INTERNATIONAL TROPICAL TIMBER ORGANIZATION / FLEGT INDEPENDENT MARKET MONITOR (IMM)

A study of EU architects' perceptions and experience with FLEGT licenses

AN IMM STUDY – NOVEMBER 2019

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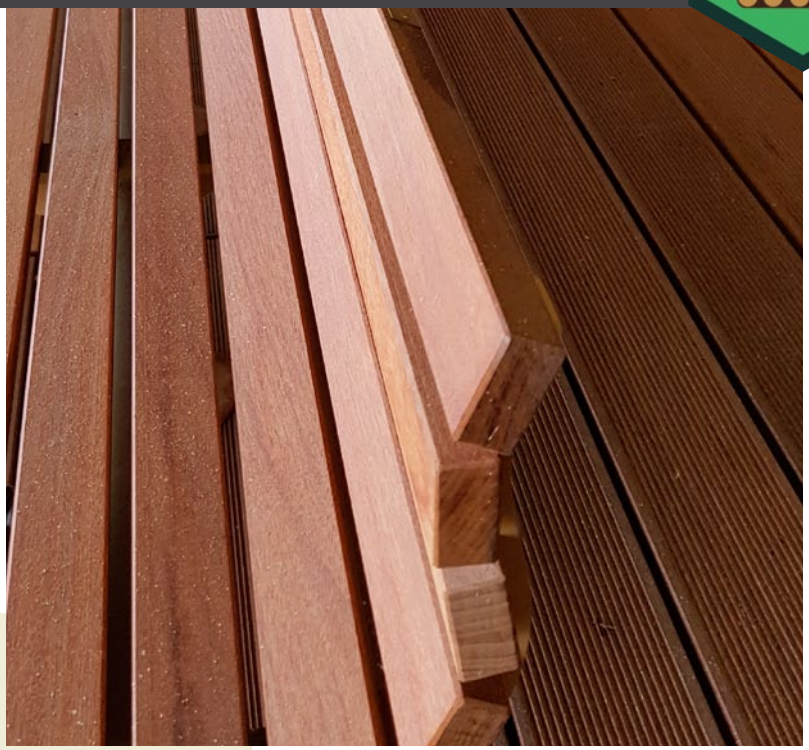

Photo: Tropical hardwood seating and decking at Paris Longchamp. © George White

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Executive Summary

Europe has an estimated 565,000 architects with over half of these operating in the seven main EU Member States that import and consume timber originating in tropical countries. More than one third of the world's largest architectural practices are based in in the EU and these practices influence architecture far beyond the EU's borders.

Previous IMM research of the private sector[1] has indicated that architects and specifiers play a vital role in the route to market of timber products. Their awareness of material choices and attitudes towards sustainability and legality of production have been identified as key to developing markets for wood products.

Architects play a role across all sectors utilising wood from the private sector to public sector and infrastructure projects and their professional perceptions and attitudes towards wood, especially tropical wood and levels of knowledge of forest certification and the FLEGT process are not widely understood.

Architects are also influenced to varying degrees by several hundred "green building initiatives" that seek through standards and ratings to play a role in shaping the use of materials and their means of production. Compliance with such standards has begun to have a bearing on the specification process for many architects.

The survey involved 22 architects from nine different EU Member States ranging in size from small to very large practices, including eight of the world's largest architectural practices. The sample included 6 of the Europe's largest architectural practices.

The study indicates:

- Architects value wood as a construction material and it is widely perceived as offering multiple technical and aesthetic advantages.
- The study indicated that wood came second only to concrete across a broad range of 35 technical and performance criteria.
- Architects perceive themselves as having most control over material specification.
- The most favoured form of assurance of sustainability and legality was self-identified as timber certification.
- Amongst surveyed architects levels of awareness of the EU-FLEGT programme and the EU Timber Regulation were low.
- A number of issues surrounding the specification of tropical timber were identified.
- Carbon footprint associated with the distance between production and end use was identified as the main negative issue.
- Of over 50 green building initiatives assessed a significant proportion specify or give credit to timber certification systems.
- Only a small number of green building initiatives indirectly refer, or specify, and then give credit to FLEGT or timber with verified legality.

The study concludes with a series of recommendations to increase uptake through specification of timber carrying the FLEGT Licence.

ACKNOWLEDGEMENTS

The author thanks the individual architects and practices across Europe who gave their time to provide some of the insights presented in this report. Thanks also to the IMM network of correspondents for their diligence in undertaking the interviews.

ACRONYMS AND ABBREVIATIONS

CITES	Convention on International Trade in Endangered Species
CoC	Chain of custody
CPD	continuing professional development
EC	European Commission
EU	European Union
EUTR	European Union Timber Regulation
FLEGT	Forest Law Enforcement, Governance and Trade
FSC	Forest Stewardship Council
IMM	Independent Market Monitor
ITTO	International Tropical Timber Organization
PEFC	Programme for the Endorsement of Forest Certification
UK	United Kingdom of Great Britain and Northern Ireland
VPA	Voluntary Partnership Agreement

ABOUT IMM

Independent Market Monitoring (IMM) is a multi-year programme funded by the European Union (EU) and managed by the International Tropical Timber Organisation (ITTO). IMM's role is to use trade flow analysis and market research to independently assess trade and market impacts of FLEGT Voluntary Partnership Agreements (VPAs).

ABOUT ITTO

The International Tropical Timber Organization (ITTO) is an intergovernmental organization promoting the conservation and sustainable management, use and trade of tropical forest resources. Its members represent the bulk of the world's tropical forests and of the global tropical timber trade. ITTO develops internationally agreed policy documents to promote sustainable forest management and forest conservation and assists tropical member countries to adapt such policies to local circumstances and to implement them in the field through projects. In addition, ITTO collects, analyses and disseminates data on the production and trade of tropical timber and funds projects and other actions aimed at developing sustainable forest industries at both the community and industrial scales. Since it became operational in 1987, ITTO has funded more than 1000 projects, pre-projects and activities valued at more than US$400 million. All projects are funded by voluntary contributions, the major donors to date being the governments of Japan and the United States of America.

[1] See IMM Special studies www.flegtimm.eu/index.php/reports

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Introduction

Buildings are a key component in the fabric of villages, towns and cities. The building and construction sector is one of the most important areas of intervention and provides opportunities to limit environmental impact as well as contribute to the achievement of sustainable development goals. The sector is estimated to provide 5 to 10% of employment at the national level and generate 5 to 15% of GDP.[2] Moreover it provides housing, mobility, water and sanitary infrastructures, and it represents the physical context for social interactions as well as economic development at the micro-level. Numerous studies have also shown a relationship between buildings and public health and at the same time, the built environment accounts for a large share of energy (estimated to be about 40% of global energy use), energy-related greenhouse gas emissions (estimated to be approximately 30%), waste generation and use of natural resources.[3]

Wood was perhaps the first building material and today continues to be an extremely important and versatile material. Today it must compete with a wide range of other man-made materials and faces great scrutiny. Those that specify wood as a construction material need to understand the material and its origins to be able to justify its usage. For tropical wood to be considered, especially in the highly sensitised markets of the European Union, even more questions are asked and a range of embedded prejudices must be overcome before the material is used.

Architects play a key role in virtually all forms of construction, large and small and Europe supports over half a million architects. Their views on building materials are vital to market dynamics and to future developments across a range of building material sectors.

This study seeks to review previous insights in to architect attitudes towards wood as a building material and to identify the material's strengths and weaknesses as perceived by European architects. It goes on to explore the issues surrounding perceptions of tropical wood in more detail and to assess the levels of understanding and perceptions around the major processes underway in the European Union and partner countries to improve forest governance and forest sustainability.

1 Methodology

This study is based upon a combination of internet research and a small number of one to one interviews plus an on-line survey. The internet research allows a broad review of previous studies and findings relating to architect attitudes generally to using wood and more precisely on using wood from the VPA countries, especially tropical timber.

The interviews were based around a structured questionnaire. The questionnaire drew on elements revealed within the literature survey and brought together elements of wider timber / architect attitude studies and specific tropical wood studies focusing on architects. The use of questions the same or similar to those previously used in other studies is designed to allow comparison of the results with the previously conducted studies.

The interviews were conducted across the EU's main markets for tropical timber (and therefore those likeliest to be impacted by the VPA process and FLEGT Licencing). Each architectural organisation involved in a face-to-face interview was also asked to complete a more straightforward additional online survey.

The architectural practices were identified using a previously reported list[4] to identify the largest practices in Europe, based upon their reported or estimated turnover. The smaller practices interviewed were selected by the IMM correspondents. Some of those interviewed were known to the interviewers through previous activities and others were new to IMM or to its' correspondents. All data was offered confidentially.

The objective was suitable for the use of mainly qualitative research because of scarce a *priori* knowledge of the questions and possible answers. The purpose of this study is to explore the considerations that would influence the propensity of architects to suggest construction in wood generally, tropical wood specifically and the resonance of more information regarding the production of the material.

The study takes a broad approach, which means that it includes a range of aspects including the perceived performance of wood, the impact of wood construction experiences on professional values, and factors that may facilitate or hamper the decision to prescribe or suggest the use of wood. Furthermore, the study determines the relative influence of different actors on material selection, as they are perceived by architects. This study focuses on the potential use of timber in residential buildings and larger projects such as schools, institutional buildings, commercial buildings and smaller residential developments. The scope also extended to aesthetic uses such as interior design and furnishings where wood might be used.

Other studies[5] have highlighted the advantage of the qualitative approach to understand decision making, and change-processes, which was the focus for this study.

[2] www.unenvironment.org/explore-topics/resource-efficiency/what-we-do/cities/sustainable-buildings

[3] www.unenvironment.org/explore-topics/resource-efficiency/what-we-do/cities/sustainable-buildings

[4] AEDAS (2017) *The World's largest architecture practices January 2017.* https://media.aedas.com/Aedas,%20WA100%202017_0.pdf

Qualitative data also have the advantage of locating meanings, perceptions, and assumptions that people place, in this case on the material selection process. A survey can produce representative information on some issues, but with the danger of omitting important information about perceptions among architects, or how processes are influenced by contextual factors. Hence an interest in peoples' motivations, perceptions, and decision-making processes led to the use of qualitative research methods.

Geographic scope

Please note that study was prepared during the latter period of the United Kingdom's withdrawal ("Brexit") from the European Union. For the purposes of this report all references to the EU and EU member states refer to the 28 Member States except where a named country is specifically referenced.

Limitations to the study

- The range of interviews is very modest and can only capture a flavour of opinions. There are an estimated ½ million architects across the EU.
- Only a low proportion of those organisations contacted were available for interview (though 6 of Europe's largest practices participated).
- The internet review of literature is largely limited to publications available in the English language. Some translation has been possible for specific documents.
- Lack of time prohibits exhaustive checks on all available documentation. Therefore some documents may be marked as "not found", "no data" or "no reference available" due to limitations in both language and time available to fully explore websites and lengthy standard documents.
- The author accepts responsibility for any inaccuracies.

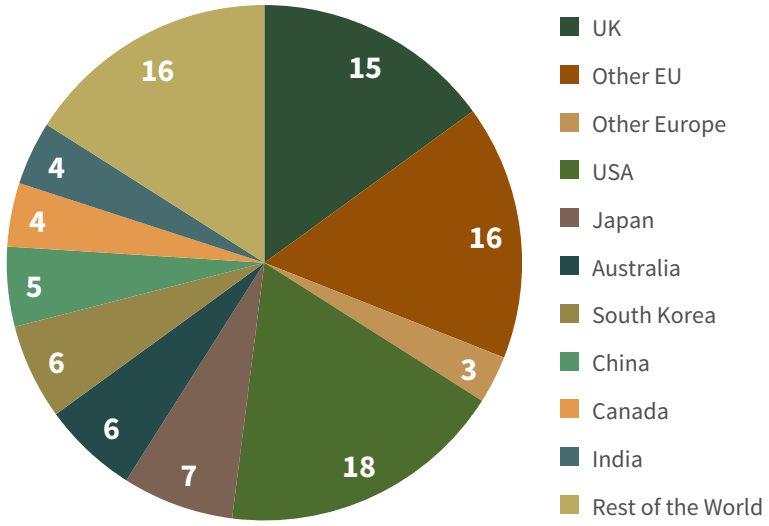

Figure 1: Geographical distribution of the World's largest architecture practices. *(n= number of practices per country / region)*

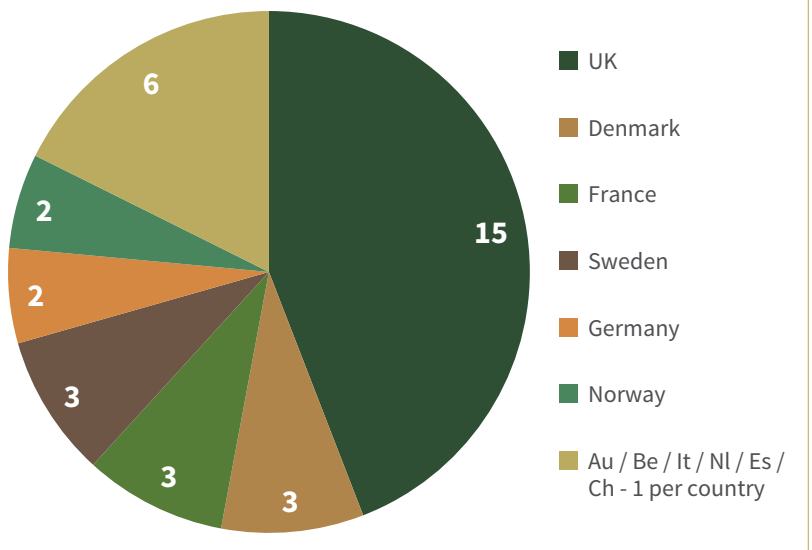

Figure 2: Geographical locations of the Europe's largest architecture practices. *(n= number of practices per country / region)*

Previous studies of architects' attitudes to wood

Previous IMM studies[6] have focused upon groups which were likely to have experienced first-hand, or at least were familiar with the concept of FLEGT Licencing and the broader FLEGT programme including the EU Timber Regulation and the perhaps the Voluntary Partnership Agreements (VPAs) between the EU and a number of tropical producer countries.

