830.0253 .13391 .13290 |
| Constants only. Must be computed directly. |
| Use NLOGIT ;...; RHS=ONE $ |
| Response data are given as ind. choice. |
| Number of obs.= 2576, skipped 0 bad obs. |
+-----+

+-----+-----+-----+-----+-----+
|Variable | Coefficient | Standard Error |b/St.Er.|P[|Z|>z] | Mean of X|
+-----+-----+-----+-----+-----+
BIODIVER .5827309173 .62952494E-01 9.257 .0000
CHEMINS .6373183660 .63205666E-01 10.083 .0000
ESPECES .5795340716 .62938253E-01 9.208 .0000
RESPONSA 1.245311735 .67382283E-01 18.481 .0000
ORIGINE .9709926626 .64712974E-01 15.005 .0000
PRICE -.1160064323 .54702075E-02 -21.207 .0000
```

```
; FN1 = -MVBIOD/MVPRICE
; FN2 = -MVCHEM/MVPRICE
```

```

; FN3 = -MVESPEC/MVPRICE
; FN4 = -MVRESP/MVPRICE
; FN5 = -MVORI/MVPRICE$
      +-----+
      | WALD procedure. Estimates and standard errors |
      | for nonlinear functions and joint test of    |
      | nonlinear restrictions.                      |
      | Wald Statistic          = 4256.26293        |
      | Prob. from Chi-squared[ 5] = .00000        |
      +-----+
+-----+-----+-----+-----+-----+-----+
|Variable | Coefficient | Standard Error |b/St.Er.|P[|Z|>z] | Mean of X|
+-----+-----+-----+-----+-----+-----+
Fncn( 1)  5.023263848   .46312804      10.846   .0000
Fncn( 2)  5.493819209   .45943988      11.958   .0000
Fncn( 3)  4.995706361   .46335991      10.781   .0000
Fncn( 4) 10.73485074   .45389001      23.651   .0000
Fncn( 5)  8.370162271   .45957594      18.213   .0000

```

Interaction Conditional Logit Model

Command for Socio-demographic factors

```

?*****AGE*****
CREATE ; AGE=2010-ANNENAIS
      ; CHEM_AGE=CHEMINS*AGE
      ; ESP_AGE=ESPECES*AGE $

?*****GENDER*****
CREATE ; BIO_FEM=BIODIVER*FEMALE
      ; ORI_FEM=ORIGINE*FEMALE $

?*****PERSONS*****
CREATE ; BIO_P1=BIODIVER*PERS1
      ; ESP_P1=ESPECES*PERS1
      ; RESP_P1=RESPONSA*PERS1
      ; ESP_P2=ESPECES*PERS2
      ; RESP_P2=RESPONSA*PERS2
      ; BIO_P3=BIODIVER*PERS3
      ; CHEM_P3=CHEMINS*PERS3
      ; ESP_P3=ESPECES*PERS3
      ; BIO_P4=BIODIVER*PERS4
      ; CHEM_P4=CHEMINS*PERS4 $

?*****CHILDREN*****
CREATE; R_ENF0=RESPONSA*ENF0
      ; B_ENF1=BIODIVER*ENF1 $

?*****EDUCATION*****

```



```
CREATE; RES_ND=RESPONSA*NODIP
; BIO_BAC=BIODIVER*BAC
; ESP_BAC=ESPECES*BAC $
```

```
?*****EMPLOYMENT*****
```

```
CREATE; RES_EMP=RESPONSA*EMPL
; RES_FOY=RESPONSA*FOYE
; BIO_INT=BIODIVER*INTER
; ORI_INT=ORIGINE*INTER $
```

```
?*****INCOME*****
```

```
CREATE; ESP_NVP=ESPECES*NVPR
; ORI_NVP=ORIGINE*NVPR
; C_M600=CHEMINS*M600
; E_M900=ESPECES*M900
; E_M1200=ESPECES*M1200 $
```

```
?*****LIVING AREA*****
```

```
CREATE ; RES_GV=RESPONSA*GVILL
; ORI_GV=ORIGINE*GVILL $
```

```
?*****INTEGRATION OF ALL VARIABLES*****
```

```
NAMelist;
S_FINAL=CHEM_AGE,ESP_AGE,BIO_FEM,ORI_FEM,BIO_P1,ESP_P1,RESP_P1,ESP_P2,RESP_P2
,BIO_P3,CHEM_P3,ESP_P3,BIO_P4,CHEM_P4,
R_ENF0,B_ENF1,RES_ND,BIO_BAC,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,
ORI_NVP,C_M600,E_M900,E_M1200,RES_GV,ORI_GV $
```

```
NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL $
```

```
?*****INTEGRATION OF ALL VARIABLES_reduced1*****
```

```
NAMelist;
S_FINAL=CHEM_AGE,ESP_AGE,BIO_FEM,ORI_FEM,BIO_P1,ESP_P1,RESP_P1,RESP_P2,BIO_P3
,CHEM_P3,ESP_P3,BIO_P4,CHEM_P4,
R_ENF0,B_ENF1,RES_ND,BIO_BAC,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,
ORI_NVP,C_M600,E_M900,E_M1200,RES_GV,ORI_GV $
```

```
NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL $
```

```
?*****INTEGRATION OF ALL VARIABLES_reduced2*****
```

```
NAMelist;
S_FINAL=CHEM_AGE,ESP_AGE,BIO_FEM,ORI_FEM,BIO_P1,RESP_P1,RESP_P2,BIO_P3,CHEM_P
3,ESP_P3,BIO_P4,CHEM_P4,
```

R_ENF0,B_ENF1,RES_ND,BIO_BAC,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,
ORI_NVP,C_M600,E_M900,E_M1200,RES_GV,ORI_GV \$

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL \$

?*****INTEGRATION OF ALL VARIABLES_reduced3*****

NAMelist;
S_FINAL=CHEM_AGE,ESP_AGE,BIO_FEM,ORI_FEM,BIO_P1,RESP_P1,RESP_P2,CHEM_P3,ESP_P
3,BIO_P4,CHEM_P4,
R_ENF0,B_ENF1,RES_ND,BIO_BAC,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,
ORI_NVP,C_M600,E_M900,E_M1200,RES_GV,ORI_GV \$

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL \$

?*****INTEGRATION OF ALL VARIABLES_reduced4*****

NAMelist;
S_FINAL=CHEM_AGE,ESP_AGE,BIO_FEM,ORI_FEM,BIO_P1,RESP_P1,RESP_P2,CHEM_P3,BIO_P
4,CHEM_P4,
R_ENF0,B_ENF1,RES_ND,BIO_BAC,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,
ORI_NVP,C_M600,E_M900,E_M1200,RES_GV,ORI_GV \$

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL \$

?*****INTEGRATION OF ALL VARIABLES_reduced5*****

NAMelist;
S_FINAL=CHEM_AGE,ESP_AGE,BIO_FEM,ORI_FEM,BIO_P1,RESP_P1,RESP_P2,CHEM_P3,BIO_P
4,CHEM_P4,
R_ENF0,B_ENF1,RES_ND,BIO_BAC,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,
ORI_NVP,C_M600,E_M1200,RES_GV,ORI_GV \$

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL \$

?*****INTEGRATION OF ALL VARIABLES_reduced6*****

NAMelist;
S_FINAL=CHEM_AGE,ESP_AGE,BIO_FEM,ORI_FEM,BIO_P1,RESP_P2,CHEM_P3,BIO_P4,CHEM_P
4,
R_ENF0,B_ENF1,RES_ND,BIO_BAC,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,
ORI_NVP,C_M600,E_M1200,RES_GV,ORI_GV \$

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL \$

?*****INTEGRATION OF ALL VARIABLES_reduced7*****

```
NAMELIST;
S_FINAL=CHEM_AGE,ESP_AGE,ORI_FEM,BIO_P1,RESP_P2,CHEM_P3,BIO_P4,CHEM_P4,
R_ENF0,B_ENF1,RES_ND,BIO_BAC,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,
ORI_NVP,C_M600,E_M1200,RES_GV,ORI_GV $
```

```
NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL $
```

?*****INTEGRATION OF ALL VARIABLES_reduced8*****

```
NAMELIST;
S_FINAL=CHEM_AGE,ESP_AGE,ORI_FEM,BIO_P1,RESP_P2,CHEM_P3,BIO_P4,CHEM_P4,
R_ENF0,B_ENF1,RES_ND,BIO_BAC,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,
ORI_NVP,E_M1200,RES_GV,ORI_GV $
```

```
NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL $
```

?*****INTEGRATION OF ALL VARIABLES_reduced9*****

```
NAMELIST;
S_FINAL=CHEM_AGE,ESP_AGE,ORI_FEM,BIO_P1,RESP_P2,CHEM_P3,BIO_P4,CHEM_P4,
R_ENF0,B_ENF1,RES_ND,BIO_BAC,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,
ORI_NVP,E_M1200,RES_GV $
```

```
NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL $
```

?*****INTEGRATION OF ALL VARIABLES_reduced10*****

```
NAMELIST; S_FINAL=CHEM_AGE,ESP_AGE,ORI_FEM,BIO_P1,RESP_P2,CHEM_P3,CHEM_P4,
R_ENF0,B_ENF1,RES_ND,BIO_BAC,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,
ORI_NVP,E_M1200,RES_GV $
```

```
NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL $
```

?*****INTEGRATION OF ALL VARIABLES_reduced11*****

```
NAMELIST; S_FINAL=CHEM_AGE,ESP_AGE,ORI_FEM,BIO_P1,RESP_P2,CHEM_P3,CHEM_P4,
R_ENF0,B_ENF1,RES_ND,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,ORI_NVP,
E_M1200,RES_GV $
```

```
NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL $
```

?*****INTEGRATION OF ALL VARIABLES_reduced12*****

```
NAMELIST; S_FINAL=CHEM_AGE,ESP_AGE,ORI_FEM,BIO_P1,RESP_P2,CHEM_P3,CHEM_P4,
R_ENF0,B_ENF1,RES_ND,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,ORI_NVP,
E_M1200,RES_GV $
```

```
NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL $
```

?*****INTEGRATION OF ALL VARIABLES_reduced13*****

```
NAMELIST; S_FINAL=CHEM_AGE,ESP_AGE,ORI_FEM,BIO_P1,RESP_P2,CHEM_P4,
R_ENF0,B_ENF1,RES_ND,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,ORI_NVP,
E_M1200,RES_GV $
```

```
NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL $
```

?*****INTEGRATION OF ALL VARIABLES_reduced14*****

```
NAMELIST; S_FINAL=CHEM_AGE,ORI_FEM,BIO_P1,RESP_P2,CHEM_P4,
R_ENF0,B_ENF1,RES_ND,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,ORI_NVP,
E_M1200,RES_GV $
```

```
NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL $
```

?*****INTEGRATION OF ALL VARIABLES_reduced15*****

```
NAMELIST; S_FINAL=CHEM_AGE,ORI_FEM,BIO_P1,RESP_P2,CHEM_P4,
R_ENF0,B_ENF1,RES_ND,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,ORI_NVP,
RES_GV $
```

```
NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL $
```

?*****INTEGRATION OF ALL VARIABLES_reduced16*****

```
NAMELIST; S_FINAL=CHEM_AGE,ORI_FEM,RESP_P2,CHEM_P4,
R_ENF0,B_ENF1,RES_ND,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,ORI_NVP,
RES_GV $
```

```
NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL $
```

?*****INTEGRATION OF ALL VARIABLES_reduced17*****

```
NAMELIST; S_FINAL=CHEM_AGE,ORI_FEM,RESP_P2,CHEM_P4,
R_ENF0,RES_ND,ESP_BAC,RES_EMP,RES_FOY,BIO_INT,ORI_INT,ESP_NVP,ORI_NVP,RES_GV
$
```

```
NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,S_FINAL $
```

Command for general attitudes of consumers towards environmental preservation