The main challenge with this study from the beginning was the working assumption that architects were unlikely to be familiar with any of these processes (for example when compared with Europe's leading importers of tropical hardwood). This starting assumption therefore determined a different approach to gathering information and also necessitated a different starting point with the literature review.

Focusing solely on FLEGT Licencing was assumed to prove unlikely to reveal great insights hence an approach was adopted to try and gather views on this in a wider context that assessed architect attitudes to wood per se as a construction or aesthetic material. This coupled with exploration of the decision making process and the role of the architect in the choice of material used within a project. In this context it was hoped that attitudes to tropical timber generally and FLEGT Licensed material especially could be unpacked for consideration. Very little available

[5] Bryman, A (2001) *Social research methods.* Oxford University Press. 560 pp.

[6] See www.flegtimm.eu

information was of direct relevance to FLEGT Licencing though it helped serve to provide context for the qualitative stage of the study.

Architects in Europe

Europe has an estimated 565,000 qualified architects.[7] A significant proportion (27 per cent) of this number are from just one country, Italy (153,000 architects) while Germany accounts for 19 per cent of Europe's architects (107,200). Other countries with high numbers of architects are Spain (51,700), the United Kingdom (34,300) and France (29,800). Europe is of global importance with respect to being home for many of the world's largest architectural practices (architectural service companies employing one or more qualified architects).

Of the world's 100 largest architectural practices identified in 2017[8] thirty four are based in Europe with 31 based in the European Union and 3 elsewhere in Europe. The United Kingdom is home for almost half of Europe's largest architectural practices.

Aside from the UK, European Union Member States with some of the largest architecture practices include Denmark, France, Sweden, Germany and Norway.

Studies on architects attitudes towards timber in construction

In the past twenty years there have been numerous studies published assessing the influence of architects and structural engineers on the use of timber in construction.

The under-utilisation of timber construction may in part be linked with the attitudes of professionals regarding wood. Two key professions are architects and structural engineers.[9,10] Architecture and structural engineering are the central technical professions involved in design and material selection in building construction; structural engineers are responsible for the static performance of buildings, while the architect generally considers the visual and functional aspects.[11] These professionals are 'system integrators' who should have a particular influence on construction-based innovation during the design stage, whereas the principal contractor has more power during the construction stage. Hence, the professions' attitudes toward wood in construction may be key factors for the diffusion of timber construction.

Several studies[12,13] from the 1990s suggested that professional status, social norms (of behaviour), and "self-image" may influence the intentions and behaviour of both architects and structural engineers in their choice of materials. It has been suggested that these factors affect the likelihood among architects and structural engineers of proposing wood as a structural material in construction.

Previous studies have also indicated that structural engineers and architects experience a lack of training for wood construction in specific applications.[14] Other studies[15] found that insisting on wood construction would require 'self-education' and extra planning time. More recent studies[16] concluded that increased thermal performance and the ability to comply with future, increasing thermal demands from building regulations are factors that are believed to make timber a key driver for sustainable energy-efficient construction.

A 2010 ITTO study[17] suggested that, in certain sectors of the architecture and design community, preconceptions about wood's behaviour in fire and its durability and strength, together with its image as an `old-fashioned material', significantly undermine wood's competitive position relative to other materials. Moreover, even where the design community appreciates the aesthetic qualities of wood there is a risk that their views will be overruled by other actors (such as building contractors and clients) in the specification process who may be more risk-averse with respect to technical characteristics (i.e. they have pre-conceptions or prejudices to wood as a material).

Interviews with interior and furniture designers undertaken during 2009 for ITTO suggested that, compared with softwoods, which were the main focus of past surveys, tropical hardwoods tend to be viewed more positively on some issues (e.g. natural technical performance and aesthetic qualities) and worse on others (notably environmental attributes).

Studies[18] have also shows that the influence of architects and structural engineers on material selection is

[7] BAK (2014) *Profile of architects in Europe* – 2014 www.bak.de/w/files/bak/07-daten-und- fakten/architektenbefragungen/ace/2014_en_kapitel1.pdf

[8] AEDAS (2017) op. cit.

[9] Kozak, R.A. & Cohen, D.H. (1999) *Architects and structural engineers: an examination of timber design and use in non-residential construction*. Forest Products Journal 49: 37–46

[10] Bregulla, J.R., Grantham, R., Johansson, H.E. & Enjily, V. 2003. *Barriers to the enhanced use of wood in Europe: particular attention to the regulatory barriers*. Report prepared by Building Research Establishment (BRE) as a part of the "Roadmap 2010" programme of the European Confederation of Woodworking Industries, CEI-Bois, Brussels. 19 p. Available at: http://www.roadmap2010.eu/about/PDFs/Reports/BRE_Report.pdf

[11] *Encyclopædia Britannica* 15 January 2010, http://search. eb.com/eb/article-60155

[12] Cialdini, R.B., Kallgren, C.A. & Reno, R.R. (1991) *A Focus theory of normative conduct: a theoretical refinement and re-evaluation of the role of norms in human behaviour.* Advances in Experimental Social Psychology 24: 201–234.

[13] Terry, D.J., Hogg, M.A. & White, K.M. (1999) *The theory of planned behaviour: Self-identity, social identity and group norms*. British Journal of Social Psychology 38: 225–244

[14] O'Connor, J, Kozak, R, Gaston, C. & Fell, D (2004) *Timber use in non-residential buildings: Opportunities and barriers*. Forest Products Journal 54(3): 19–28

[15] Bayne, K & Taylor, S (2006) *Attitudes to the use of timber as a structural material in non-residential building applications: opportunities for growth*. Forest and Timber Products Research and Development Corporation (FWPRDC), Project PN05.1020, Clayton, Victoria, Australia. 39 pp.

[16] Omoregie, A. and English, M. (2016) *Housing infrastructure: contemporary issues in timber adoption*, Proceedings of the Institution of Civil Engineers - Municipal Engineer, DOI: 10.1680/jmuen.16.00022

[17] Oliver, R. & Donkor, B. (2010) *Levelling the playing field – Options for boosting the competitiveness of tropical hardwoods against substitute products*. ITTO Technical Series No 36. ISBN 4-902045-69-9

[18] O'Connor, J, Kozak, R, Gaston, C. & Fell, D (2004) *Timber use in non-residential buildings: Opportunities and barriers*. Forest Products Journal 54(3): 19–28

moderated by other 'stakeholders' – e.g., authorities, contractors, and developers. This study takes a broad view of the role of architects and structural engineers focusing on their general attitude, perceptions on, and power over the material selection in the building process.

A 2010 Swedish study[19] considered the influence of architects and structural engineers on timber in construction. The study considered structural engineers' and architects' perceptions of structural timber in multi-story construction contexts. Qualitative approaches, with interviews and focus groups were used to investigate attitudes, perceived norms, and perceived factors that hamper or facilitate the prescription of wood use in construction. The study revealed architects', and even more so engineers', perceptions of negative aspects of wood focused on decay, instability and sound transmission. Although wood-based construction was seen as a required professional skill, it was not expected to improve one's professional status. Positive aspects of wood in construction included its strength, environmental friendliness, simple handling and appropriateness for use in conjunction with industrial methods, whereas knowledge gaps and weak support from the wood industry have reduced the use of wood among structural engineers and architects. Both professions perceived their influence on material selection to be weak. They sensed that most of the influence over material selection rested with developers and contractors. Their paper contained suggestions on how to make these two professions more influential advocates for wood in construction.

The table summarises the main findings of the 2010 study.[20] The study made no attempt to differentiate between softwood or hardwood materials and **did not** consider tropical timber specifically.

The Swedish study of 2010 concluded that material preference among architects and structural engineers is influenced by attitudes regarding the properties of wood, normative beliefs and beliefs about the control and ease of building in wood. The sector's 'standard practices' based on concrete and steel (which are manifest in the corporate policies of contractors) as well as a sense of deficient knowledge are the main obstacles for architects and engineers for suggesting that wood should be used.

While timber is perceived as a recognized construction material, architects and, to a greater degree, structural engineers are reluctant to use timber in their designs due to concerns about form instability, fire, decay, and sound transmission. The advantages of timber structures included its low costs, flexibility, low weight, and low environmental impact – as well as opportunities to use industrialized methods.

The study indicated that both architects and engineers identified " a professional challenge in working with timber, although experience in wood construction did not enhance their careers". Most respondents highlighted the need for more active engagement among timber material suppliers in solving their problems and providing straightforward timber-based solutions.

The Swedish study suggested that the most influential parties in the process of material selection, from architects' and structural engineers' perspectives were developers and contractors, whereas the final user was often not aware of the structural material of the building. Inexperienced engineers were uncomfortable about timber construction alternatives, and architects noted that they had a rather limited influence on material selection. The study found that both engineers and architects believed they had only a limited power in the material selection. They speculated that one cause for this limited impact may be that the preference for non-wood building methods lies more in the culture and 'standard practice' than in individual

Theory of Planned Behaviour - Concept	Mainly Positive attitudes	Ambiguous /neutral attitudes	Mainly Negative attitudes
Attitude	• Wood often creates links between the built and natural environment and local building traditions • Natural, warm appearance • Energy-efficient • Environmental and climate advantages • Strong and light material	• Fire properties • Economic costs and risks	• Sound transmission properties • Poor form stability and movement • Decay
Subjective Norm	• Interesting to build with wood		• Professional norms are not compatible with wood • For engineers, larger projects matter more
Perceived Behavioral Control	• Appropriate for industrialized building methods • Does not need much ground preparation • Easy to make adjustment afterwards	• Codes, regulations, and authority decisions	• Few demonstration examples • 'Standard practice' and corporate culture are obstacles • Insufficient education and knowledge • Insecure wood supply • Insufficient support from suppliers of wood in construction

Table 1: Summary of theory of planned behaviour analysis – attitudes to wood in construction

[19] Roos, A, Woxblom, L & McCluskey, D (2010). *The influence of architects and structural engineers on timber in construction* – perceptions and roles. Silva Fennica 44(5): 871–884

[20] Roos et al (2010) *op. cit.*

preferences. These strategic decisions on building material are "made at the top corporate level of the larger contracting firms by managers and economists".

Architectural and designer perceptions towards tropical wood

For the Northern Hemisphere tropical timbers have long been exotic, valuable and aesthetically pleasing though presenting challenges in identification, use and adoption.[21]

> "A manufacturer, architect or construction engineer is unlikely to accept a new wood unless he is assured that
>
> (a) it is suitable for his purpose;
>
> (b) it will be available in adequate quantity, and
>
> (c) it will be accepted by the consumer."
>
> *US Dept. of Commerce, 1947*

The practical challenges and levels of understanding of the material evolved over time though as new tropical species emerged on the market the challenge of making them acceptable in construction or end use has continued to be a major issue. As long ago as 1947[22] the main challenges for tropical timbers were identified – suitability, availability and acceptance by consumers. It can be argued that not much has changed since.

Fast forwarding to 2010 - a study published by ITTO[23] assessed the competitiveness of tropical wood compared to competing materials.

It suggested that, in certain sectors of the architecture and design community, preconceptions about wood's behaviour in fire and its durability and strength, together with its image as an `old-fashioned material', significantly undermine wood's competitive position relative to other materials. Moreover, it suggested that even where the design community appreciates the aesthetic qualities of wood there is a risk that their views will be overruled by other actors (such as building contractors and clients) in the specification process who may be more risk-averse with respect to technical characteristics.

Figure 3: Tropical hardwood used in shop refurbishment. *Photo: G White*

ITTO's 2010 report suggested that most studies to that date focused heavily on structural uses of wood in Western markets, which are much less relevant to many types of tropical hardwood than the finishing and furniture sectors. The structural sector is renowned for being relatively risk-averse and conservative compared with the finishing sectors, where there is more room for experimentation and a greater focus on aesthetics, versatility, ease of use, and "naturalness".

Interviews conducted for the ITTO study conducted with interior and furniture designers suggested that, compared with softwoods, which were the main focus of past surveys, tropical hardwoods tended to be viewed more positively on some issues (e.g. natural technical performance and aesthetic qualities) and worse on others (notably environmental attributes).

The ITTO report also identified a number of design trends, most of which remain relevant today. Some of the **key themes** in design that were identified included:

- **Responsible and sustainable:** Among architects, sustainability covers a host of issues. In furniture design the term is frequently linked to efforts to increase the durability of products, reduce waste and enhance recycling rather than to the origin of the raw materials. Since 2010 to this might be added `decarbonisation' and a concern for reducing carbon footprint of materials. Related to this might also be included an increase in interest in lifecycle analysis to make comparisons between material choices.

- **Aesthetics:** Designers today tend to feel an obligation to incorporate 'delight' and aesthetics into their designs. Moreover, they recognize that aesthetics is not just about visual appeal. Sound, touch and even smell are increasingly seen as important in the creation of 'delightful' architecture and products.

[21] Stone, H. (1904) *The timbers of commerce and their identification.* William Rider & Son Ltd. London

[22] McKellar, A.D. (1947) *Immense tropical hardwood forests await development. U.S. Department of Commerce.* Published in Foreign Commerce Weekly, October 4 1947 edition. Accessed via: https://books.google.co.uk/

[23] Oliver, R. & Donkor, B. (2010) *op. cit.*

- **Naturalness:** There is an increasing view that design should be humane and should connect people. This view, linked to demand for products that seduce by appealing to all the senses, has encouraged borrowing from nature and led to more interest in low-tech and globally understandable design.

- **Design Narrative:** Designers are increasingly interested in the 'narrative' behind particular materials – for example, what is its historical context and what cultural, social and moral messages does it send?

- **Health:** There is emerging concern for how products and buildings affect physical and psychological well-being. These trends are both influenced by and feed wider public concerns about personal health.

- **Mixed materials:** The huge range of materials now available and a more eclectic approach to design is encouraging a much greater mixing of materials.

- **Authentic and individual:** Parts of the design community are reacting against anonymous globalization. This suggests that rather than shipping generic products around the globe, companies can benefit from creating a unique profile and a unique assortment on each continent or in each country.

- **Pragmatic, durable and timeless:** Greater emphasis is being placed on timeless objects that are built to last rather than paying lip-service to passing fashions.

The relationship between architects and other stakeholders in the material decision process

Previous studies[24] have identified the main stakeholders in the building process as: developers, contractors, architects, structural engineers (performing different functions), authorities (local and national), material and service suppliers, and end-users. The building process is generally divided into a programme phase, a design phase, and a construction phase (and finally a use phase). Material selection generally takes place in the programme phase or design phase.[25]

The following section describes both the perceived attitudes and the power of each stakeholder based mainly upon the study of Roos *et al* (2010). It should be noted that the study focused on primarily Swedish organisations and it can be inferred the timber involved primarily to be softwood or temperate hardwoods.

Developers

In the 2010 study the developer was the most influential actor in the process. Low costs and rapid assembly for timber houses could influence the final decision for this stakeholder. In prestigious public space projects, clients tended to be mainly concerned with architectural design and aesthetics. The study revealed that any views regarding material selection usually related to the aesthetic feel of the building. In general developers were risk-averse in their planning of construction and any views they expressed regarding material selection were developed in a cost-constrained context.

Contractors

The study revealed that building firms were firmly planted in a tradition of using concrete. The contractor could also have an important element of control over material selection. The study's respondents identified the major building companies as the primary opponents of timber construction. In some cases, when a contractor was developing a building for sale, the material selected was concrete by default.

Architects

Architects were curious about timber use in the structural elements of buildings, but the study concluded that they had *limited authority* over the material choice. They valued wood as a building material and welcomed its environmental advantages. However, architects experienced some difficulty in ascertaining the advantages of timber for structural purposes. Softwood timber was seen as belonging to the Nordic tradition and therefore as appropriate for smaller one- and two-family houses. However, although timber was viewed with positive curiosity, architects emphasized that they are 'material-neutral' and that the preferred material depended on the contextual factors for each project. A survey[26] of North American architects engaged in non-residential construction, found that wood products were perceived to perform less well than steel and concrete in their contribution to high building value, durability, fire resistance and structural performance. Only on one issue – that of `environmental friendliness' – did wood products outperform the key non-wood competitors.

Architects are primarily responsible for producing a functional design that should also be aesthetically pleasing to the client. In prestigious public space projects, exposure of load-bearing elements could increase the attractiveness of a building. In housing projects, load-bearing elements were generally hidden in the structure. In such cases, the choice of the material for a loadbearing element was sometimes considered as the structural engineers' responsibility. In this study architects combined a positive regard on wood with a limited influence in the material selection process.

Structural Engineers

Structural engineers normally assume responsibility for the structural aspects of the project. A structural engineer quoted in the study stated that "*architects can influence the visible parts; the engineer influences the frame*". The study also noted that several respondents said that professionals in this category mainly favoured concrete. They sometimes had an indirect impact such as when they voiced unease regarding timber. Engineers were not always convinced that timber-building would be carried out with the necessary prudence on site.

Structural engineers' choice of materials for load-bearing elements was primarily influenced by their perceptions

[24] Roos et al (2010) *op. cit.*

[25] Nord, T (2008) *Prefabrication strategies in the timber housing industry – a comparison of Swedish and Austrian markets*. Doctoral thesis 2008:51. Dept. of Civil Environmental Engineering, Division of Structural Engineering – Timber Structures, Luleå University, Sweden. 210 pp

[26] Robichaud, F. et al. (2009). *Wood use in non-residential construction: a case for communication with architects*. Forest Products Journal January–February 2009

Stakeholder	Perception	Power
Developer	• *In prestigious buildings*: Aesthetics matter. • Otherwise: the focus is on construction and maintenance costs • Risk-averse	• **Highest** control over material selection
Contractor	• Negative attitude due to established experience with concrete • Corporate policy decisions to use concrete	• **Strong** due to experience • Has technical expertise and authority
Architect	• Interested but has a lack of experience and knowledge	• **Weak** • Unless there is a 'big name' involved and it is a special project
Structural engineer	• Somewhat negative • Education and work experience are mainly based on concrete • Perceives wood as risky	• **Weak**, but scepticism can destroy a timber proposal
Public authorities	• Neutral to slightly positive due to promotion campaigns • Since 1995, functional requirements replace material prescriptions	• **Potentially strong**
Timber material supplier	• Positive • However, low activity to market wood construction	• **Weak** due to fragmented industry
End-user	• Neutral • Price, location, comfort, and visual details matter more	• **Weak**

Table 2: Summary of stakeholder attitudes towards timber in construction[27]

of the feasibility of their engineering design: "tried and tested" approaches are the preferred choices. Therefore, the choice of a load-bearing element was often influenced by the engineers' educational background and experience-based interpretations of regulatory codes. Timber was viewed as suitable for one-family dwellings. For larger timber projects, engineers doubted the final performance of the timber construction. For some engineers, however, this view was combined with an overall positive view of timber construction and a curious desire to learn more. The engineers' power was described as being stronger than that of architects. However, the structural engineers' thorough experience with concrete generally narrowed the set of available materials.

Authorities

Authorities play a potential key role in the material selection process. However, they do not prescribe the material to be used. Because building regulations do not specifically prescribe the building material, the main position of building authorities towards timber was regarded by the study as neutral. No examples were reported of authorities' that favour one specific material in construction.

Wood Suppliers

While building component wood suppliers are rarely directly involved in most projects, they influence the process by issuing technical guidelines and providing service and support for their components and systems. In this regard steel and concrete suppliers were considered particularly helpful. Respondents working in the construction sector complained that timber material suppliers were rather anonymous and passive in marketing of timber products. Architects and structural engineers desired more product and systems innovation and support as well as more active, personal marketing. Respondents noticed that current marketing efforts did not match those of other material providers.

The Roos *et al* (2010) study revealed that the most influential parties in the process of material selection, from architects' and structural engineers' perspective, were developers and contractors, whereas the final user was often not aware of the structural material of the building. Inexperienced engineers were uncomfortable about timber construction alternatives, and architects noted that they had a rather limited influence on material selection. The study found that both engineers and architects believed they had only a limited power in the material selection suggest that their roles as 'systems integrators' should not be overstated. One cause for this limited impact may be that the preference for non-wood building methods lies more in the culture and 'standard practice' than in individual preferences. It concluded that these strategic decisions on building material are made at the top corporate level of the larger contracting firms by managers and economists.

By contrast a 2016 UK study[28] identified the key professionals influencing the timber adoption decision making process in the built environment are principally architects and architectural technologists. The contradictory findings of the Swedish and UK studies perhaps indicate that the influence of architects over material choice varies by country or project type.

The findings of Roos *et al* (2010) primarily apply to softwood and temperate hardwoods used within Scandinavian construction. As previously stated the study therefore did not explicitly touch upon tropical hardwoods as a material. The study has been quoted at length though as it provides in an insight towards attitudes towards wood in a society noted for its affinity towards using

[27] Adapted from: Roos et al (2010) *op. cit.*

[28] Omoregie, A. and English, M. (2016) *op. cit.*

wood. It indicates that wood per se has a tough time being specified in construction in a country with a strong tradition of using wood. If extrapolating this finding to tropical wood, it begins to reveal some of the difficulties that might be faced trying to get tropical wood products / materials specified.

The 2016 UK study[29] recognised that previous studies focused solely on the opinions and perceptions of architects and engineers. It recognised that few, if any, studies exist establishing the opinion and perception from an architectural technologist's perspective. These professionals are one of the key agents that drive the technical specification and technology selection within the construction industry and, as such, they may hold valuable knowledge and insight on the potential barriers to timber adoption within the housing market.

Offering a non-EU viewpoint, leading Canadian architect Michael Green sees new mass or engineered timber as a "*prime material for meeting our mounting environmental challenges and growing housing needs*". Green's practice MG-Architecture (MGA) has been one of the leading lights in North American timber building since launching in 2012 and is author of The Case for Tall Wood Buildings.[30] "*As we become better at improving the energy performance of buildings in-use, the carbon and wider environmental performance of our building materials themselves are set to become ever more significant factors in the overall impact of the structure. It may be a big statement, but the only way to build a high embodied carbon building is with wood. Some other materials, notably aluminium, have horrendous carbon footprints. We have this construction soup we're making and the only ingredient you can throw in flat out and come out carbon neutral is timber*".[31]

Green building initiatives & related influences

2

The previous section has considered the role of architects and their role, along with other stakeholders, in the process of choosing materials. Previous studies have not considered the growing influence of green building initiatives.

Buildings have extensive direct and indirect impacts on the environment. During their construction, occupancy, renovation, repurposing, and demolition, buildings use energy, water, and raw materials, generate waste, and emit potentially harmful atmospheric emissions. These facts have prompted the creation of green building standards, certification standards, and associated rating systems aimed at mitigating the impact of buildings on the natural environment through more sustainable design.

Figure 4: LEED Gold awarded Hotel 1882 Barcelona.
Photo: G White

For this study, a "green building" is defined as a construction project that is either certified under any recognized global green rating system or built to qualify for certification.[32]

Design, specification and construction to a green building certification standard add another layer of complexity and effectively another major "stakeholder" to the process. A green building certification standard might place restrictions or certain material types or construction methods and where used on a project – place great influence or constraint on the architect. Mr Green's "construction soup" thickens.

Green building – a growth area

The 2017 World Green Building Council survey[33] of 1,026 architects, contractors, builders, owners, developers and engineers indicated that globally green building continues to double every three years and that emerging economies like Brazil, India, Saudi Arabia and South Africa will be engines of green growth in the next three years, with development varying from two-fold to six-fold over current green building levels.
Their results also reveal that expansion will continue in countries like the US, Germany and the UK. Across all regions, many respondents forecasted that more than 60% of their projects will be green by 2018. The study found that green buildings offer significant operational cost savings compared with traditional buildings. To this effect, respondents expect a 14% savings in operational costs over

[29] Omoregie, A. and English, M. (2016) *op. cit.*
[30] Reviewed at - www.archdaily.com/220779/michael-green-presents-the-case-for-tall-wood-buildings
[31] Interview notes courtesy of Mike Jeffree (personal communication)
[32] Dodge Data & Analytics (2016) *World Green Building Trends 2016: Developing Markets Accelerate Global Green Growth SmartMarket Report*
[33] Dodge Data & Analytics (2016) *op. cit.*

five-year savings for new green buildings and 13% savings in operational costs over five years for green retrofit and renovation projects. Building owners also report that green buildings—whether new or renovated—command a 7% increase in asset value over traditional buildings. Overall, the survey data indicates that the global commitment to green building is "transforming the built environment".

The development of green building initiatives

The push toward sustainable design increased with the launch in 1990 of the UK based Building Research Establishment's Environmental Assessment Method (BREEAM), the first green building rating system in the world. In 2000, the U.S. Green Building Council (USGBC) followed suit and developed and released criteria also aimed at improving the environmental performance of buildings through its Leadership in Energy and Environmental Design (LEED) rating system for new construction. Since its first release, LEED has continued to grow and to include rating systems for existing buildings and entire neighbourhoods.

Others programmes also became established and responded to the growing interest and demand for sustainable design including the Green Building Initiative (GBI), which was created to assist the Canada based National Association of Homebuilders (NAHB) in promoting its Green Building Guidelines for Residential Structures. Although originally developed for Canada, GBI helped to make Green Globes available for use in the U.S. in 2005. Additional rating systems have been developed that were influenced by these early programs but are tailored to their own national priorities and requirements or seek to go beyond the limits of current policy and building practices to address broader issues of sustainability or evolving concepts such as net zero energy, and living and restorative building concepts that improve the natural environment.