```
CREATE; OPTION1=(CHOSET=1)
; OPTION2=(CHOSET=2)
; OPTION3=(CHOSET=3) $

?*****BEHAVE (MUI, EPSR, EPER) *****

CREATE; B_EPER=BIODIVER*EPER
; C_EPER=CHEMINS*EPER
; E_EPER=ESPECES*EPER
; R_EPER=RESPONSA*EPER
; O_EPER=ORIGINE*EPER $

CREATE; B_MUI=BIODIVER*MUI
; C_MUI=CHEMINS*MUI
; E_MUI=ESPECES*MUI
; R_MUI=RESPONSA*MUI
; O_MUI=ORIGINE*MUI $

CREATE; B_EPSR=BIODIVER*EPSR
; C_EPSR=CHEMINS*EPSR
; E_EPSR=ESPECES*EPSR
; R_EPSR=RESPONSA*EPSR
; O_EPSR=ORIGINE*EPSR $

NAMELIST;
BEHAVE=B_EPER,C_EPER,E_EPER,R_EPER,O_EPER,B_MUI,C_MUI,E_MUI,R_MUI,O_MUI,B_EPS
R,C_EPSR,E_EPSR,O_EPSR $

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,BEHAVE $

?****reduced*****

NAMELIST;
BEHAVE=B_EPER,C_EPER,E_EPER,R_EPER,O_EPER,C_MUI,E_MUI,O_MUI,B_EPSR,C_EPSR,E_E
PSR,O_EPSR $

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,BEHAVE $

?****reduced2*****

NAMELIST;
BEHAVE=B_EPER,C_EPER,E_EPER,R_EPER,O_EPER,E_MUI,O_MUI,C_EPSR,E_EPSR,O_EPSR $

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,BEHAVE $

?****reduced3*****

NAMELIST; BEHAVE=B_EPER,C_EPER,O_EPER,E_MUI,O_MUI,C_EPSR,E_EPSR,O_EPSR $
```

```

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
        ; CHOICES=OPTION1,OPTION2,OPTION3
        ; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,BEHAVE $

?*****reduced4*****

NAMELIST; BEHAVE=B_EPER,C_EPER,O_EPER,E_EPSR,E_MUI,O_MUI,O_EPSR $

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
        ; CHOICES=OPTION1,OPTION2,OPTION3
        ; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,BEHAVE $

?*****FSC*****

CREATE; B_FSC=BIODIVER*FSC_know
        ; C_FSC=CHEMINS*FSC_know
        ; E_FSC=ESPECES*FSC_know
        ; R_FSC=RESPONSA*FSC_know
        ; O_FSC=ORIGINE*FSC_know $

CREATE; B_FSCS=BIODIVER*FSC_see
        ; C_FSCS=CHEMINS*FSC_see
        ; E_FSCS=ESPECES*FSC_see
        ; R_FSCS=RESPONSA*FSC_see
        ; O_FSCS=ORIGINE*FSC_see $

NAMELIST;
FSC=B_FSC,C_FSC,E_FSC,R_FSC,O_FSC,B_FSCS,C_FSCS,E_FSCS,R_FSCS,O_FSCS $

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
        ; CHOICES=OPTION1,OPTION2,OPTION3
        ; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,FSC $

?*****PEFC*****

CREATE; BPK=BIODIVER*PEFC_k
        ; CPK=CHEMINS*PEFC_k
        ; EPK=ESPECES*PEFC_k
        ; RPK=RESPONSA*PEFC_k
        ; OPK=ORIGINE*PEFC_k $

CREATE; BPs=BIODIVER*PEFC_s
        ; CPs=CHEMINS*PEFC_s
        ; EPs=ESPECES*PEFC_s
        ; RPs=RESPONSA*PEFC_s
        ; OPs=ORIGINE*PEFC_s $

NAMELIST; PEFC=BPK,CPK,EPK,RPK,OPK,BPs,CPs,EPs,RPs,OPs $

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
        ; CHOICES=OPTION1,OPTION2,OPTION3
        ; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,PEFC $

?*****reduced1*****

NAMELIST; PEFC=BPK,CPK,EPK,RPK,BPs,CPs,EPs,RPs $

```

```
NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,PEFC $
```

?*****EDUCATION*****

```
CREATE; BIO_ND=BIODIVER*NODIP
; CHEM_ND=CHEMINS*NODIP
; ESP_ND=ESPECES*NODIP
; RES_ND=RESPONSA*NODIP
; ORI_ND=ORIGINE*NODIP $
```

```
CREATE; BIO_BAC=BIODIVER*BAC
; CHEM_BAC=CHEMINS*BAC
; ESP_BAC=ESPECES*BAC
; RES_BAC=RESPONSA*BAC
; ORI_BAC=ORIGINE*BAC $
```

```
CREATE; BIO_BAC2=BIODIVER*BAC2
; CHE_BAC2=CHEMINS*BAC2
; ESP_BAC2=ESPECES*BAC2
; RES_BAC2=RESPONSA*BAC2
; ORI_BAC2=ORIGINE*BAC2 $
```

```
CREATE; BIO_BAC3=BIODIVER*BAC3
; CHE_BAC3=CHEMINS*BAC3
; ESP_BAC3=ESPECES*BAC3
; RES_BAC3=RESPONSA*BAC3
; ORI_BAC3=ORIGINE*BAC3 $
```

```
CREATE; BIO_BAC5=BIODIVER*BAC5
; CHE_BAC5=CHEMINS*BAC5
; ESP_BAC5=ESPECES*BAC5
; RES_BAC5=RESPONSA*BAC5
; ORI_BAC5=ORIGINE*BAC5 $
```

```
NAMelist;
EDU=BIO_ND,CHEM_ND,ESP_ND,RES_ND,ORI_ND,BIO_BAC,CHEM_BAC,ESP_BAC,RES_BAC,ORI_
BAC,BIO_BAC2,CHE_BAC2,
ESP_BAC2,RES_BAC2,ORI_BAC2,BIO_BAC3,CHE_BAC3,ESP_BAC3,RES_BAC3,ORI_BAC3,
BIO_BAC5,CHE_BAC5,ESP_BAC5,RES_BAC5,ORI_BAC5 $
```

```
NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,EDU $
```

?*****EMPLOYMENT*****

```
CREATE; BIO_AGR=BIODIVER*AGRI
; CHE_AGR=CHEMINS*AGRI
; ESP_AGR=ESPECES*AGRI
; RES_AGR=RESPONSA*AGRI
; ORI_AGR=ORIGINE*AGRI $
```

```
CREATE; BIO_EMP=BIODIVER*EMPL
; CHE_EMP=CHEMINS*EMPL
```

```

; ESP_EMP=ESPECES*EMPL
; RES_EMP=RESPONSA*EMPL
; ORI_EMP=ORIGINE*EMPL $

CREATE; BIO_FOY=BIODIVER*FOYE
; CHE_FOY=CHEMINS*FOYE
; ESP_FOY=ESPECES*FOYE
; RES_FOY=RESPONSA*FOYE
; ORI_FOY=ORIGINE*FOYE $

CREATE; BIO_INT=BIODIVER*INTER
; CHE_INT=CHEMINS*INTER
; ESP_INT=ESPECES*INTER
; RES_INT=RESPONSA*INTER
; ORI_INT=ORIGINE*INTER$

CREATE; BIO_CAD=BIODIVER*CADRE
; CHE_CAD=CHEMINS*CADRE
; ESP_CAD=ESPECES*CADRE
; RES_CAD=RESPONSA*CADRE
; ORI_CAD=ORIGINE*CADRE $

CREATE; BIO_PAT=BIODIVER*PATR
; CHE_PAT=CHEMINS*PATR
; ESP_PAT=ESPECES*PATR
; RES_PAT=RESPONSA*PATR
; ORI_PAT=ORIGINE*PATR $

CREATE; BIO_ETU=BIODIVER*ETUD
; CHE_ETU=CHEMINS*ETUD
; ESP_ETU=ESPECES*ETUD
; RES_ETU=RESPONSA*ETUD
; ORI_ETU=ORIGINE*ETUD $

CREATE; BIO_OU=BIODIVER*OUVR
; CHE_OU=CHEMINS*OUVR
; ESP_OU=ESPECES*OUVR
; RES_OU=RESPONSA*OUVR
; ORI_OU=ORIGINE*OUVR $

NAMELIST;
KERJA=BIO_EMP,CHE_EMP,ESP_EMP,RES_EMP,ORI_EMP,BIO_FOY,CHE_FOY,ESP_FOY,RES_FOY
,ORI_FOY,

BIO_INT,CHE_INT,ESP_INT,RES_INT,ORI_INT,BIO_CAD,CHE_CAD,ESP_CAD,RES_CAD,ORI_C
AD,BIO_PAT,CHE_PAT,ESP_PAT,RES_PAT,ORI_PAT,

BIO_ETU,CHE_ETU,ESP_ETU,RES_ETU,ORI_ETU,BIO_OU,CHE_OU,ESP_OU,RES_OU,ORI_OU,BI
O_AGR,CHE_AGR,ESP_AGR,RES_AGR,ORI_AGR $

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,KERJA $

```


?*****INCOME*****

```
CREATE; BIO_NVP=BIODIVER*NVPR
; CHE_NVP=CHEMINS*NVPR
; ESP_NVP=ESPECES*NVPR
; RES_NVP=RESPONSA*NVPR
; ORI_NVP=ORIGINE*NVPR $
```

```
CREATE; B_M900=BIODIVER*M900
; C_M900=CHEMINS*M900
; E_M900=ESPECES*M900
; R_M900=RESPONSA*M900
; O_M900=ORIGINE*M900 $
```

```
CREATE; B_M1200=BIODIVER*M1200
; C_M1200=CHEMINS*M1200
; E_M1200=ESPECES*M1200
; R_M1200=RESPONSA*M1200
; O_M1200=ORIGINE*M1200 $
```

```
CREATE; B_M1500=BIODIVER*M1500
; C_M1500=CHEMINS*M1500
; E_M1500=ESPECES*M1500
; R_M1500=RESPONSA*M1500
; O_M1500=ORIGINE*M1500 $
```

```
CREATE; B_M2300=BIODIVER*M2300
; C_M2300=CHEMINS*M2300
; E_M2300=ESPECES*M2300
; R_M2300=RESPONSA*M2300
; O_M2300=ORIGINE*M2300 $
```

```
CREATE; B_M3000=BIODIVER*M3000
; C_M3000=CHEMINS*M3000
; E_M3000=ESPECES*M3000
; R_M3000=RESPONSA*M3000
; O_M3000=ORIGINE*M3000 $
```

NAMELIST; GAJI

```
=BIO_NVP,CHE_NVP,ESP_NVP,RES_NVP,ORI_NVP,B_M900,C_M900,E_M900,R_M900,O_M900,
B_M1200,C_M1200,E_M1200,R_M1200,O_M1200,B_M1500,C_M1500,E_M1500,R_M1500,O_M15
00,B_M2300,C_M2300,E_M2300,R_M2300,O_M2300,
B_M3000,C_M3000,E_M3000,R_M3000,O_M3000$
```

```
NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,GAJI $
```

?*****LIVING AREA*****

```
CREATE ; BIO_GV=BIODIVER*GVILL
; CHEM_GV=CHEMINS*GVILL
; ESP_GV=ESPECES*GVILL
; RE_GV=RESPONSA*GVILL
```

```

; ORI_GV=ORIGINE*GVILL$

CREATE ; BIO_PV=BIODIVER*PVILL
; CHEM_PV=CHEMINS*PVILL
; ESP_PV=ESPECES*PVILL
; RE_PV=RESPONSA*PVILL
; ORI_PV=ORIGINE*PVILL$

NAMELIST;
LIV=BIO_GV,CHEM_GV,ESP_GV,RE_GV,ORI_GV,BIO_PV,CHEM_PV,ESP_PV,RE_PV,ORI_PV $

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,LIV $

```

Command for semi final analysis