Green product standards also began to appear in the marketplace in the 1980s and increased in the 1990s. Initially, many green product standards were developed in response to growing concerns for product toxicity and its impact on children's health and indoor environmental quality (IEQ). In the 21st century, when growing concerns over global warming and resource depletion became more prominent and supported by research, the number and type of green product standards and certifications grew.

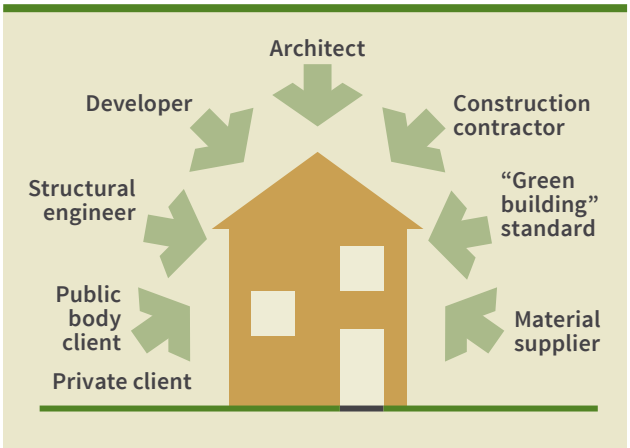

Figure 5: The full range of stakeholders influencing material decisions

The focus also expanded to include a broader range of environmental issues and the impacts of products during their manufacture, use, and reuse. While there is still no universal definition of a "green product", these products are intended to meet claims that they offer environmental benefits and adhere to certain standards.

There is now a proliferation of standards, ratings, and certification programmes in the marketplace to help guide, demonstrate, and document efforts to deliver sustainable, high-performance buildings. It is estimated that there are nearly 600 green product certifications in the world with nearly 100 in use in the U.S., and the numbers continue to grow.[34]

Rating tools vary in their approach and can be applied to the planning and design, construction, operation and maintenance, renovation, and eventual demolition phases of a green building. Rating tools can also differ in the type of buildings they are applied to, with specific tools or subsets of tools used for different building types such as homes, commercial buildings or even a whole neighbourhood.[35] The green building rating programmes in use around the world vary in their approach with some outlining pre-requisites and optional credits, while others take a prescriptive approach, and still others suggest performance-based requirements that can be met in different ways for different products and project types. As a result, it can be challenging and time consuming determining which standards, certifications, and rating programs are most credible and applicable to a particular project.

Green building ratings and timber

A number of green building initiatives now give credits for the use of certified timber; encouraging the use of sustainable timber in buildings and construction projects, and notable examples[36] include: Green Building Initiative (GBI), Green Globes (ANSI Standard), Energy Star & Leadership in Energy and Environmental Design (LEED).

Table 3 below, provides an overview of over 30 of the main ratings tools and standards. Where a programme offers multiple tools or standards (for example a set of criteria for residential buildings and also for other project types) the standard most applicable to residential buildings has been accessed.

Where the table states that a standard is not available this is either due to access to the standard being charged for (i.e. it is not freely available) or the standard was not identified via the host website. It should be noted that many of the programmes listed have multiple standards ranging from demolition to residential construction, and these range in page length from 20 to 400 pages. The table focuses primarily on the standard's references to timber (if any) and specific references to timber *sustainability* or *legality* (if any). It should also be noted that where criteria exist within the studies standards, it perhaps represents perhaps only a tiny fraction of the total weighting of the complete set of criteria.

[34] www.buildinggreen.com/material-selection
[35] www.worldgbc.org/rating-tools
[36] The Green Building Initiative - www.thegbi.org/about-gbi/

Global Programmes	Description	Last review date	References to FLEGT	Attitude to timber certification
UN Environment Programme, Sustainable Buildings and Climate Initiative[37]	UNEP launched the Sustainable Buildings and Climate Initiative (SBCI) in 2006. It promotes and supports sustainable building practices on a global scale with a focus on energy efficiency and GHG emission reduction. The initiative develops tools and strategies to better evaluate and implement sustainable building practices. Pilot projects demonstrate the important role of buildings for mitigation and adaptation to climate change. One of those pilot projects is UNEP's Sustainable Social Housing Initiative (SUSHI), which promotes sustainability in social housing programmes.	Unknown	No reference	No reference
World Green Building Council (GBCs)[38] (NOTE: Affiliated Councils highlighted below)	The World Green Building Council is a network of national GBCs in more than one hundred countries, making it the world's largest international organization influencing the green building marketplace. These GBCs strive to empower industry leaders to transform the local building industry.	Information given below		
EDGE International Finance Corporation (IFC)	An innovation of IFC, EDGE ("Excellence in Design for Greater Efficiencies") is an online platform, a green building standard and a certification system for over 150 countries. The EDGE application helps to determine the most cost-effective options for designing green within a local climate context. EDGE can be used for buildings of all vintages, including new construction, existing buildings and major retrofits.	Unknown		
Green Key Eco-Rating Program (Hotels)	The Green Key Eco-Rating Program is a graduated rating systems designed to recognize a wide range of hotels and lodging facilities for their commitment to improving environmental and fiscal performance.	Standard not available		
GRESB[40]	GRESB assesses and benchmarks the Environmental, Social and Governance (ESG) performance of real assets, providing standardized and validated data to the capital markets.	2019	No reference	Positive Certification bodies include, but are not limited to: Forest Stewardship Council (FSC); Programme for the Endorsement of Forest Certification (PEFC); Sustainable Forestry Initiative (SFI).
ICP[41]	The Investor Confidence Project (ICP) defines a clear road-map from retrofit opportunity to reliable Investor Ready Energy Efficiency™. With Commercial and Multifamily Energy Performance Protocols in place, ICP reduces transaction costs by assembling existing standards and practices into a transparent process that promotes efficient markets by increasing confidence in energy efficiency outcomes.	Standard not available		
International WELL Building Institute™ (IWBI™)[42]	The International WELL Building Institute™ (IWBI™) is a public benefit corporation whose mission is to improve human health and well-being in buildings and communities across the world through its WELL Building Standard™ (WELL™).	Undated	No reference	No reference
United States / Global **US Green Building Council - Leadership in Energy and Environmental Design (LEED)® Green Building Rating System V.4**[43]	Leadership in Energy and Environmental Design is the most widely used green building rating system in the world. Available for virtually all building, community and home project types.	2012	No reference	Positive

Table 3: Overview of green building initiatives

[37] www.unenvironment.org/explore-topics/resource-efficiency/what-we-do/cities/sustainable-buildings
[38] www.worldgbc.org
[39] www.edgebuildings.com/marketing/edge/
[40] gresb.com/gresb-real-estate-assessment/ & documents.gresb.com/generated_files/real_estate/2019/real_estate/reference_guide/complete.html
[41] www.eeperformance.org/ & www.eeperformance.org/files/theme/ICP_Protocol_NA_Standard_Multifamily.pdf
[42] v2.wellcertified.com/v/en/materials
[43] www.epa.gov/smartgrowth/us-green-building-councils-leadership-energy-and-environmental-design-leedr

National programmes					
Country	**Name of programme**	**Description**	**Date of last review**	**References to FLEGT**	**Attitude to timber certification**
Australia	**GBC Green Star**[44]	Green Star certification is a formal process during which a building, fit out, or precinct is awarded a rating by an independent, third party assessment panel of sustainable development experts through a documentation-based assessment. A Green Star certified rating provides independent verification that a building or community project is sustainable.	2019	No reference	Positive FSC & PEFC referenced
China	**Assessment Standard for Green Building of China**[45]	Under development	2019	Unknown	Unknown
France	**HQE**[46]	HQE™ is the French certification awarded to building construction and management as well as urban planning projects. HQE is managed by a group of stakeholders within a recognised public service organisation called, HQE Association. The French certification trademark is NF HQE™. There are three bodies in charge of delivering certification in France: • **Certivea** for local planning and non-residential buildings that are being built, renovated or used; • **Cerqual** for Residential buildings, renovated or used; • **Cequami** for detached houses.		Standard not available	Unknown
Germany	**DGNB System**[47]	The DGNB system is intended to be used both as motivation and as a planning tool, to enable demonstrably better buildings to be built and managed.	2018	No reference. Negative towards uncertified tropical wood. "A minimum requirement for awarding of quality level 1.2 or 1.3 for installed wood and wood products is, above all, that wood harvested via uncontrolled extraction in tropical, subtropical and boreal climate zones must not be used. The use of tropical, subtropical or boreal woods that lack certification constitutes a failure to meet this minimum standard. In this case, no points will be awarded."	Positive FSC & PEFC given as examples
Hong Kong	**BEAM Plus**[48]	The Hong Kong Green Building Council Limited (HKGBC) is a non-profit, member led organisation established in 2009 with the vision to help save the planet and improve the wellbeing of the people of Hong Kong by transforming the city into a greener built environment.	2019	No direct reference. Refers to acceptability of Known, Licensed Sources (WWF definition)	Positive

Table 3 continued: Overview of green building initiatives

[44] new.gbca.org.au/green-star/certification-process/ & www.gbca.org.au/green-star/materials-category/revised-timber-credit/?_ga=2.90922906.129503900.1573386596-1929328975.1573386596

[45] www.worldgbc.org/sites/default/files/Introduction%20to%20China%20Green%20Building%20Assessment%20Standard%203rd %20Edition.pdf

[46] www.behqe.com/

[47] www.dgnb-system.de/en/system/version2018/ & https://static.dgnb.de/fileadmin/dgnb-system/en/buildings/new-construction/criteria/02_ENV1.3_Sustainable-resource-extraction.pdf?m=1573216253&

[48] www.hkgbc.org.hk/eng/beam-plus/beam-plus-new-buildings/

Indonesia	**Greenship**[49]	For the green building benchmarks in Indonesia, GBC Indonesia issued a rating tool titled GREENSHIP. GREENSHIP was developed by Green Building Council Indonesia (GBC Indonesia) by considering the conditions, natural character and regulations as well standards that apply in Indonesia.		Standard not available	Unknown
Ireland	**Home Performance Index**[50] **(Irish Green Building Council - IGBC)**	From design to build, the Home Performance Index represents a first in Irish residential development certification. For developers and buyers the HPI is a trusted seal of quality based on crucial indicators, because both makers and takers need to know that their house is a home.	2016	No reference	No criteria for timber
Italy	**GBC Italy (GBC Home / GBC Quartieri** **GBC Condomini / GBC Historic Building))**	The Italian chapter of the Green Building Council.		Standard not available	Unknown
Japan	**CASBEE**[51]	Comprehensive Assessment System for Built Environment Efficiency (CASBEE) is a method for evaluating and rating the environmental performance of buildings and the built environment.		Standard not available	Unknown
Korea, Republic of	**KGBC Korea Green Building Certification**[52]	A rating tool within the KGBC rating system is referenced as Green Building Certification Criteria (GBCC). GBCCs were developed for use by either the national or local (e.g., municipal) governments. The objectives of the KGBC and its tools are to evaluate the environmental performance of buildings and promote dissemination of green building in Korea.		Standard not available	Unknown
Latvia	**BREEAM – LV**[53]	Latvian Sustainable Building Council (LSBC) uses an adapted version of BREEAM.		Standard not available	Unknown
Malaysia	**Green Building Index**[54]	GBI is designed specifically for the tropical climate (hot and humid) and Malaysia's current social, infrastructure and economic development.	2013	No reference	Positive Compliance with certifications issued by: 1. Forest Stewardship Council (FSC), OR 2. Malaysian Timber Certification Scheme (MTCS).
The Netherlands	**BREEAM – NL**[55]	BREEAM-NL comprises four different labels. First BREEAM-NL New Construction and Renovation. This label is operational since September 2009. It is used to determine the sustainable performance of new buildings. The second label is BREEAM-NL In-Use. The third label is BREEAM-NL Area Development (2011) and assesses the sustainability performance of an area development. In 2013 BREEAM-NL Demolition was launched to assess the sustainability of demolition projects.	2014 (construction standard)	No direct reference. Requires all wood to be "100% legally harvested"	Positive All the wood that is processed in the building is certified by a certification system approved by the Timber Procurement Assessment Committee.

[49] www.gbcindonesia.org/greenship
[50] homeperformanceindex.ie/wp-content/uploads/2016/12/HPI-Checklist-23.01.18.pdf
[51] www.ibec.or.jp/CASBEE/english/
[52] https://www.esci-ksp.org/archives/project/korea-green-building-certification-kgbc
[53] www.ibp.lv/en
[54] new.greenbuildingindex.org/Files/Resources/GBI%20Tools/GBI%20RNC%20Residential%20Tool%20V3.0.pdf
[55] www.breeam.nl/

Country	Name of programme	Description	Date of last review	References to FLEGT	Attitude to timber certification
New Zealand	**Homestar (GBC New Zealand)**[56]	Homestar rates whole buildings, rather than building components such as products and materials. Under Homestar, materials that have certain attributes can receive points that contribute to the overall score of a rated home.		No reference	Positive FSC only
Norway	**BREEAM – NOR**[57]	An adapted version of BREEAM developed for Norway.	2019	No direct reference. Examples of compliance: Legally harvested: • FSC, PEFC or SFI certification • Evidence of compliance with the EUTR (EU's Timber Regulation) • Risk assessment/due diligence documentation demonstrating a low risk of non-compliance with the 'legally harvested' requirements given in the manual.	Positive reference: FSC, CSA, SFI with CoC, PEFC Acceptable: MTCC, Verified, SGS, TFT
Philippines	**BERDE**[58]	In 2009, the BERDE Program was established by the Philippine Green Building Council (PHILGBC) as an appropriate response to the Philippine building industry's need to proactively address the negative impacts of climate change.		Standard not available	Unknown
Sweden	**BREEAM – SE**[59] **Miljöbyggnad** **Citylab** **GreenBuilding**	Not available in English.	2017	Unknown	Unknown
Turkey	**CEDBIK-Konut Green building certification system (BREEAM)**	Not available in English.		Unknown	Unknown
United Kingdom	**BREEAM**[60]	BREEAM is an international scheme that provides independent third party certification of the assessment of the sustainability performance of individual buildings, communities and infrastructure projects.	2018	No direct reference Refers to 100% of timber and timber-based products used on the project are 'Legal' and 'Sustainable' as per the UK Government's Timber Procurement Policy (TPP)	Positive 'Legal' and 'Sustainable' as per the UK Government's Timber Procurement Policy (TPP)
United States	**Green Building Initiative's Green Globes Rating System**[61]	Green Globes© is a web-enabled, fully interactive green building assessment and certification programme. It includes an on-site visit by a third-party assessor and comprehensive customer support.	2018	No reference	Positive
Viet Nam	**LOTUS**[62]	No information available		Unknown	Unknown

Table 3 continued: Overview of green building initiatives

There are a number of other schemes affiliated with the World Green Building Council[63] which have not been reviewed.[A]

[56] www.nzgbc.org.nz/ & https://12253-console.memberconnex.com/Attachment?Action=Download&Attachment_id=2120

[57] byggalliansen.no/sertifisering/breeam/om-breeam-nor/

[58] berdeonline.org/

[59] www.sgbc.se/certifiering/breeam-se/

[60] www.breeam.com/discover/how-breeam-certification-works/

[61] www.thegbi.org/green-globes-certification/

[62] vgbc.vn/en/lotus-en/rating-systems/

[63] www.worldgbc.org/rating-tools

[A] Other systems identified include: ARZ System – Lebanon; Casa – Colombia; DGBC Woonmerk – Denmark; DGNB - Switzerland; GBC Brasil CASA – Brasil; GreenSL – Sri Lanka; Green Star SA – South Africa; Green Star SA Kenya – Kenya; INSIDE/INSIDE – The Netherlands; NABERSNZ – New Zealand; OMIR – Kazakhstan; Pakistan Green Building Guideline (PGBG) BD+C – Pakistan; PEARL - Abu Dhabi; PEER – USA; Singapore Green Building Product/Services Certification – Singapore; SITES – USA; VERDE - Spain

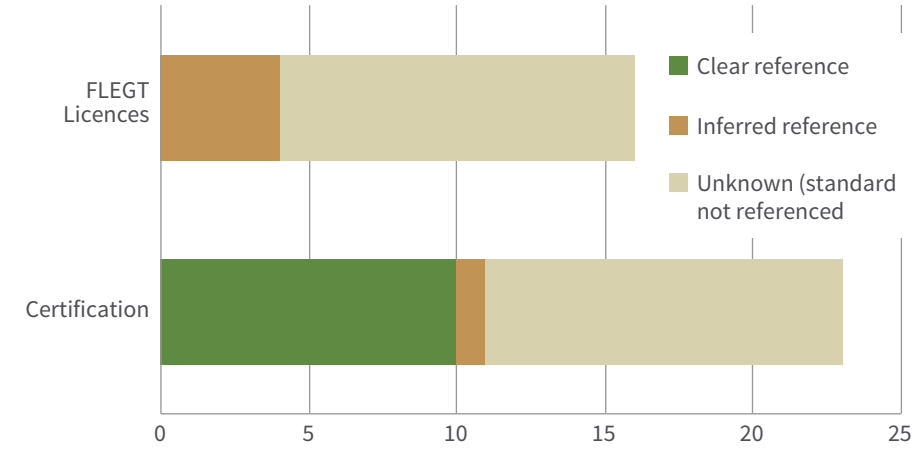

Figure 6: Reference to certification and FLEGT Licences in green building standards.

Green building programmes' attitudes to wood sourcing

As with previous IMM Studies it is clear that the forest certification has made some progress with influencing the development of standards with a number of the programmes assessed making direct reference to forest certification and CoC as a positive indicator of the sustainability of wood-based materials within an assessed project.

The number of programmes making any direct or even inferred reference to FLEGT is very modest. The German DGNB standard specifically excludes any tropical timber that is not certified – the only example of this type found in this sample. The study results resonate with the thoughts of architect Michael Green who believes too that greater credit for building with wood should be given by green building schemes, such as LEED and BREEAM, which '*formed their mind-sets and criteria at a time when chopping down any trees was considered bad*'.[64]

The majority of the standards assessed are reviewed frequently and several of the largest in terms of uptake have been reviewed within the past three years indicating that these standards are still evolving rapidly and that there are opportunities at a national / central level to amend the indicators used to determine ratings.

Mixed messages from technical organisations

At a technical level there are numerous organisations across Europe that seek to provide advice to specifiers, especially architects and engineers on how to use and specify wood.

Organisations such as TRADA[65] in the UK and CNDB in France are well established in this role. Whilst outside the scope of this study it is worth noting that CNDB[66] makes no reference to tropical hardwoods in its guidance on external wood cladding – an end use well suited to many species of tropical hardwood. This contrasts with TRADA's approach which has environmental information regarding over 150 species, many of which are tropical, and has produced a series of guides and standards addressing sustainability in design.

Architect attitudes to wood and other construction materials – study results

3

Between July and October 2019 a number of architects were approached to complete an online questionnaire developed for this study. Those approached were asked to complete the questionnaire remotely and to answer a series of questions making general comparisons of preferences between wood as a material in comparison with other commonly used materials - concrete, steel, aluminium, plastics and composites. The design of the questions drew upon the previous studies identified in section 4 (*Studies on architects attitudes towards timber in construction*) and sought to identify general preferences towards materials. The questions did not specifically refer to types of wood, such as tropical, temperate, hardwood or softwood. The purpose of this was to allow comparison with the previous studies referenced.

Country	Number of responses
Belgium	2
France	2
Germany	3
Italy	3
Portugal	1
Spain	1
The Netherlands	2
United Kingdom	3
Total	**17**

Table 4: Responses to the IMM questionnaire – Part 1

64. Interview notes courtesy of Mike Jeffree *op. cit.*

65. www.trada.co.uk

66. CNDB (2008) Les essentials du bois - 5 Revetements exterieurs en bois. Downloaded from: www.cndb.org

In total 17 different architectural practices from eight European Union countries completed the questionnaire. Four of the responses were from practices identified as being amongst the largest in Europe (see *Architects in Europe*).

For each property the question asked: *"For a range of different properties can you place the following materials in terms of preference? Assign figures between 1 (least suitable) and 10 (most suitable) material."*

Results

The results are presented graphical, grouped by general themes. The responses are rated from 0 to 10 and in all charts represent the average rating of those that responded.

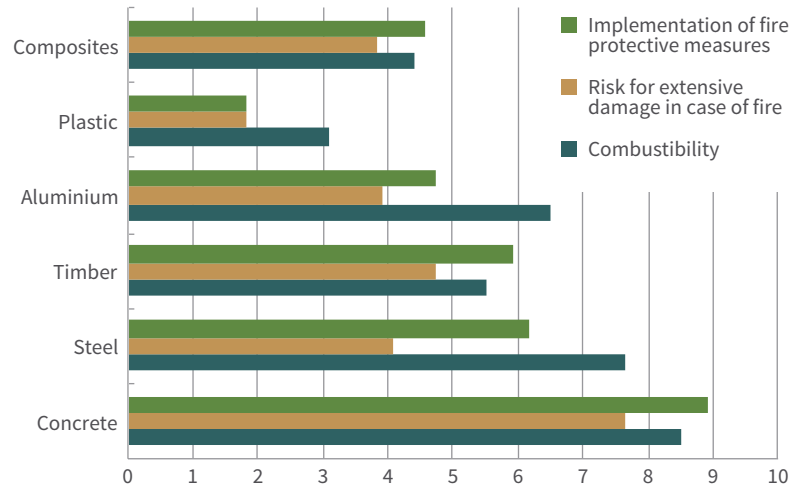

Figure 7: Fire related properties.

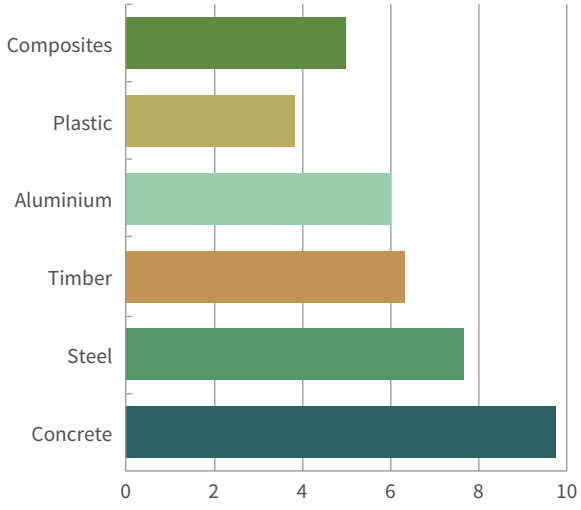

Figure 8: Compliance with building codes.

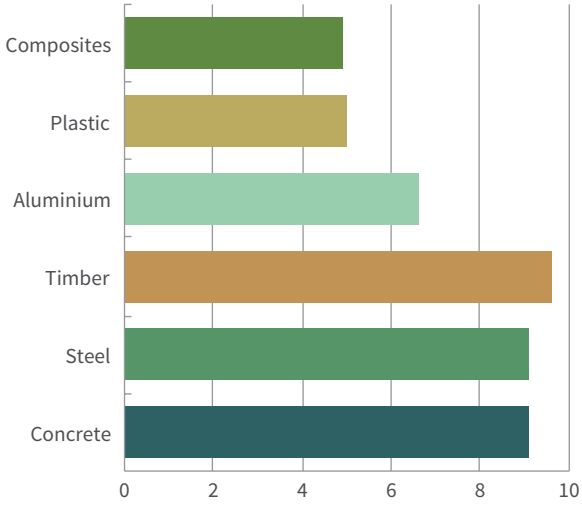

Figure 9: Visual appeal.

Fire related properties

Concrete has the highest perception ratings for fire related properties. Timber and steel have similar levels of positive perception. Plastic has by far the least positive level of perception.

Compliance with building codes

For ease of compliance with building codes concrete has the most positive perception followed by steel. Timber is the third most positively perceived material scoring higher than composites, plastics and aluminium.

Visual appeal

Timber was regarded by the respondents as the most visually appealing material, though closely followed by steel and concrete.

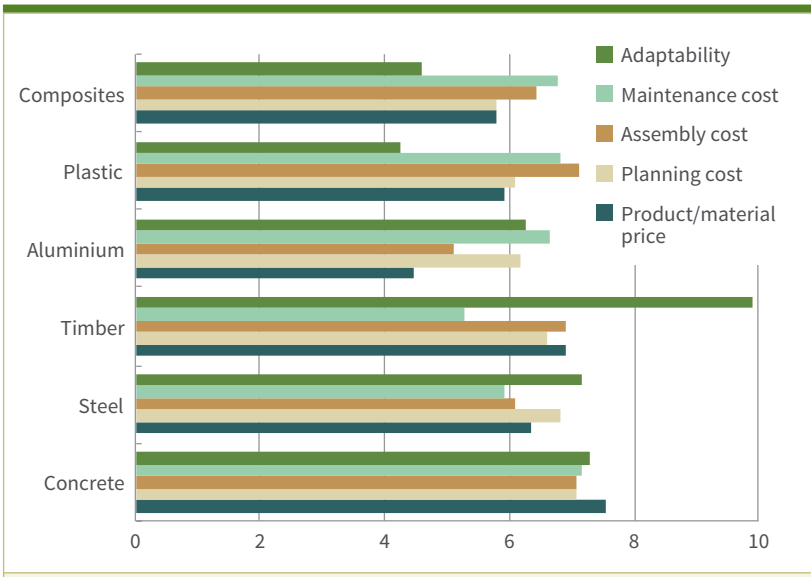

Figure 10: Cost and Adaptability

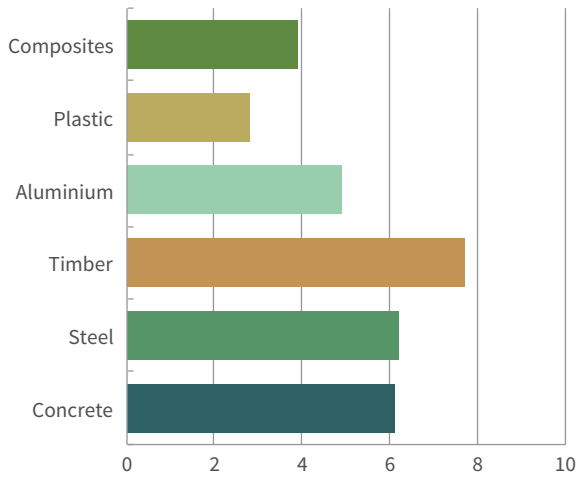

Figure 11: Availability of credible data on environmental aspects.