```

?*****SEMIFINAL*****

NAMELIST;
SEMFIN=B_EPER,C_EPER,E_MUI,O_MUI,O_EPSR,E_FSCK,R_FSCK,E_FSCS,R_FSCS,CPK,EPK,C
PS,EPS,RES_ND,
RES_FOY,BIO_NVP,ESP_NVP, B_M1200,BIO_GV,CHEM_GV,ESP_GV, RE_GV,ORI_GV, ESP_PV$

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,SEMFIN $

```

```

?*****SEMIFINAL1*****

NAMELIST;
SEMFIN=B_EPER,C_EPER,E_MUI,O_MUI,O_EPSR,E_EPSR,E_FSCK,R_FSCK,E_FSCS,R_FSCS,CP
K,EPK,CPS,EPS,RES_ND,
RES_FOY,BIO_NVP,ESP_NVP,BIO_GV,CHEM_GV,ESP_GV, RE_GV,ORI_GV,ESP_PV$

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,SEMFIN $

```

```

?*****SEMIFINAL2*****

NAMELIST;
SEMFIN=B_EPER,C_EPER,E_MUI,O_MUI,O_EPSR,E_EPSR,E_FSCK,R_FSCK,E_FSCS,R_FSCS,CP
K,EPK,CPS,EPS,RES_ND,
RES_FOY,BIO_NVP,ESP_NVP,BIO_GV,RE_GV,ORI_GV,ESP_PV$

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,SEMFIN $

```

?*****SEMIFINAL3*****

NAMELIST;

SEMFIN=B_EPER,C_EPER,E_MUI,O_MUI,E_EPSR,E_FSCK,R_FSCK,E_FSCS,R_FSCS,CPK,EPK,CPS, EPS,RES_ND,RES_FOY,BIO_NVP,ESP_NVP,BIO_GV,RE_GV,ESP_PV\$

NLOGIT; LHS=RESPCHOI,CSET,CHOSET

; CHOICES=OPTION1,OPTION2,OPTION3

; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,SEMFIN \$

?*****SEMIFINAL4*****

NAMELIST;

SEMFIN=B_EPER,C_EPER,E_MUI,O_MUI,E_EPSR,R_FSCK,E_FSCS,R_FSCS,CPK,EPK,CPS, EPS,RES_ND,RES_FOY,BIO_NVP,ESP_NVP,BIO_GV,ESP_PV\$

NLOGIT; LHS=RESPCHOI,CSET,CHOSET

; CHOICES=OPTION1,OPTION2,OPTION3

; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,SEMFIN \$

?*****SEMIFINAL4*****

NAMELIST;

SEMFIN=B_EPER,C_EPER,E_MUI,R_FSCK,E_FSCS,R_FSCS,CPK,EPK,CPS, EPS,RES_ND,RES_FOY,BIO_NVP,ESP_NVP,BIO_GV,ESP_PV\$

NLOGIT; LHS=RESPCHOI,CSET,CHOSET

; CHOICES=OPTION1,OPTION2,OPTION3

; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,SEMFIN \$

?*****SEMIFINAL4*****

NAMELIST; SEMFIN=B_EPER,C_EPER,E_MUI,R_FSCK,E_FSCS,R_FSCS,CPK,EPK,CPS,RES_ND,RES_FOY,ESP_NVP,BIO_GV,ESP_PV\$

NLOGIT; LHS=RESPCHOI,CSET,CHOSET

; CHOICES=OPTION1,OPTION2,OPTION3

; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,SEMFIN \$

?*****SEMIFINAL5*****

NAMELIST; SEMFIN=B_EPER,E_MUI,R_FSCK,E_FSCS,R_FSCS,CPK,EPK,CPS,RES_ND,RES_FOY,ESP_NVP,BIO_GV,ESP_PV\$

NLOGIT; LHS=RESPCHOI,CSET,CHOSET

; CHOICES=OPTION1,OPTION2,OPTION3

; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,SEMFIN \$

?*****FINAL*****

NAMELIST; FIN=B_EPER,E_MUI,R_FSCK,E_FSCS,R_FSCS,CPK,EPK,CPS,RES_ND,
RES_FOY,ESP_NVP,BIO_GV,ESP_PV\$

NLOGIT; LHS=RESPCHOI,CSET,CHOSET
; CHOICES=OPTION1,OPTION2,OPTION3
; RHS=BIODIVER,CHEMINS,ESPECES,RESPONSA,ORIGINE,PRICE,FIN \$

WALD ;
LABELS=MVBIO,MVCHEM,MVES,MVRESP,MVORI,MVPRICE,MVBEPR,MVEMUI,MVRFSC,MVCFSCS,M
VRFSCS,MVCPK,MVEPK,MVCPS,MVRND,MVRFOY,MVENVP,MVBGV,MVEPV
; START=B
; VAR=VARB
; FN1=-MVBIO/MVPRICE
; FN2=-MVCHEM/MVPRICE
; FN3=-MVES/MVPRICE
; FN4=-MVRESP/MVPRICE
; FN5=-MVORI/MVPRICE
; FN6=-MVBEPR/MVPRICE
; FN7=-MVEMUI/MVPRICE
; FN8=-MVRFSC/MVPRICE
; FN9=-MVCFSCS/MVPRICE
; FN10=-MVRFSCS/MVPRICE
; FN11=-MVCPK/MVPRICE
; FN12=-MVEPK/MVPRICE
; FN13=-MVCPS/MVPRICE
; FN14=-MVRND/MVPRICE
; FN15=-MVRFOY/MVPRICE
; FN16=-MVENVP/MVPRICE
; FN17=-MVBGV/MVPRICE
; FN18=-MVEPV/MVPRICE \$

Results

```

+-----+
| Discrete choice (multinomial logit) model |
| Maximum Likelihood Estimates              |
| Dependent variable                       Choice |
| Weighting variable                       ONE   |
| Number of observations                    2568  |
| Iterations completed                     6     |
| Log likelihood function                  -2433.556 |
| Log-L for Choice model =                 -2433.5563 |
| R2=1-LogL/LogL* Log-L fncn R-sqrd RsqAdj |
| No coefficients -2821.2364 .13741 .13404 |
| Constants only. Must be computed directly. |
| Use NLOGIT ;...; RHS=ONE $ |
| Response data are given as ind. choice. |
| Number of obs.= 2568, skipped 0 bad obs. |
+-----+

```

```

+-----+-----+-----+-----+-----+
|Variable | Coefficient | Standard Error |b/St.Er.|P[|Z|>z] | Mean of X|
+-----+-----+-----+-----+-----+

```

BIODIVER	.9078295941	.23056752	3.937	.0001
CHEMINS	.5397556374	.23185149	2.328	.0199
ESPECES	1.077843993	.23112112	4.664	.0000
RESPONSA	1.197435042	.19214536	6.232	.0000
ORIGINE	.8297810964	.22919860	3.620	.0003
PRICE	-.1166524446	.55053800E-02	-21.189	.0000
B_EPER	-.9243591919E-01	.44114940E-01	-2.095	.0361
C_EPER	.7268723152E-01	.44507642E-01	1.633	.1024
E_EPER	-.2553093504E-01	.44186128E-01	-.578	.5634
R_EPER	.1714417580E-01	.41888180E-01	.409	.6823
O_EPER	-.6235984397E-01	.43818657E-01	-1.423	.1547
B_MUI	.3054235955E-02	.47355849E-01	.064	.9486
C_MUI	-.5465940900E-02	.47089332E-01	-.116	.9076
E_MUI	-.8099282746E-01	.47548556E-01	-1.703	.0885
R_MUI	-.2909693517E-02	.44570827E-01	-.065	.9479
O_MUI	.7482657273E-01	.46568916E-01	1.607	.1081
B_EPSR	.8239048126E-02	.46499976E-01	.177	.8594
C_EPSR	-.5178061825E-01	.46206023E-01	-1.121	.2624
E_EPSR	-.5886470832E-01	.46367000E-01	-1.270	.2042
O_EPSR	.6160614916E-01	.46201079E-01	1.333	.1824

Reduced1

```

+-----+
| Discrete choice (multinomial logit) model |
| Maximum Likelihood Estimates |
| Dependent variable           Choice |
| Weighting variable           ONE |
| Number of observations       2568 |
| Iterations completed         6 |
| Log likelihood function      -2433.560 |
| Log-L for Choice model =    -2433.5598 |
| R2=1-LogL/LogL* Log-L fncn R-sqrd RsqAdj |
| No coefficients -2821.2364 .13741 .13438 |
| Constants only. Must be computed directly. |
| Use NLOGIT ;...; RHS=ONE $ |
| Response data are given as ind. choice. |
| Number of obs.= 2568, skipped 0 bad obs. |
+-----+

```

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
BIODIVER	.9127232294	.21849108	4.177	.0000	
CHEMINS	.5402273859	.23091747	2.339	.0193	
ESPECES	1.078368820	.23017543	4.685	.0000	
RESPONSA	1.191960810	.17272913	6.901	.0000	
ORIGINE	.8298272659	.22797265	3.640	.0003	
PRICE	-.1166533059	.55053085E-02	-21.189	.0000	
B_EPER	-.9195523216E-01	.43495823E-01	-2.114	.0345	
C_EPER	.7272457718E-01	.44456342E-01	1.636	.1019	
E_EPER	-.2548628849E-01	.44138590E-01	-.577	.5637	
R_EPER	.1665210851E-01	.41204600E-01	.404	.6861	
O_EPER	-.6236355722E-01	.43763971E-01	-1.425	.1542	
C_MUI	-.5626718853E-02	.45370916E-01	-.124	.9013	
E_MUI	-.8121351983E-01	.45951646E-01	-1.767	.0772	
O_MUI	.7493135551E-01	.44427222E-01	1.687	.0917	
B_EPSR	.8551878459E-02	.46125296E-01	.185	.8529	

```

C_EPSR  -.5183702553E-01  .46190978E-01  -1.122  .2618
E_EPSR  -.5891495307E-01  .46353160E-01  -1.271  .2037
O_EPSR  .6152385211E-01  .46176019E-01   1.332  .1827

```

Reduced2

```

+-----+
| Discrete choice (multinomial logit) model |
| Maximum Likelihood Estimates              |
| Dependent variable                       Choice |
| Weighting variable                       ONE   |
| Number of observations                    2568  |
| Iterations completed                     6     |
| Log likelihood function                  -2433.585 |
| Log-L for Choice model =                 -2433.5848 |
| R2=1-LogL/LogL* Log-L fncn R-sqrd RsqAdj |
| No coefficients -2821.2364 .13740 .13471 |
| Constants only. Must be computed directly. |
| Use NLOGIT ;...; RHS=ONE $              |
| Response data are given as ind. choice.   |
| Number of obs.= 2568, skipped 0 bad obs. |
+-----+

```

```

+-----+-----+-----+-----+-----+-----+
|Variable | Coefficient | Standard Error |b/St.Er.|P[|Z|>z] | Mean of X|
+-----+-----+-----+-----+-----+-----+
BIODIVER .9360163449   .17834073      5.248   .0000
CHEMINS  .5275834983   .21891028      2.410   .0160
ESPECES  1.076422130   .22879226      4.705   .0000
RESPONSA 1.191957497   .17272276      6.901   .0000
ORIGINE  .8265598448   .22464931      3.679   .0002
PRICE    -.1166508436   .55051805E-02 -21.189 .0000
B_EPER   -.9086122571E-01 .43086653E-01 -2.109  .0350
C_EPER   .7166598775E-01 .43912454E-01  1.632  .1027
E_EPER   -.2545703816E-01 .44099940E-01 -.577  .5638
R_EPER   .1665275008E-01 .41202863E-01  .404   .6861
O_EPER   -.6235950019E-01 .43689481E-01 -1.427  .1535
E_MUI    -.8244889217E-01 .44889286E-01 -1.837  .0663
O_MUI    .7318604483E-01 .42154181E-01  1.736  .0825
C_EPSR   -.5106657340E-01 .45113580E-01 -1.132  .2577
E_EPSR   -.5734804678E-01 .45709209E-01 -1.255  .2096
O_EPSR   .6389721707E-01 .44657180E-01  1.431  .1525

```

Reduced3