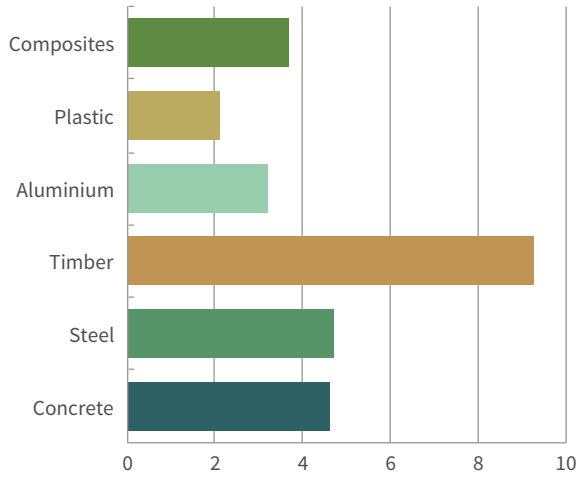

Figure 12: Environmental impacts associated with production of materials.

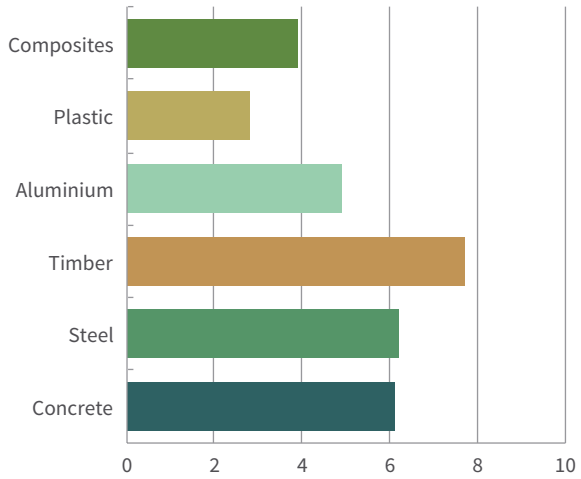

Figure 13: Associated/alleged occupational health concerns

Costs & Adaptability

With little to choose across a range of cost related topics timber stands out as being perhaps regarded as the most adaptable material.

Environmental impacts

The environmental impacts associated with production of timber have by far the most positive perception compared to the other materials under consideration. The credibility of available data is also perceived most highly for timber.

Associated / alleged occupational health concerns

Timber, followed by steel and concrete, has the most positive perception with respect to associated or alleged occupational health concerns.

Physical properties of the material

Across a range of physical properties timber is generally perceived favourably. Overall both concrete and steel are perceived more favourably across a range of physical attributes. One area where timber excels is its acoustic and thermal insulation properties.

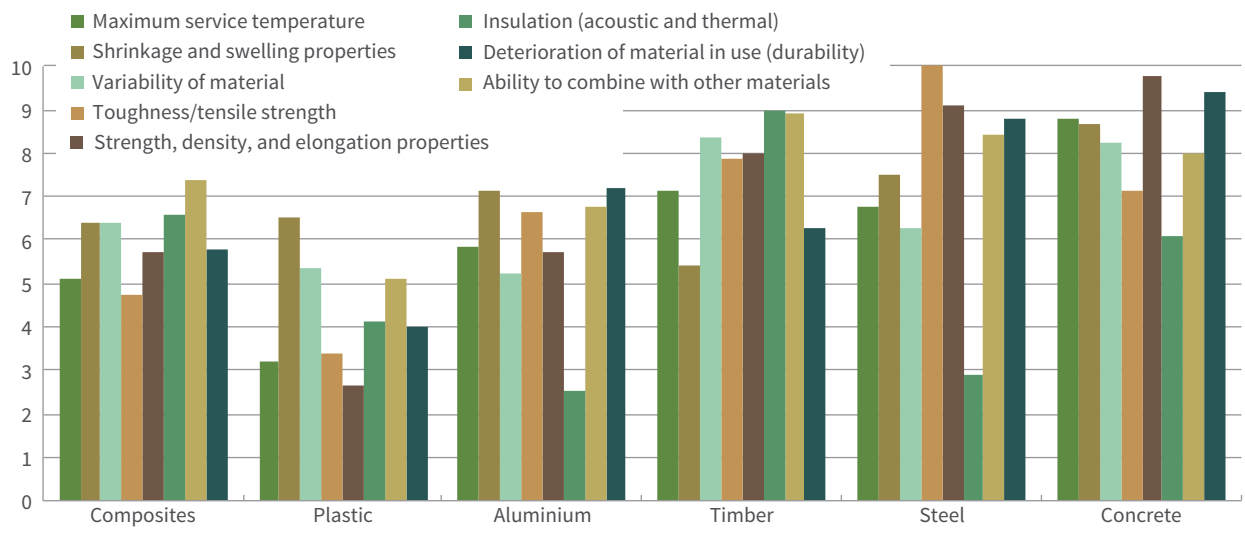

Figure 14: Physical properties of materials.

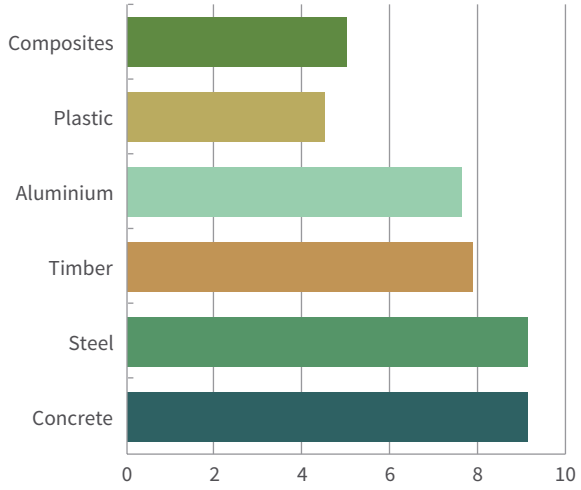

Figure 15: Availability of credible data on physical and mechanical properties.

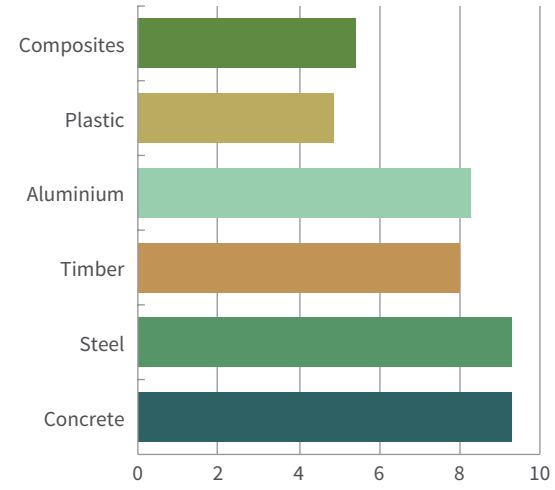

Figure 16: Availability of CAD / modelling data.

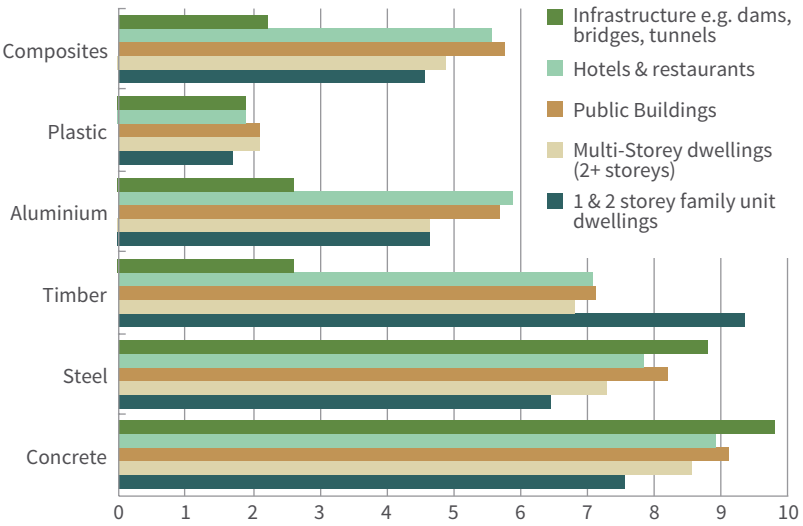

Figure 17: Suitability for different types of end-use.

Performance data and modelling

With the exception of plastics and composites there is little to choose between materials with respect to perceptions of the availability of data.

Suitability for different types of end-use

For single and two storey buildings timber is perceived most favourably of the materials. For public buildings and hotels concrete and steel are more favourably perceived. For infrastructure projects concrete and steel are by far the most favourably perceived materials.

Finishing applications

For interior finishes timber is cleary preceived more favourably. For exterior finishes aluminium, concrete and timber all have similar high levels of preference.

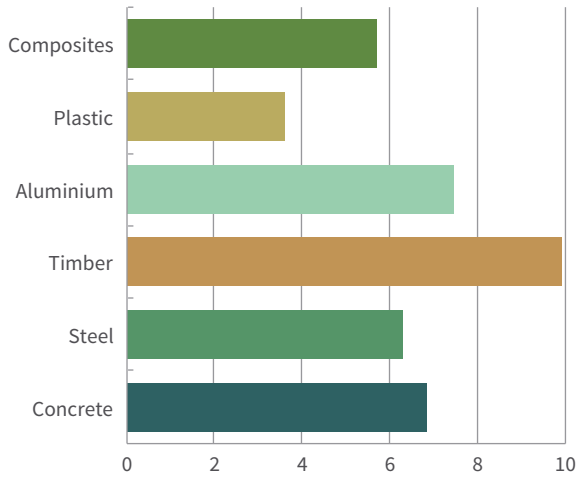

Figure 18: Interior finishing applications.

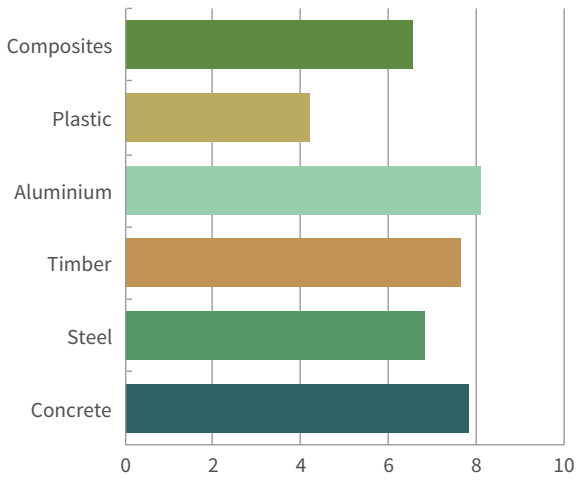

Figure 19: Exterior finishing applications.

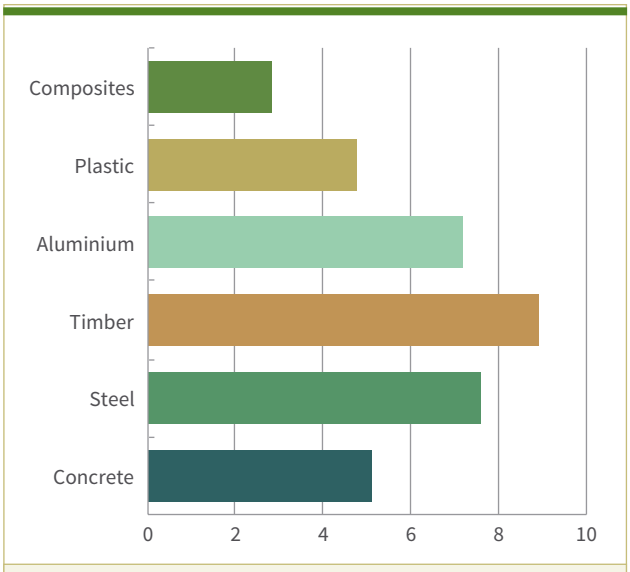

Figure 20: Potential for recycling.

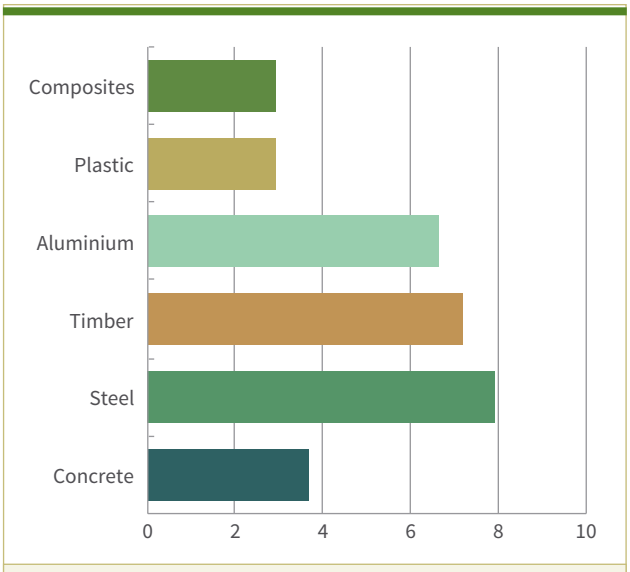

Figure 21: Potential for recycling.