```

+-----+
| Discrete choice (multinomial logit) model |
| Maximum Likelihood Estimates              |
| Dependent variable                       Choice |
| Weighting variable                       ONE   |
| Number of observations                    2568  |
| Iterations completed                     6     |
| Log likelihood function                  -2433.796 |
| Log-L for Choice model =                 -2433.7959 |
| R2=1-LogL/LogL* Log-L fncn R-sqrd RsqAdj |
| No coefficients -2821.2364 .13733 .13497 |
| Constants only. Must be computed directly. |
| Use NLOGIT ;...; RHS=ONE $              |
| Response data are given as ind. choice.   |
+-----+

```

| Number of obs.= 2568, skipped 0 bad obs. |

```

+-----+
|Variable | Coefficient | Standard Error |b/St.Er.|P[|Z|>z] | Mean of X|
+-----+
BIODIVER .9380163832 .17319415 5.416 .0000
CHEMINS .5251979654 .21564729 2.435 .0149
ESPECES .9953898952 .18325402 5.432 .0000
RESPONSA 1.256193521 .67813302E-01 18.524 .0000
ORIGINE .8314798303 .22087348 3.765 .0002
PRICE -.1166369355 .55042593E-02 -21.190 .0000
B_EPER -.9125074059E-01 .41664010E-01 -2.190 .0285
C_EPER .7156141461E-01 .42606955E-01 1.680 .0930
O_EPER -.6516316385E-01 .41648913E-01 -1.565 .1177
E_MUI -.8602691037E-01 .44336349E-01 -1.940 .0523
O_MUI .7459216553E-01 .42067362E-01 1.773 .0762
C_EPSR -.5037739986E-01 .45078631E-01 -1.118 .2638
E_EPSR -.5994230136E-01 .45412610E-01 -1.320 .1869
O_EPSR .6464454658E-01 .44636464E-01 1.448 .1475

```

* B_EPER,C_EPER,E_MUI,O_MUI,O_EPSR,E_EPSR

FSC

```

+-----+
| Discrete choice (multinomial logit) model |
| Maximum Likelihood Estimates |
| Dependent variable Choice |
| Weighting variable ONE |
| Number of observations 2528 |
| Iterations completed 6 |
| Log likelihood function -2396.029 |
| Log-L for Choice model = -2396.0291 |
| R2=1-LogL/LogL* Log-L fncn R-sqrd RsqAdj |
| No coefficients -2777.2919 .13728 .13454 |
| Constants only. Must be computed directly. |
| Use NLOGIT ;...; RHS=ONE $ |
| Response data are given as ind. choice. |
| Number of obs.= 2568, skipped 40 bad obs. |
+-----+

```

```

+-----+
|Variable | Coefficient | Standard Error |b/St.Er.|P[|Z|>z] | Mean of X|
+-----+
BIODIVER .6222021190 .76230580E-01 8.162 .0000
CHEMINS .6274384949 .76240908E-01 8.230 .0000
ESPECES .6169693645 .76220460E-01 8.095 .0000
RESPONSA 1.190818751 .78557469E-01 15.159 .0000
ORIGINE .9574637611 .77284005E-01 12.389 .0000
PRICE -.1172390235 .55420902E-02 -21.154 .0000
B_FSCK -.6534979577E-01 .18214858 -.359 .7198
C_FSCK -.2350121113 .17990423 -1.306 .1914
E_FSCK .4051624179 .18366262 2.206 .0274
R_FSCK -.4434335523 .17082196 -2.596 .0094
O_FSCK .2308437459 .17916689 1.288 .1976
B_FSCS -.6622771411E-01 .15360281 -.431 .6664
C_FSCS .1453083237 .15130526 .960 .3369
E_FSCS -.3252221217 .15705154 -2.071 .0384

```

```

R_FSCS      .4322592207      .14381713      3.006      .0027
O_FSCS      -.1118830249      .15267970      -.733      .4637

```

* E_FSCK,R_FSK,E_FSCS,R_FSCS

PEFC

```

+-----+
| Discrete choice (multinomial logit) model |
| Maximum Likelihood Estimates              |
| Dependent variable                        Choice |
| Weighting variable                        ONE   |
| Number of observations                    2551  |
| Iterations completed                      6     |
| Log likelihood function                   -2422.889 |
| Log-L for Choice model =                 -2422.8894 |
| R2=1-LogL/LogL* Log-L fncn R-sqrd RsqAdj |
| No coefficients -2802.5599 .13547 .13275 |
| Constants only. Must be computed directly. |
| Use NLOGIT ;...; RHS=ONE $              |
| Response data are given as ind. choice.   |
| Number of obs.= 2568, skipped 17 bad obs. |
+-----+

```

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
BIODIVER	.6085017764	.77865345E-01	7.815	.0000	
CHEMINS	.6532414467	.77923430E-01	8.383	.0000	
ESPECES	.6202947977	.77878236E-01	7.965	.0000	
RESPONSA	1.185993331	.79778808E-01	14.866	.0000	
ORIGINE	.9977125984	.78909447E-01	12.644	.0000	
PRICE	-.1153703282	.55054638E-02	-20.956	.0000	
BPK	-.4872432407	.48016571	-1.015	.3102	
CPK	-.6547377930	.46913637	-1.396	.1628	
EPK	-.7223629668	.47122253	-1.533	.1253	
RPK	-.2926621113	.44183714	-.662	.5077	
OPK	.1333214369	.49598484	.269	.7881	
BPS	.4187051799	.47855920	.875	.3816	
CPS	.6013248608	.46746909	1.286	.1983	
EPS	.6192710811	.46947084	1.319	.1871	
RPS	.4407966296	.44034830	1.001	.3168	
OPS	-.1913000359	.49465898	-.387	.6990	

* CPK,EPK,CPS,EPS

```

+-----+
| Discrete choice (multinomial logit) model |
| Maximum Likelihood Estimates              |
| Dependent variable                        Choice |
| Weighting variable                        ONE   |
| Number of observations                    2568  |
| Iterations completed                      6     |
| Log likelihood function                   -2415.553 |
| Log-L for Choice model =                 -2415.5535 |
+-----+

```



```

| R2=1-LogL/LogL*  Log-L fncn  R-sqrd  RsqAdj |
| No coefficients  -2821.2364  .14380  .13860 |
| Constants only.  Must be computed directly. |
|               Use NLOGIT ;...; RHS=ONE $ |
| Response data are given as ind. choice.     |
| Number of obs.= 2568, skipped  0 bad obs.  |
+-----+

```

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
BIODIVER	.4007362034	.11814586	3.392	.0007	
CHEMINS	.7951286435	.11644540	6.828	.0000	
ESPECES	.2891401104	.11889055	2.432	.0150	
RESPONSA	1.374416408	.11642494	11.805	.0000	
ORIGINE	1.075053616	.11690816	9.196	.0000	
PRICE	-.1179143799	.55556274E-02	-21.224	.0000	
BIO_ND	-.3421457264E-01	.32266721	-.106	.9156	
CHEM_ND	-.1338928896E-01	.31240348	-.043	.9658	
ESP_ND	-.2568648676E-01	.32580631	-.079	.9372	
RES_ND	-.6957450603	.31311230	-2.222	.0263	
ORI_ND	.1081555592	.30724714	.352	.7248	
BIO_BAC	.3000106823	.16552416	1.812	.0699	
CHEM_BAC	-.2287611761	.16390787	-1.396	.1628	
ESP_BAC	.1129417057	.16874207	.669	.5033	
RES_BAC	-.1206347430	.15670722	-.770	.4414	
ORI_BAC	-.8661330252E-01	.16156694	-.536	.5919	
BIO_BAC2	.2334628209	.15121313	1.544	.1226	
CHE_BAC2	-.1920714586	.14853927	-1.293	.1960	
ESP_BAC2	.6343103169	.15070141	4.209	.0000	
RES_BAC2	.3146881598E-01	.14095333	.223	.8233	
ORI_BAC2	-.1806206170	.14812436	-1.219	.2227	
BIO_BAC3	.2665571788	.18192099	1.465	.1429	
CHE_BAC3	-.3643627115E-01	.17856352	-.204	.8383	
ESP_BAC3	.4466669492	.18216640	2.452	.0142	
RES_BAC3	-.4559860701	.17476885	-2.609	.0091	
ORI_BAC3	-.1841161715	.17897093	-1.029	.3036	
BIO_BAC5	.2630406691	.20732518	1.269	.2045	
CHE_BAC5	-.3707013723	.20867497	-1.776	.0757	
ESP_BAC5	.2708459872	.20940323	1.293	.1959	
RES_BAC5	-.4344160169E-01	.19593956	-.222	.8245	
ORI_BAC5	.8605996980E-01	.20161225	.427	.6695	

* RES_ND,BIO_BAC,ESP_BAC2,ESP_BAC3,RES_BAC3,CHE_BAC5

```

+-----+
| Discrete choice (multinomial logit) model |
| Maximum Likelihood Estimates              |
| Dependent variable                        Choice |
| Weighting variable                        ONE   |
| Number of observations                     2568  |
| Iterations completed                      6     |
| Log likelihood function                    -2400.610 |
| Log-L for Choice model =                  -2400.6103 |
| R2=1-LogL/LogL*  Log-L fncn  R-sqrd  RsqAdj |
| No coefficients  -2821.2364  .14909  .14140 |
| Constants only.  Must be computed directly. |
|               Use NLOGIT ;...; RHS=ONE $ |
+-----+

```

| Response data are given as ind. choice. |
 | Number of obs.= 2568, skipped 0 bad obs. |

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
BIODIVER	.5918799455	.12085233	4.898	.0000	
CHEMINS	.5298604176	.12113873	4.374	.0000	
ESPECES	.4990079801	.12129652	4.114	.0000	
RESPONSA	1.142151086	.12005747	9.513	.0000	
ORIGINE	.8921676290	.12080486	7.385	.0000	
PRICE	-.1185287402	.55755941E-02	-21.258	.0000	
BIO_EMP	-.1034305918	.14976501	-.691	.4898	
CHE_EMP	.2306555315	.14881860	1.550	.1212	
ESP_EMP	-.3997916890E-01	.15065897	-.265	.7907	
RES_EMP	.2275764579	.14254350	1.597	.1104	
ORI_EMP	.4422940699E-01	.14740271	.300	.7641	
BIO_FOY	.1680673199	.21018920	.800	.4239	
CHE_FOY	-.4789183423E-01	.21462666	-.223	.8234	
ESP_FOY	.1899316829	.21168937	.897	.3696	
RES_FOY	.2952305954	.20042479	1.473	.1407	
ORI_FOY	.1429672906E-01	.21130338	.068	.9461	
BIO_INT	.1622843886	.18325131	.886	.3758	
CHE_INT	.2024040624	.18391980	1.101	.2711	
ESP_INT	.4990159635	.18127935	2.753	.0059	
RES_INT	.9004277261E-02	.17626105	.051	.9593	
ORI_INT	.1517007812	.18312018	.828	.4074	
BIO_CAD	-.5689986771E-01	.18923435	-.301	.7637	
CHE_CAD	-.6984486055E-01	.19047197	-.367	.7138	
ESP_CAD	.3597209773E-01	.18979521	.190	.8497	
RES_CAD	.2918650970	.17884492	1.632	.1027	
ORI_CAD	.4215384117	.18338291	2.299	.0215	
BIO_PAT	.1182490012	.30094101	.393	.6944	
CHE_PAT	.2686328040	.29932627	.897	.3695	
ESP_PAT	.2994852416	.29946327	1.000	.3173	
RES_PAT	-.7914267653E-01	.29266963	-.270	.7868	
ORI_PAT	-.5147606862	.31311660	-1.644	.1002	
BIO_ETU	-.2838620922	.42706517	-.665	.5063	
CHE_ETU	.5080686334	.40348078	1.259	.2080	
ESP_ETU	.3587290490	.40846149	.878	.3798	
RES_ETU	-.6539412103	.41918560	-1.560	.1188	
ORI_ETU	.4793791920	.39858096	1.203	.2291	
BIO_OU	.1705092142	.39132405	.436	.6630	
CHE_OU	.3920043189	.38635534	1.015	.3103	
ESP_OU	-.2991101555	.41560149	-.720	.4717	
RES_OU	.8673826024	.36042513	2.407	.0161	
ORI_OU	.4951461019	.39557782	1.252	.2107	
BIO_AGR	.7314815538	.76531305	.956	.3392	
CHE_AGR	.7935010817	.76542317	1.037	.2999	
ESP_AGR	.8243535193	.76548059	1.077	.2815	
RES_AGR	-2.676427878	.99756913	-2.683	.0073	
ORI_AGR	1.862665104	.83278675	2.237	.0253	

* RES_FOY,ESP_INT,ORI_CAD,RES_OU,RES_AGR,ORI_AGR

| Discrete choice (multinomial logit) model |
 | Maximum Likelihood Estimates |

```

| Dependent variable           Choice |
| Weighting variable          ONE    |
| Number of observations       2568  |
| Iterations completed         6     |
| Log likelihood function      -2407.258 |
| Log-L for Choice model =    -2407.2575 |
| R2=1-LogL/LogL* Log-L fncn R-sqrd RsqAdj |
| No coefficients -2821.2364 .14674 .14071 |
| Constants only. Must be computed directly. |
|                               Use NLOGIT ;...; RHS=ONE $ |
| Response data are given as ind. choice. |
| Number of obs.= 2568, skipped 0 bad obs. |
+-----+

```

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
BIODIVER	.6238827704	.10515585	5.933	.0000	
CHEMINS	.6457514772	.10506865	6.146	.0000	
ESPECES	.8004065838	.10456909	7.654	.0000	
RESPONSA	1.170136767	.10418134	11.232	.0000	
ORIGINE	1.120374938	.10526453	10.643	.0000	
PRICE	-.1190345235	.55831711E-02	-21.320	.0000	
BIO_NVP	-.5215054820	.22061192	-2.364	.0181	
CHE_NVP	.1418586551E-01	.21250576	.067	.9468	
ESP_NVP	-.9003496902	.22381003	-4.023	.0001	
RES_NVP	.1709585811	.20442100	.836	.4030	
ORI_NVP	.2962563166	.20524963	1.443	.1489	
B_M900	-.5611171407E-01	.41265160	-.136	.8918	
C_M900	-.2574108261	.41937561	-.614	.5394	
E_M900	-.2326355275	.41227284	-.564	.5726	
R_M900	.2719536218	.38730620	.702	.4826	
O_M900	.1519870659	.39780451	.382	.7024	
B_M1200	.5852997725	.21774224	2.688	.0072	
C_M1200	.1328349138E-01	.22454461	.059	.9528	
E_M1200	-.4070138718	.22892787	-1.778	.0754	
R_M1200	-.4972200707E-01	.21629385	-.230	.8182	
O_M1200	-.5459824220	.22889512	-2.385	.0171	
B_M1500	.3794521312E-01	.21663849	.175	.8610	
C_M1500	-.1147924061	.21847698	-.525	.5993	
E_M1500	-.4832276756	.22150391	-2.182	.0291	
R_M1500	-.4051543822E-01	.20878281	-.194	.8461	
O_M1500	.1254726864	.21046722	.596	.5511	
B_M2300	-.8199819950E-02	.14948968	-.055	.9563	
C_M2300	.1484687726	.14799173	1.003	.3158	
E_M2300	-.6186333969E-02	.14697086	-.042	.9664	
R_M2300	.2025844878E-01	.14247427	.142	.8869	
O_M2300	-.4174486388	.14957578	-2.791	.0053	
B_M3000	-.1160331639	.15351652	-.756	.4497	
C_M3000	-.6278868898E-01	.15273196	-.411	.6810	
E_M3000	-.2626811340	.15222781	-1.726	.0844	
R_M3000	.4167793231	.14391721	2.896	.0038	
O_M3000	-.1279784123	.15050922	-.850	.3952	

*BIO_NVP, ESP_NVP, B_M1200

```

+-----+
| Discrete choice (multinomial logit) model |
| Maximum Likelihood Estimates              |
+-----+

```

```

| Dependent variable           Choice |
| Weighting variable           ONE   |
| Number of observations       2568  |
| Iterations completed         6     |
| Log likelihood function      -2434.960 |
| Log-L for Choice model =    -2434.9596 |
| R2=1-LogL/LogL* Log-L fncn R-sqrd RsqAdj |
| No coefficients -2821.2364 .13692 .13422 |
| Constants only. Must be computed directly. |
|                               Use NLOGIT ;...; RHS=ONE $ |
| Response data are given as ind. choice. |
| Number of obs.= 2568, skipped 0 bad obs. |
+-----+

```

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
BIODIVER	.5461312352	.84855596E-01	6.436	.0000	
CHEMINS	.6951340103	.84808009E-01	8.197	.0000	
ESPECES	.6541720839	.84804273E-01	7.714	.0000	
RESPONSA	1.229288682	.86022553E-01	14.290	.0000	
ORIGINE	1.024370152	.85651483E-01	11.960	.0000	
PRICE	-.1161322459	.54963763E-02	-21.129	.0000	
BIO_GV	.2098633538	.14201750	1.478	.1395	
CHEM_GV	-.9798637049E-01	.14293540	-.686	.4930	
ESP_GV	-.9869272092E-02	.14260625	-.069	.9448	
RE_GV	.1296726991	.13484071	.962	.3362	
ORI_GV	-.9696547188E-01	.14235184	-.681	.4958	
BIO_PV	-.1224507461E-01	.12209989	-.100	.9201	
CHEM_PV	-.1110468636	.12107070	-.917	.3590	
ESP_PV	-.2097555985	.12220761	-1.716	.0861	
RE_PV	-.7703241736E-02	.11583322	-.067	.9470	
ORI_PV	-.8982960004E-01	.11970576	-.750	.4530	

* BIO_GV, CHEM_GV, ESP_GV, RE_GV, ORI_GV, ESP_PV

Semifinal

```

+-----+
| Discrete choice (multinomial logit) model |
| Maximum Likelihood Estimates |
| Dependent variable           Choice |
| Weighting variable           ONE   |
| Number of observations       2512  |
| Iterations completed         6     |
| Log likelihood function      -2313.174 |
| Log-L for Choice model =    -2313.1740 |
| R2=1-LogL/LogL* Log-L fncn R-sqrd RsqAdj |
| No coefficients -2759.7141 .16181 .15508 |
| Constants only. Must be computed directly. |
|                               Use NLOGIT ;...; RHS=ONE $ |
| Response data are given as ind. choice. |
| Number of obs.= 2568, skipped 56 bad obs. |
+-----+

```

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
----------	-------------	----------------	----------	----------	-----------

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+-----+-----+-----+-----+-----+
BIODIVER .9762622281 .17937525 5.443 .0000
CHEMINS .4748058123 .18362656 2.586 .0097
ESPECES .8374557877 .15920072 5.260 .0000
RESPONSA 1.231050326 .91342207E-01 13.477 .0000
ORIGINE .7673440457 .17497430 4.385 .0000
PRICE -.1210822458 .57186388E-02 -21.173 .0000
B_EPER -.1094664946 .41344174E-01 -2.648 .0081
C_EPER .6239567340E-01 .42310766E-01 1.475 .1403
E_MUI -.9793228251E-01 .46832506E-01 -2.091 .0365
O_MUI .5043708092E-01 .43517882E-01 1.159 .2465
O_EPSR .1900706096E-01 .39841508E-01 .477 .6333
E_FSCK .3486633515 .18006188 1.936 .0528
R_FSCK -.4538357820 .15832393 -2.867 .0042
E_FSCS .4450323022 .28896669 1.540 .1235
R_FSCS .4532645075 .13710725 3.306 .0009
CPK -.9189206043 .44436552 -2.068 .0386
EPK -1.399065330 .50822216 -2.753 .0059
CPS .8093251798 .44131126 1.834 .0667
EPS .6594271722 .44521161 1.481 .1386
RES_ND -.5289792837 .25000878 -2.116 .0344
BIO_BAC .7376970977E-01 .11943557 .618 .5368
ESP_BAC2 .4692845702 .11500034 4.081 .0000
ESP_BAC3 .3637353056 .15456452 2.353 .0186
RES_BAC3 -.3740101149 .14103970 -2.652 .0080
CHE_BAC5 -.7654839710E-01 .17092591 -.448 .6543
RES_FOY .3023266498 .15336656 1.971 .0487
ESP_INT .4346445336 .14419126 3.014 .0026
ORI_CAD .3741589733 .13265819 2.820 .0048
RES_OU .9409525902 .29592170 3.180 .0015
RES_AGR -2.084731112 .99761523 -2.090 .0366
ORI_AGR 2.052294731 .78439820 2.616 .0089
BIO_NVP -.2300383630 .18111126 -1.270 .2040
ESP_NVP -.5794375387 .18736067 -3.093 .0020
B_M1200 .3489046973 .18121819 1.925 .0542
BIO_GV .1959600594 .13650464 1.436 .1511
CHEM_GV -.2208345994E-01 .14005365 -.158 .8747
ESP_GV -.6940291364E-01 .14650364 -.474 .6357
RE_GV .1937045789 .13130781 1.475 .1402
ORI_GV -.8645028613E-01 .13838274 -.625 .5322
ESP_PV -.3443252223 .11032657 -3.121 .0018

```

Semifinal1

```

+-----+-----+-----+-----+-----+
| Discrete choice (multinomial logit) model |
| Maximum Likelihood Estimates |
| Dependent variable Choice |
| Weighting variable ONE |
| Number of observations 2512 |
| Iterations completed 6 |
| Log likelihood function -2348.124 |
| Log-L for Choice model = -2348.1235 |
| R2=1-LogL/LogL* Log-L fncn R-sqrd RsqAdj |
| No coefficients -2759.7141 .14914 .14403 |
| Constants only. Must be computed directly. |

```

```

|                               Use NLOGIT ;...; RHS=ONE $ |
| Response data are given as ind. choice.                |
| Number of obs.= 2568, skipped 56 bad obs.             |
+-----+

```

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
BIODIVER	.9842431181	.17513699	5.620	.0000	
CHEMINS	.4599616516	.18089345	2.543	.0110	
ESPECES	1.209529813	.19927454	6.070	.0000	
RESPONSA	1.174151726	.86642058E-01	13.552	.0000	
ORIGINE	.7367085500	.17890025	4.118	.0000	
PRICE	-.1185997705	.56345258E-02	-21.049	.0000	
B_EPER	-.1030038463	.40807681E-01	-2.524	.0116	
C_EPER	.6225218405E-01	.41720811E-01	1.492	.1357	
E_MUI	-.7601421921E-01	.46470104E-01	-1.636	.1019	
O_MUI	.4944657755E-01	.43062759E-01	1.148	.2509	
O_EPSR	.3999115814E-01	.43117645E-01	.927	.3537	
E_EPSR	-.6508765417E-01	.45545740E-01	-1.429	.1530	
E_FSCK	.3426273439	.17844702	1.920	.0549	
R_FSCK	-.4593939278	.15682595	-2.929	.0034	
E_FSCS	.4074151183	.28412643	1.434	.1516	
R_FSCS	.4699769427	.13582307	3.460	.0005	
CPK	-.8933315654	.44328090	-2.015	.0439	
EPK	-1.340517131	.50564936	-2.651	.0080	
CPS	.7695169666	.44042339	1.747	.0806	
EPS	.6539949492	.44391202	1.473	.1407	
RES_ND	-.6569440884	.24580100	-2.673	.0075	
RES_FOY	.2721250950	.15221289	1.788	.0738	
BIO_NVP	-.2834843129	.17882212	-1.585	.1129	
ESP_NVP	-.5377250906	.18480634	-2.910	.0036	
BIO_GV	.1865709227	.13494645	1.383	.1668	
CHEM_GV	-.3461547981E-01	.13665754	-.253	.8000	
ESP_GV	-.3860030246E-01	.14435364	-.267	.7892	
RE_GV	.1552004516	.12952964	1.198	.2308	
ORI_GV	-.4499586867E-01	.13579041	-.331	.7404	
ESP_PV	-.3292538744	.10821336	-3.043	.0023	