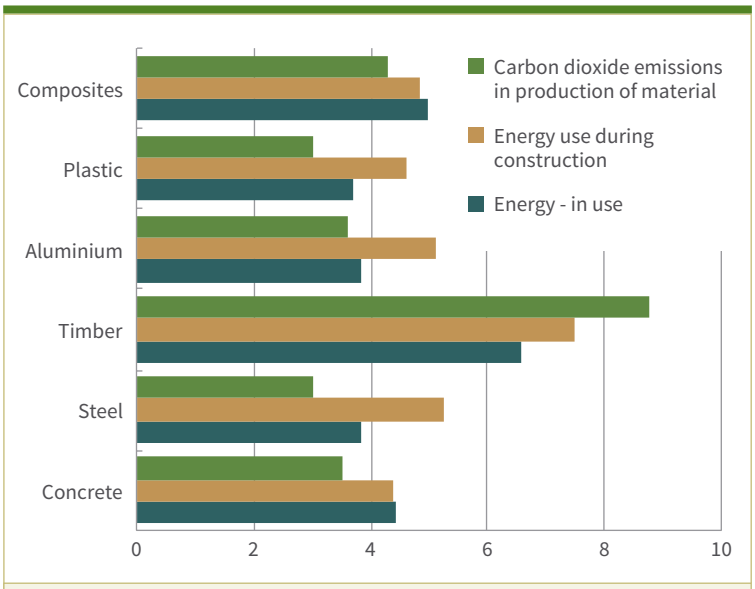

Figure 22: Energy and Carbon dioxide.

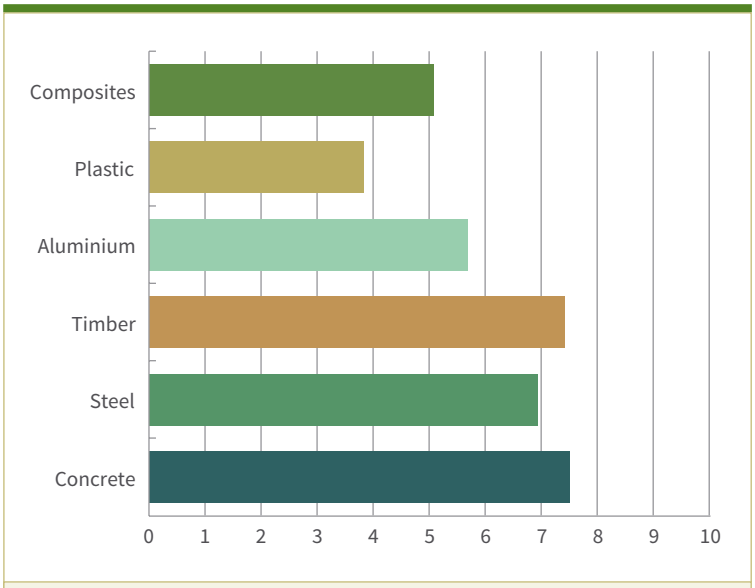

Figure 23: Overall scoring of preferences for 35 questions.

Recyclability and Reusability

Timber is perceived most favourably for its ability to be recycled and for its reusability.

Energy & Carbon dioxide

Timber is perceived most favourably for its low energy use in construction and its energy usage whilst in service. Timber is also perceived as having by far the most positive profile regarding carbon dioxide emissions during production. In terms of energy and carbon dioxide emissions timber is clearly perceived most favourably of the materials under consideration.

Overview of comparisons

As indicated by the accompanying table and chart a simple compilation of the scores for all 35 questions indicates that timber is perceived well by those participating. With an average score of 7.4, timber is only perceived more favourably by concrete (7.5).

The simple comparison ignores any relative weighting between properties and attributes but does perhaps provide an interesting comparison across a very broad range of properties.

Overall	Total (35 categories)	Average
Concrete	262.1	7.5
Steel	242.3	6.9
Timber	258.9	7.4
Aluminium	198.3	5.7
Plastic	133.9	3.8
Composites	177.5	5.1

Table 5: Overall scoring of preferences for 35 questions

4 Architect attitudes to tropical wood – study results

The previous section has considered "wood" as a generic material without consideration to softwood or hardwood, temperate or tropical in origin. It provides a useful reference for general attitudes of architects towards wood as a material. It does not provide any insight to wood of tropical origin. To try and provide more insight in to wood of tropical origin a second questionnaire was developed. This questionnaire was again targeted at architects based within the European Union. A major point of difference with the first questionnaire was that this questionnaire was used within an interview context and allowed for significantly more narrative to be recorded. Typically interviews were conducted face to face or over the telephone and averaged around 30 minutes of discussion.

In total 22 interviews were conducted with architectural practices based in nine EU Member States. Of these interviews, six where conducted with organisations previously noted as being amongst the largest 100 in the world (6 out of 34 based in Europe). The size of the practices varied widely, the smallest with a single employee and the largest with over 900 employees in offices spread across the EU. The average size was 120 employees though when the three largest practices with over 100 employees are removed from the total the typical size range is 15-25 employees per practice (please note many practices use freelance / consultants and these have been included in these totals).

Country	Number of responses
UK	5
France	3
Germany	3
Italy	3
Netherlands	3
Belgium	2
Austria	1
Portugal	1
Spain	1
Total	**22**

Table 6: Responses to the IMM questionnaire – Part 2

Results

The following sections cover each question within the questionnaire. Where appropriate graphs are used and other sections contain direct quotes or summaries of the responses.

Primary sources of information of using wood in projects

This question related to wood generally. It sought to identify where or to whom architects turn to for advice regarding choosing to use a wood product within a project.

It revealed that the primary source of information is a colleague or peer. The second most frequent `go to' source

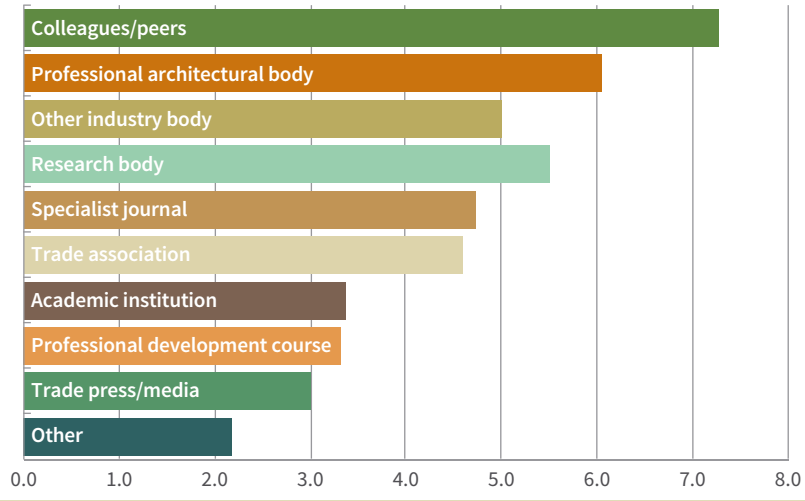

Figure 24: Primary sources of information for using wood in a project.
NOTE: The bars represent the frequency of preferences

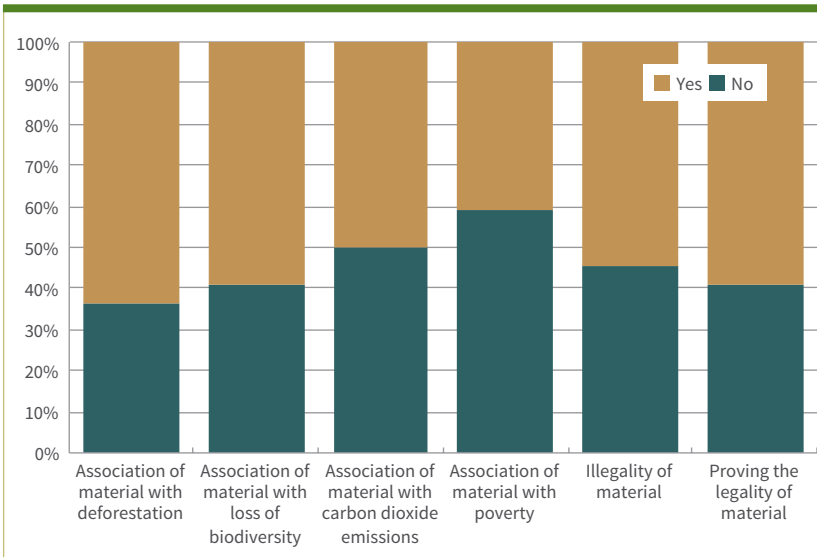

Figure 25: Response to questions concerning tropical wood sourcing.

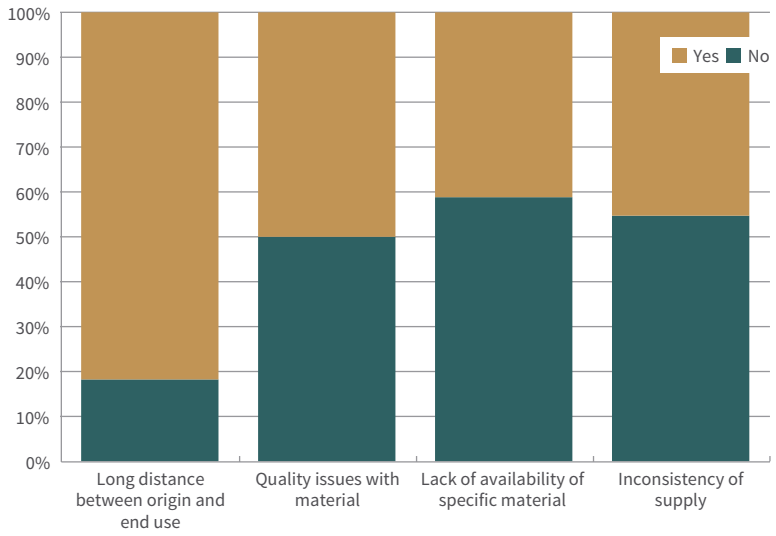

Figure 26: Response to questions concerning locality of sourcing and material consistency

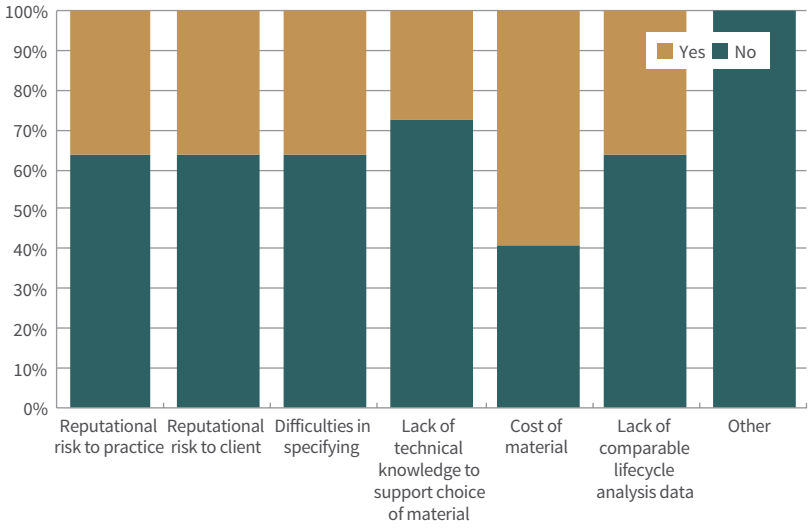

Figure 27: Response to questions of risk and other issues

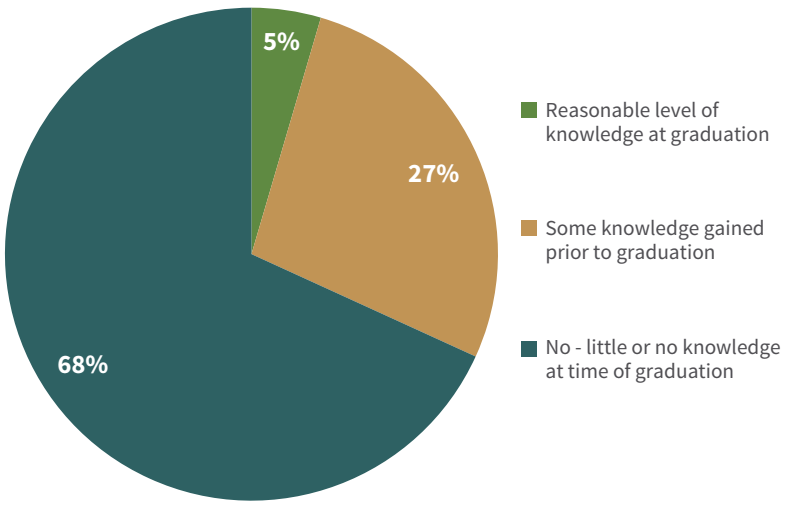

Figure 28: Levels of awareness around tropical timber upon graduation

is a professional body for architects. The "Other" response included a variety of response, which most frequently referred to the "internet" and to receiving advice from "trusted material suppliers".

Concerns over using tropical wood

The questionnaire asked the architects to list specific concerns they have over using tropical wood within their projects. Using a simple yes or no response they were asked a series of questions regarding potential concerns when specifying tropical timber for projects.

The majority of respondents expressed concerns over potential association with deforestation, loss of biodiversity, carbon dioxide emissions, poverty and the legality of the material. Proving the legality of the material and concern over association with deforestation were marginally the greatest concerns expressed in this group of questions.