Semifinal2

```

+-----+
| Discrete choice (multinomial logit) model             |
| Maximum Likelihood Estimates                          |
| Dependent variable                                     Choice |
| Weighting variable                                     ONE   |
| Number of observations                                 2512  |
| Iterations completed                                  6     |
| Log likelihood function                               -2348.199 |
| Log-L for Choice model =                             -2348.1987 |
| R2=1-LogL/LogL* Log-L fncn R-sqrd RsqAdj            |
| No coefficients -2759.7141 .14912 .14435            |
| Constants only. Must be computed directly.          |
|                               Use NLOGIT ;...; RHS=ONE $ |
| Response data are given as ind. choice.                |
| Number of obs.= 2568, skipped 56 bad obs.             |
+-----+

```

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
BIODIVER	.9870585865	.17495262	5.642	.0000	
CHEMINS	.4499749330	.17620755	2.554	.0107	
ESPECES	1.196892475	.19337240	6.190	.0000	
RESPONSA	1.177732667	.86183139E-01	13.665	.0000	
ORIGINE	.7403415036	.17864959	4.144	.0000	
PRICE	-.1185976570	.56350537E-02	-21.046	.0000	
B_EPER	-.1032039079	.40791906E-01	-2.530	.0114	
C_EPER	.6287473295E-01	.41637979E-01	1.510	.1310	
E_MUI	-.7647402821E-01	.46444300E-01	-1.647	.0996	
O_MUI	.4960803417E-01	.43052003E-01	1.152	.2492	
O_EPSR	.3972882662E-01	.43104195E-01	.922	.3567	
E_EPSR	-.6457591902E-01	.45514780E-01	-1.419	.1560	
E_FSCK	.3459456034	.17804158	1.943	.0520	
R_FSCK	-.4602810435	.15678651	-2.936	.0033	
E_FSCS	.4133011340	.28359721	1.457	.1450	
R_FSCS	.4687025338	.13575216	3.453	.0006	
CPK	-.8958864127	.44327767	-2.021	.0433	
EPK	-1.349606533	.50492462	-2.673	.0075	
CPS	.7738830216	.44007009	1.759	.0787	
EPS	.6582179469	.44378333	1.483	.1380	
RES_ND	-.6567163077	.24576785	-2.672	.0075	
RES_FOY	.2719723509	.15219309	1.787	.0739	
BIO_NVP	-.2843836008	.17878089	-1.591	.1117	
ESP_NVP	-.5339526594	.18438610	-2.896	.0038	
BIO_GV	.1774347066	.13272258	1.337	.1813	
RE_GV	.1412136697	.12422714	1.137	.2556	
ORI_GV	-.6149905685E-01	.12885780	-.477	.6332	
ESP_PV	-.3193282205	.10287091	-3.104	.0019	

Semifinal3

```

+-----+
| Discrete choice (multinomial logit) model |
| Maximum Likelihood Estimates             |
| Dependent variable                       Choice |
| Weighting variable                       ONE   |
| Number of observations                    2512  |
| Iterations completed                      6    |
| Log likelihood function                   -2348.760 |
| Log-L for Choice model =                 -2348.7601 |
| R2=1-LogL/LogL*   Log-L fncn   R-sqrd   RsqAdj |
| No coefficients   -2759.7141   .14891   .14448 |
| Constants only.  Must be computed directly. |
|                               Use NLOGIT ;...; RHS=ONE $ |
| Response data are given as ind. choice. |
| Number of obs.= 2568, skipped 56 bad obs. |
+-----+

```

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
BIODIVER	.9875199627	.17473775	5.651	.0000	
CHEMINS	.4439215127	.17604651	2.522	.0117	
ESPECES	1.145083490	.18589480	6.160	.0000	
RESPONSA	1.179837082	.85884738E-01	13.737	.0000	
ORIGINE	.8427466589	.12624603	6.675	.0000	

PRICE	-.1184350959	.56288434E-02	-21.041	.0000
B_EPER	-.1025562388	.40784523E-01	-2.515	.0119
C_EPER	.6399694804E-01	.41612695E-01	1.538	.1241
E_MUI	-.7891068173E-01	.46341126E-01	-1.703	.0886
O_MUI	.5458907209E-01	.42551342E-01	1.283	.1995
E_EPSR	-.4722217921E-01	.41519096E-01	-1.137	.2554
E_FSCK	.3461960238	.17796143	1.945	.0517
R_FSCK	-.4585251906	.15668334	-2.926	.0034
E_FSCS	.4153394190	.28359326	1.465	.1430
R_FSCS	.4685793463	.13570916	3.453	.0006
CPK	-.8962205860	.44291538	-2.023	.0430
EPK	-1.352307225	.50461071	-2.680	.0074
CPS	.7757108996	.43969664	1.764	.0777
EPS	.6585233483	.44342777	1.485	.1375
RES_ND	-.6505628597	.24540192	-2.651	.0080
RES_FOY	.2695425295	.15208895	1.772	.0763
BIO_NVP	-.2814937717	.17868468	-1.575	.1152
ESP_NVP	-.5330615466	.18427289	-2.893	.0038
BIO_GV	.1580055888	.12717962	1.242	.2141
RE_GV	.1238182465	.11951660	1.036	.3002
ESP_PV	-.3155280018	.10249165	-3.079	.0021

Semifinal4

```

+-----+
| Discrete choice (multinomial logit) model |
| Maximum Likelihood Estimates |
| Dependent variable | Choice |
| Weighting variable | ONE |
| Number of observations | 2512 |
| Iterations completed | 6 |
| Log likelihood function | -2351.217 |
| Log-L for Choice model = | -2351.2171 |
| R2=1-LogL/LogL* Log-L fncn R-sqrd RsqAdj |
| No coefficients -2759.7141 .14802 .14393 |
| Constants only. Must be computed directly. |
| Use NLOGIT ;...; RHS=ONE $ |
| Response data are given as ind. choice. |
| Number of obs.= 2568, skipped 56 bad obs. |
+-----+

```

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
BIODIVER	.9710867084	.17403300	5.580	.0000	
CHEMINS	.4411275646	.17579806	2.509	.0121	
ESPECES	1.169182496	.18553881	6.302	.0000	
RESPONSA	1.209198236	.80272627E-01	15.064	.0000	
ORIGINE	.8364747362	.12605139	6.636	.0000	
PRICE	-.1181913610	.56213319E-02	-21.026	.0000	
B_EPER	-.1007273906	.40698862E-01	-2.475	.0133	
C_EPER	.6401210412E-01	.41546818E-01	1.541	.1234	
E_MUI	-.9077344437E-01	.45883981E-01	-1.978	.0479	
O_MUI	.5614258439E-01	.42492522E-01	1.321	.1864	
E_EPSR	-.4431622362E-01	.41522132E-01	-1.067	.2858	
R_FSCK	-.3427816608	.14250205	-2.405	.0162	
E_FSCS	.6192487271	.26116154	2.371	.0177	
R_FSCS	.3875169370	.12932476	2.996	.0027	
CPK	-.8899489551	.44334571	-2.007	.0447	

EPK	-1.377698879	.50220705	-2.743	.0061
CPS	.7754082480	.44022082	1.761	.0782
EPS	.6875140092	.44085444	1.560	.1189
RES_ND	-.6523686634	.24486764	-2.664	.0077
RES_FOY	.2541411025	.15131516	1.680	.0930
BIO_NVP	-.2832539923	.17854468	-1.586	.1126
ESP_NVP	-.5276405116	.18428195	-2.863	.0042
BIO_GV	.2007384295	.11815481	1.699	.0893
ESP_PV	-.3380765264	.10192984	-3.317	.0009

Semifinal5

```

+-----+
| Discrete choice (multinomial logit) model |
| Maximum Likelihood Estimates |
| Dependent variable Choice |
| Weighting variable ONE |
| Number of observations 2512 |
| Iterations completed 6 |
| Log likelihood function -2352.663 |
| Log-L for Choice model = -2352.6630 |
| R2=1-LogL/LogL* Log-L fncn R-sqrd RsqAdj |
| No coefficients -2759.7141 .14750 .14375 |
| Constants only. Must be computed directly. |
| Use NLOGIT ;...; RHS=ONE $ |
| Response data are given as ind. choice. |
| Number of obs.= 2568, skipped 56 bad obs. |
+-----+

```

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
BIODIVER	.9640542069	.17393250	5.543	.0000	
CHEMINS	.4342342536	.17565573	2.472	.0134	
ESPECES	.9831819652	.13701855	7.176	.0000	
RESPNSA	1.207768967	.80209228E-01	15.058	.0000	
ORIGINE	.9780631038	.66269480E-01	14.759	.0000	
PRICE	-.1180079261	.56154625E-02	-21.015	.0000	
B_EPER	-.9945130117E-01	.40674139E-01	-2.445	.0145	
C_EPER	.6558968530E-01	.41507053E-01	1.580	.1141	
E_MUI	-.7281708605E-01	.41465491E-01	-1.756	.0791	
R_FSCK	-.3536151012	.14225555	-2.486	.0129	
E_FSCS	.6028331669	.26080580	2.311	.0208	
R_FSCS	.3929149039	.12914760	3.042	.0023	
CPK	-.8835520008	.44359270	-1.992	.0464	
EPK	-1.364506864	.50111319	-2.723	.0065	
CPS	.7678093112	.44044700	1.743	.0813	
EPS	.6837197066	.43971199	1.555	.1200	
RES_ND	-.6617618279	.24486555	-2.703	.0069	
RES_FOY	.2573857720	.15129602	1.701	.0889	
BIO_NVP	-.2786403412	.17837519	-1.562	.1183	
ESP_NVP	-.5388471504	.18397981	-2.929	.0034	
BIO_GV	.2048438668	.11805627	1.735	.0827	
ESP_PV	-.3386600268	.10189746	-3.324	.0009	

```

+-----+
| Discrete choice (multinomial logit) model |

```

```

| Maximum Likelihood Estimates
| Dependent variable           Choice
| Weighting variable           ONE
| Number of observations       2512
| Iterations completed         6
| Log likelihood function      -2355.089
| Log-L for Choice model =    -2355.0887
| R2=1-LogL/LogL* Log-L fncn R-sqrd RsqAdj
| No coefficients -2759.7141 .14662 .14321
| Constants only. Must be computed directly.
|                               Use NLOGIT ;...; RHS=ONE $
| Response data are given as ind. choice.
| Number of obs.= 2568, skipped 56 bad obs.
+-----+

```

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
BIODIVER	.9402778597	.17309752	5.432	.0000	
CHEMINS	.4252889417	.17558599	2.422	.0154	
ESPECES	1.010109638	.13632344	7.410	.0000	
RESPNSA	1.206120548	.80168408E-01	15.045	.0000	
ORIGINE	.9782294442	.66278300E-01	14.759	.0000	
PRICE	-.1180163455	.56111300E-02	-21.033	.0000	
B_EPER	-.1003148039	.40657262E-01	-2.467	.0136	
C_EPER	.6644924954E-01	.41510821E-01	1.601	.1094	
E_MUI	-.7543549757E-01	.41377416E-01	-1.823	.0683	
R_FSCK	-.3522626053	.14214911	-2.478	.0132	
E_FSCS	.5973675786	.26061100	2.292	.0219	
R_FSCS	.3924887358	.12915682	3.039	.0024	
CPK	-1.047441822	.42087522	-2.489	.0128	
EPK	-.6914664877	.25449671	-2.717	.0066	
CPS	.9368538597	.41647902	2.249	.0245	
RES_ND	-.6624656241	.24483936	-2.706	.0068	
RES_FOY	.2538810572	.15119303	1.679	.0931	
ESP_NVP	-.6493037631	.17324944	-3.748	.0002	
BIO_GV	.2137345621	.11790315	1.813	.0699	
ESP_PV	-.3350973581	.10175658	-3.293	.0010	

```

+-----+
| Discrete choice (multinomial logit) model
| Maximum Likelihood Estimates
| Dependent variable           Choice
| Weighting variable           ONE
| Number of observations       2512
| Iterations completed         6
| Log likelihood function      -2356.380
| Log-L for Choice model =    -2356.3803
| R2=1-LogL/LogL* Log-L fncn R-sqrd RsqAdj
| No coefficients -2759.7141 .14615 .14291
| Constants only. Must be computed directly.
|                               Use NLOGIT ;...; RHS=ONE $
| Response data are given as ind. choice.
| Number of obs.= 2568, skipped 56 bad obs.
+-----+

```

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
----------	-------------	----------------	----------	----------	-----------

BIODIVER	.8567825568	.16511705	5.189	.0000
CHEMINS	.6766238791	.78191685E-01	8.653	.0000
ESPECES	1.003980858	.13612455	7.375	.0000
RESPONSA	1.204584826	.80092935E-01	15.040	.0000
ORIGINE	.9764418384	.66197286E-01	14.750	.0000
PRICE	-.1178342527	.56066698E-02	-21.017	.0000
B_EPER	-.7893740960E-01	.38474406E-01	-2.052	.0402
E_MUI	-.7273227619E-01	.41314388E-01	-1.760	.0783
R_FSCK	-.3479042049	.14205536	-2.449	.0143
E_FSCK	.6050785594	.26098918	2.318	.0204
R_FSCK	.3900204894	.12903142	3.023	.0025
CPK	-.9667965955	.41716468	-2.318	.0205
EPK	-.6996504344	.25491976	-2.745	.0061
CPS	.8703282160	.41371956	2.104	.0354
RES_ND	-.6473353287	.24418527	-2.651	.0080
RES_FOY	.2515984634	.15110055	1.665	.0959
ESP_NVP	-.6495245359	.17329856	-3.748	.0002
BIO_GV	.2143873063	.11787741	1.819	.0690
ESP_PV	-.3333389086	.10171287	-3.277	.0010

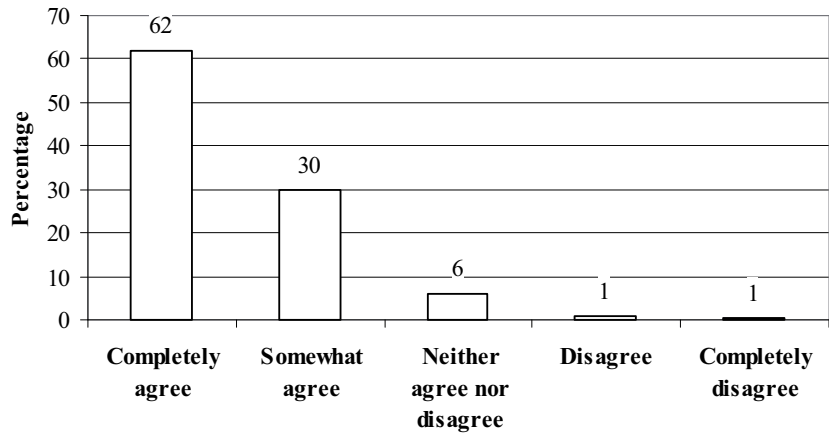
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+-----+
| WALD procedure. Estimates and standard errors |
| for nonlinear functions and joint test of     |
| nonlinear restrictions.                       |
| Wald Statistic = 4230.46970                 |
| Prob. from Chi-squared[18] = .00000         |
+-----+

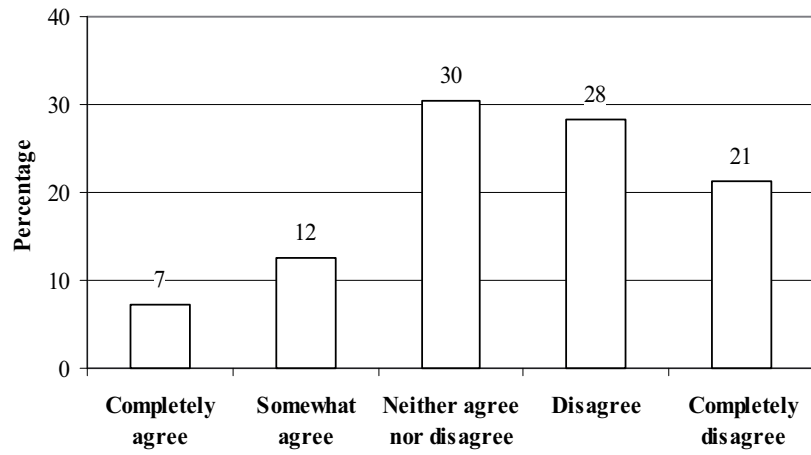
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Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
Fncn(1)	7.271082363	1.3656260	5.324	.0000	
Fncn(2)	5.742166334	.59069330	9.721	.0000	
Fncn(3)	8.520280262	1.1083396	7.687	.0000	
Fncn(4)	10.22270518	.57306695	17.839	.0000	
Fncn(5)	8.286570465	.46387233	17.864	.0000	
Fncn(6)	-.6699020681	.32738561	-2.046	.0407	
Fncn(7)	-.6172422238	.35122069	-1.757	.0788	
Fncn(8)	-2.952487896	1.2107418	-2.439	.0147	
Fncn(9)	5.134997213	2.2225699	2.310	.0209	
Fncn(10)	3.309907606	1.1007719	3.007	.0026	
Fncn(11)	-8.204716143	3.5510438	-2.311	.0209	
Fncn(12)	-5.937581121	2.1729545	-2.732	.0063	
Fncn(13)	7.386037556	3.5200937	2.098	.0359	
Fncn(14)	-5.493609147	2.0825304	-2.638	.0083	
Fncn(15)	2.135189536	1.2844169	1.662	.0964	
Fncn(16)	-5.512187848	1.4826786	-3.718	.0002	
Fncn(17)	1.819397173	1.0024385	1.815	.0695	
Fncn(18)	-2.828879556	.86856908	-3.257	.0011	

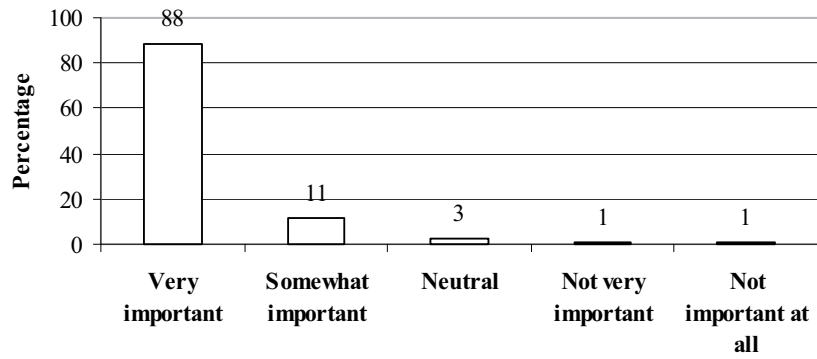
Change consumption mode to show example to others



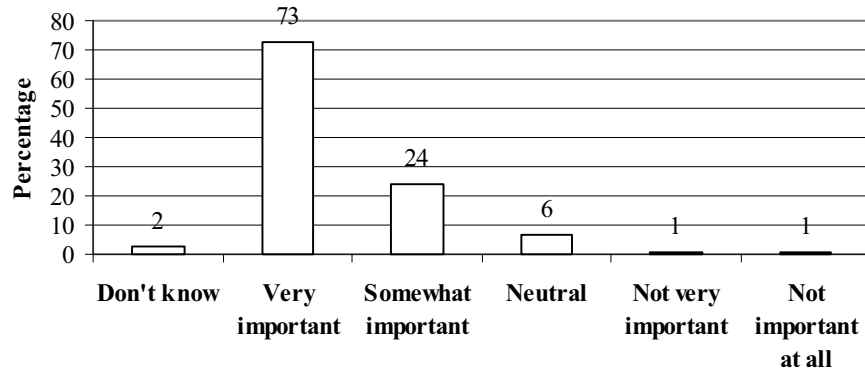
More urgent issues than environmental protection



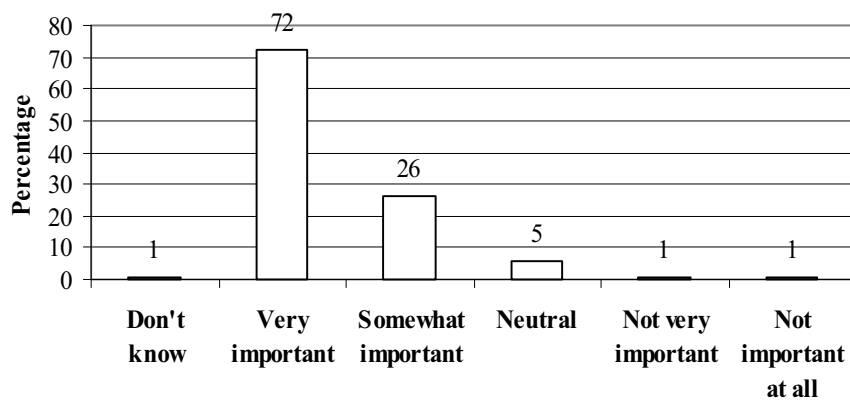
Recycling of waste



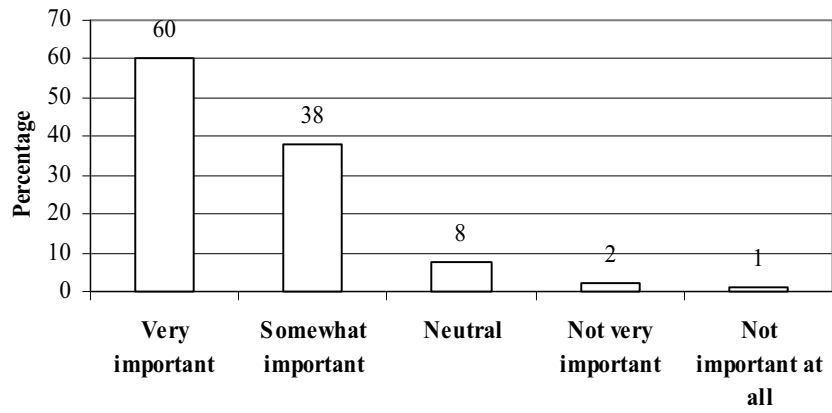
Prevention of risk of chemical plants



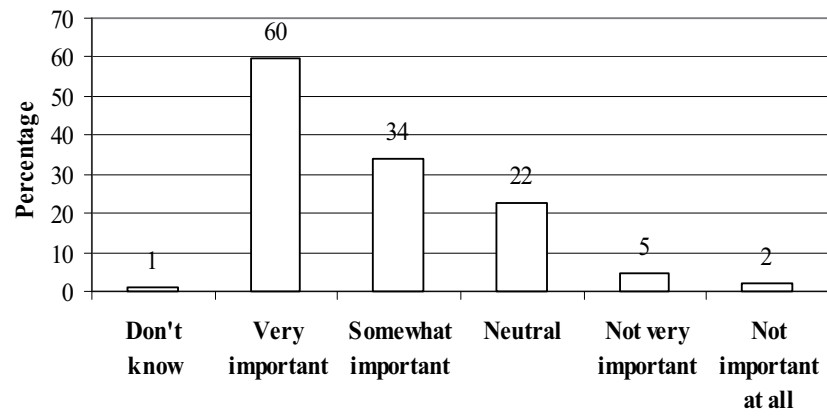
Reduction of uses of pesticides



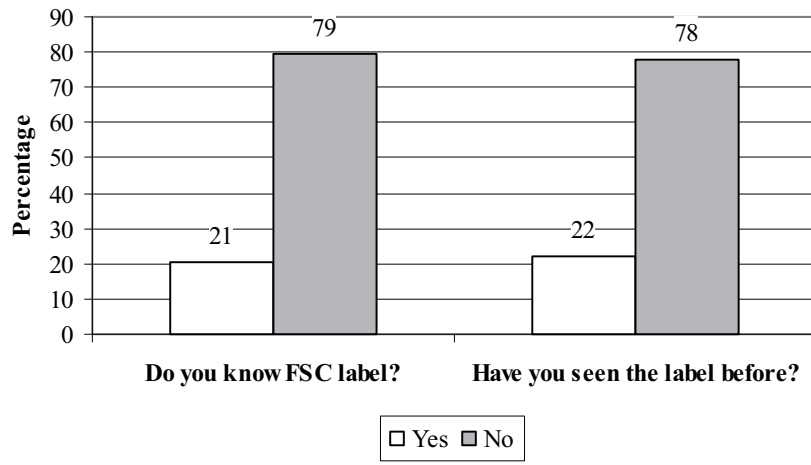
Buying low light ampoules



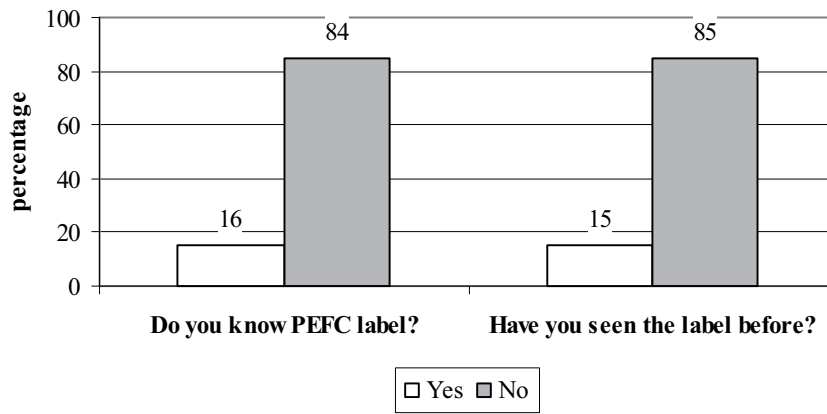
Reducing travel by car



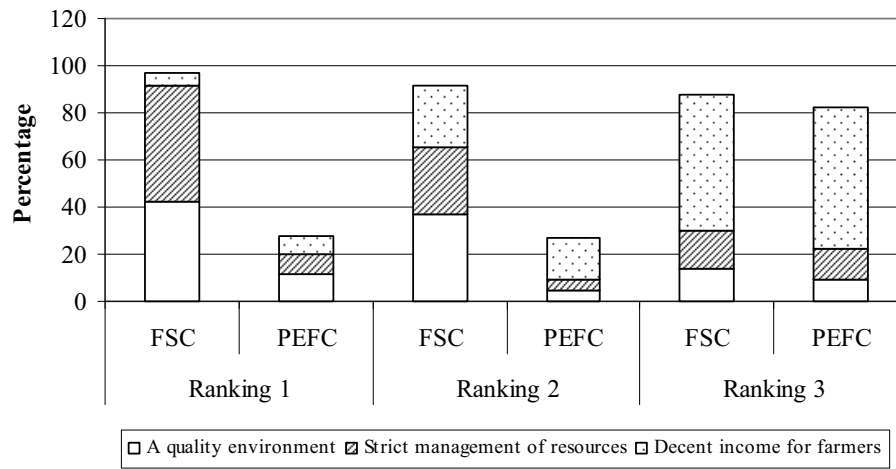
Knowledge on FSC



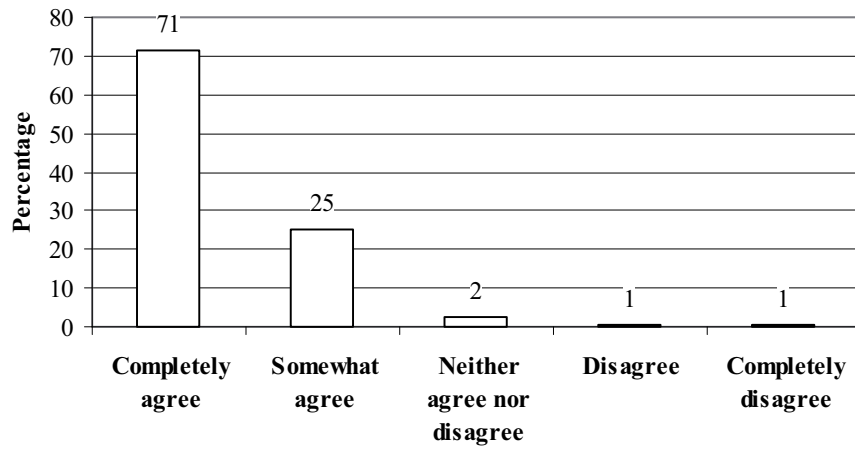
Knowledge on PEFC label



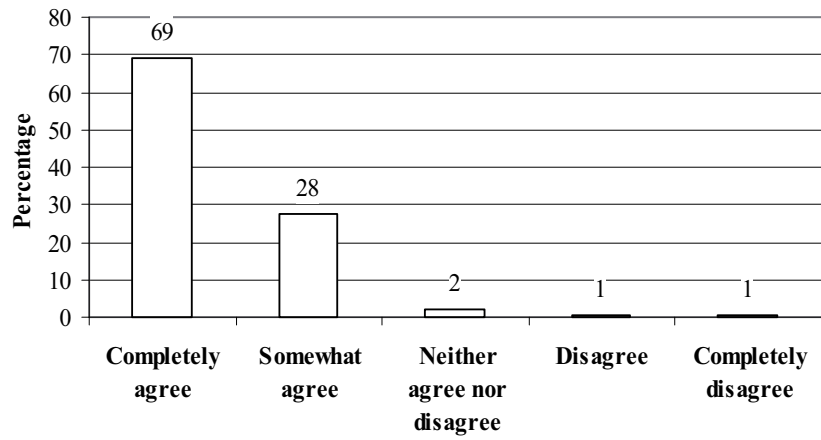
What does FSC and PEFC label guarantees?



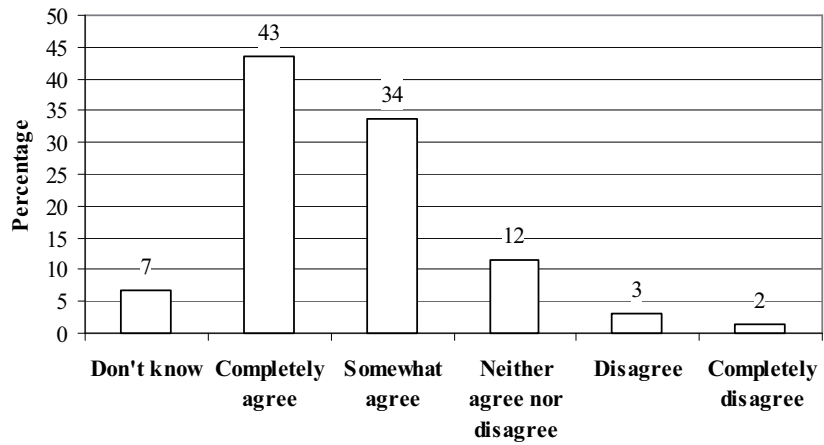
Forest stewardship can preserve the resource for our children



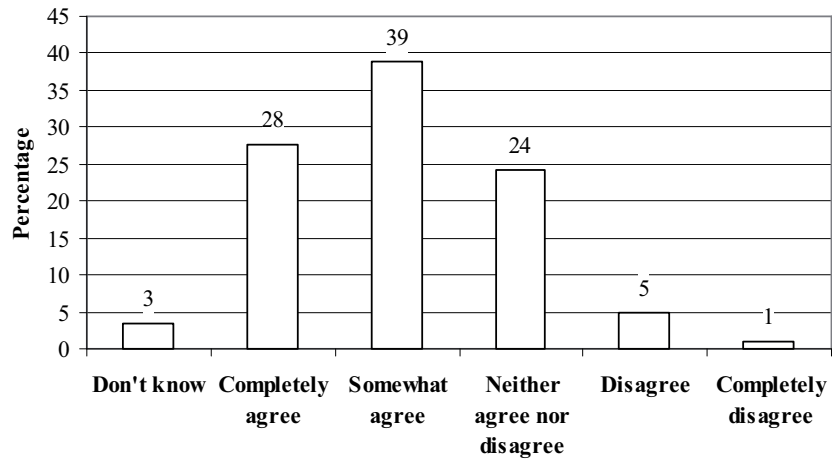
Forest stewardship can protect flora and fauna



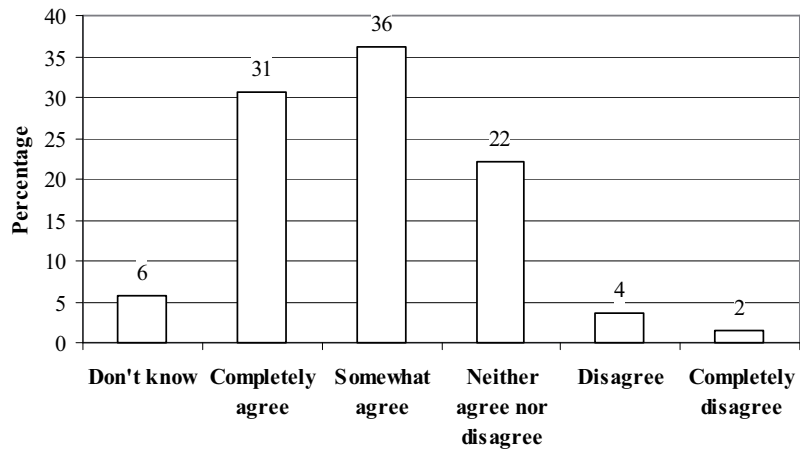
Forest stewardship can reduce global warming



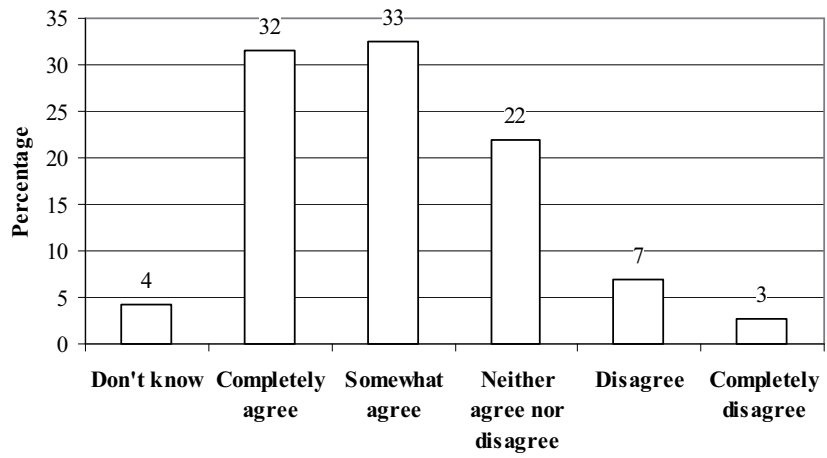
Forest stewardship can develop leisure activities



Forest stewardship can develop timber industry



Forest stewardship can limit urban development



Do you think that stewardship can:	Mean	Standard Deviation
Protect flora and fauna	4.63	0.617
Reduce global warming	3.95	1.368
To preserve the resources for our children	4.66	0.619
To develop the timber industry	3.74	1.293
To develop the leisure activity in the recreational park	3.78	1.131
To limit urban development	3.72	1.284

Total observations = 329

Calculated based on the mean score of five-point scale items (strongly agree-strongly disagree)