Despite the variability of tropical wood given the wide range of species involved concerns over quality, availability of selected species and consistency of supply were not identified as major issues by the majority. The long distance between points of harvest and end-use in Europe was identified as a concern by over 80% of respondents.

Within this group of questions the cost of the material was identified as the most significant concern.

Levels of awareness upon graduation

The interviewees were asked if when they graduated / qualified if they felt they had sufficient knowledge of any of the concerns listed (see Figure 22-24) to be able to discuss them in the work environment. Over two thirds of respondents stated they had little or no knowledge of these issues. Only 5% felt suitably equipped to discuss these issues upon graduation.

Most (though not all) of those interviewed stated that they had made some efforts over time to better understand these issues.

> *"We had some knowledge of the transformation process but no knowledge of the materials as such. This is clearly a big knowledge gap here."*

Experience of specifying tropical wood

The interviewees were asked if they had specified tropical timber within any of their projects and to give their reasons for doing so. They were also asked for their primary reason for not choosing tropical wood if they had not specified it. Answers were spontaneous and no guidance or examples were offered in the question itself.

Reasons for using tropical timber within specification varied though were dominated by some species having natural durability lending themselves to exterior applications. The inherent aesthetics of tropical wood was also offered as a rationale. Two of the larger practices interviewed stated that they used tropical widely – though only in their Asian projects (and both pointed out that they used tropical wood very infrequently within their European projects). Other reasons given for specification included the need to match to existing designs, client preference for a certain species or aesthetic and using Dark Red Meranti specifically to meet fire regulations for doors and windows.

The majority of those interviewed that do not specify tropical timber either do not do so on principle or do not do so as they perceive tropical timber to be relatively expensive compared to other materials. Others expressed concerns that the length of the supply chain from tropical forest to European construction site was to long (i.e. the carbon footprint was too high or the building rating scheme they use does not allow such travel distances). One response stated that there was a perception of a shortage of suitable material.

Environmental assurances sought

The interviewees were asked what environmental assurances they seek when specifying tropical wood. Answers were spontaneous and no guidance or examples were offered in the question itself.

The narrative nature of the responses ensures that the responses are unquantifiable. The quotes below give a flavour of the range of responses given. Views range from those who have no interest in the origins of tropical wood (who will specify when requested) to those who are aware of FLEGT and Licensed Timber. The responses also indicate the limited influence (in this sample) of 'green building' schemes and the wide adoption of forest certification schemes. The responses also include a proportion of respondents who will not specify tropical wood (for reasons discussed above).

The responses cover the full range from what might be regarded as complete ignorance of the issues through to a detailed technical understanding of the subject (and all points in-between).

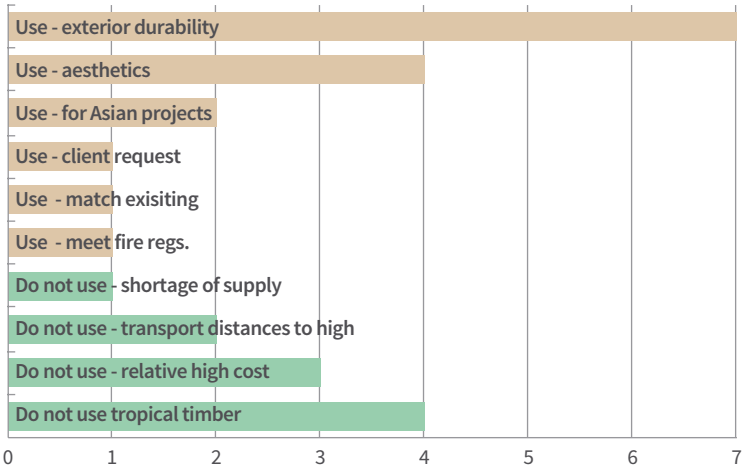

Figure 29: Reasons for specifying and not specifying tropical timber in projects. *(n= number of responses) NOTE: interviews could give multiple answers.*

"We are aligning our practice with the UN Sustainable Development Goals (aim for April 2020 compliance) and one aim under this process is for the specification of locally-sourced (where possible), 100% certified timber only."

"Forest Law Enforcement, Governance and Trade (FLEGT) - licensed timber or equivalent sources."

"Compliance with requirements of BREEAM, LEED or SKA requirements as appropriate"

"Our specifications note:
- The laws governing forest management in the producer country or countries
- CITES
- Documentary evidence (which has been or can be independently verified)"

"We are very sensitive to the environmental problems that are affecting us more and more. So we are attentive to the way the materials are produced, conveyed ..."

"If the information provided is too limited we cannot pursue with that supplier."

"Good reputation of suppliers (general reputation, not only suppliers certified)"

"I would avoid tropical timber because I think there should be domestic alternative (hardwoods)"

"Ecolabelling/ third party certification -mostly FSC or PEFC. We have some reservations about the certification process but we have no other choice but to trust our suppliers."

"It needs to be certified and traceable."

"Generally we are obliged to specify FSC. But we have a non-tropical policy"

"We work mostly for a high end private clientèle so environmental issues are not an issue for our customers. Neither is it a concern for us."

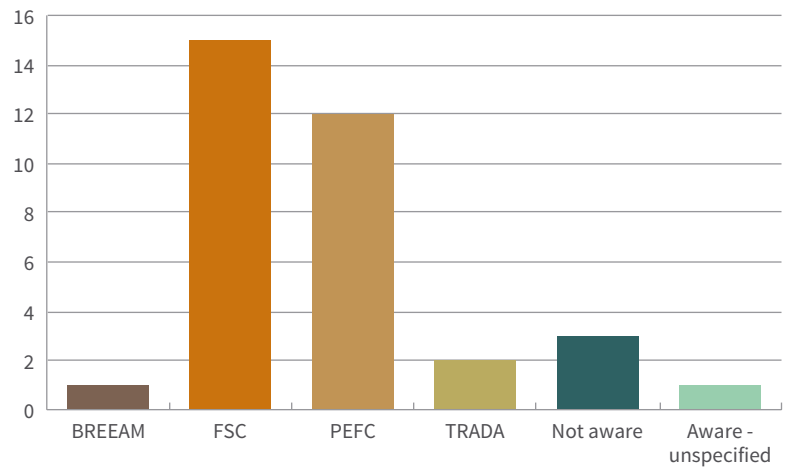

Figure 30: Knowledge of schemes assuring responsible production of timber (n-number of mentions) *NOTE: interviews could give multiple answers.*

"We are not requiring any environmental assurances when specifying tropical wood"

Assurance schemes

The interviewees were asked if they were aware of any schemes that aim to assure responsible production of timber. Answers were spontaneous and no guidance or examples were offered in the question itself.

In total 19 out of 22 respondents were able to name at least one scheme that they considered offered assurance of production. FSC and PEFC certification were by far the most dominant responses.

Perceptions of procurement policies and the role of FLEGT Licencing

FLEGT process

The interviewees were asked if they were aware of European Union led processes that aim to promote good forest governance in major timber supplying countries and guarantee the legality of all timber produced in those countries.

The unprompted responses showed that over two thirds of those interviewed were not aware of any EU led processes in this context. Around a quarter stated they were aware but were not able to give an example. A small percentage were able to mention FLEGT, both UK based.

The question was followed by a statement read to the interviewee. The statement[67] was as follows:

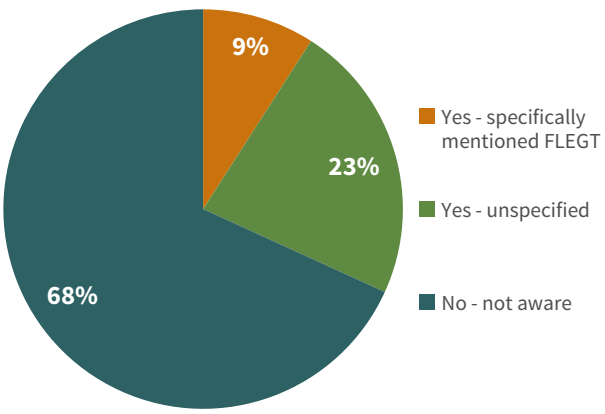

Figure 31: Awareness of FLEGT process

[67] Text taken verbatim from - www.euflegt.efi.int

The EU FLEGT action plan

"In 2003, the EU adopted the Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan to address illegal logging and associated trade on the basis of cooperation between producers and consumers and a combination of demand- and supply-side measures.

Its supply-side measures include Voluntary Partnership Agreements (VPAs), which are legally binding trade agreements between the EU and timber-exporting countries outside the EU.

Fifteen tropical countries are implementing or negotiating VPAs. Together their forests cover an area the size of the EU and they account for 80% of EU tropical timber imports.

The countries implementing VPAs are Cameroon, Central African Republic, Ghana, Indonesia, Liberia and the Republic of the Congo. Indonesia is the first to reach the milestone of exporting FLEGT licenced products. Ghana is also at an advanced stage of VPA implementation. The countries negotiating VPAs are Côte d'Ivoire, the Democratic Republic of the Congo, Gabon, Guyana, Honduras, Laos, Malaysia, Thailand and Vietnam."

After hearing the statement the interviewee was asked to give their opinion based upon a selection of answers – they were asked to choose the most appropriate response based on their reaction to the statement.

The majority of respondents found the statement somewhat reassuring though they would need to know more detail. Eighteen percent were not reassured but open to further information on the topic. One respondent remained sceptical and two others were reassured and confident to continue specifying tropical wood based on this statement.

Anti-illegal logging legislation

The interviewees were asked if they were aware of processes that aim to ensure a negligible risk of any illegal timber being traded within the EU.

The unprompted responses revealed that only 5% of respondents spontaneously named the EU Timber Regulation. Similar levels of response were given for FSC and "chain of custody", leaving 86% of respondents unable to name a process.

The question was followed by a statement read to the interviewee.

The statement[68] was as follows:

The EU Timber Regulation

"The EU Timber Regulation aims to reduce illegal logging by ensuring that no illegal timber or timber products can be sold in the EU. It was created as part of the EU's FLEGT Action Plan.

The EU Timber Regulation came into force on 3 March 2013. It prohibits operators in Europe from placing illegally harvested timber and products derived from illegal timber on the EU market. 'Legal' timber is defined as timber produced in compliance with the laws of the country where it is harvested. All timber and timber products with a FLEGT licence automatically comply with the EU Timber Regulation. This means that when purchasing FLEGT-licensed timber, EU operators do not need to carry out additional due diligence checks."

After hearing the statement the interviewee was asked to give their opinion based upon a selection of answers – they were asked to choose the most appropriate response based on their reaction to the statement.

[68] Text taken verbatim from - www.euflegt.efi.int

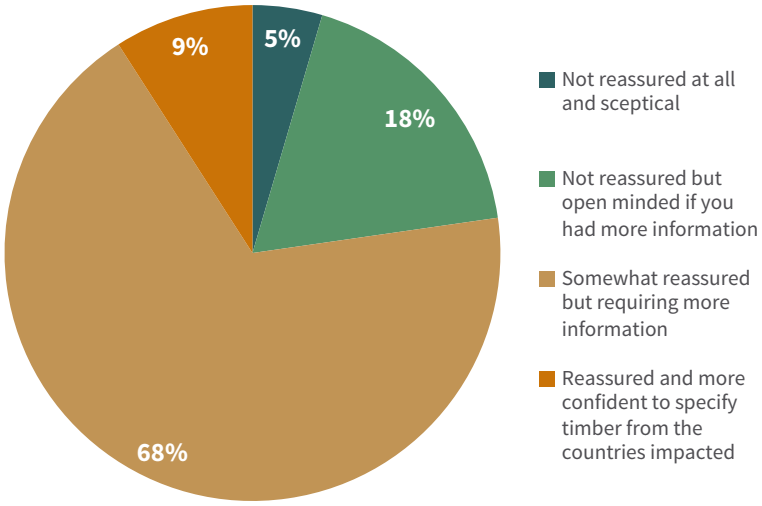

Figure 32: Reactions to the FLEGT description

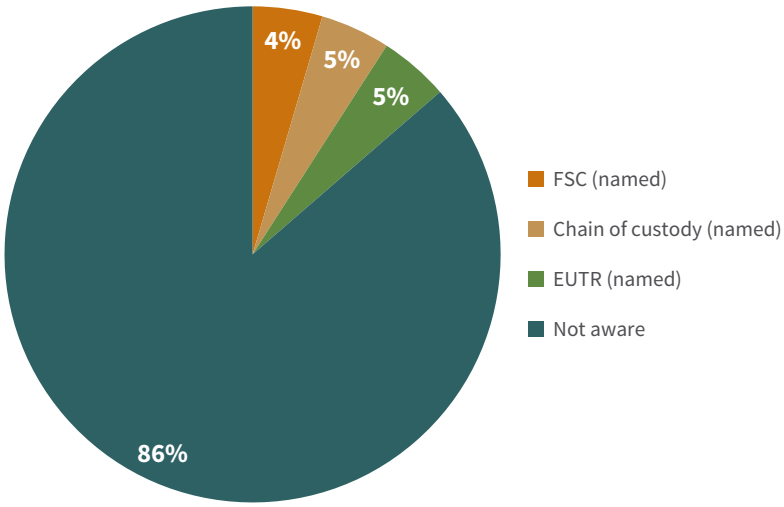

Figure 33: Awareness of the EU Timber Regulation

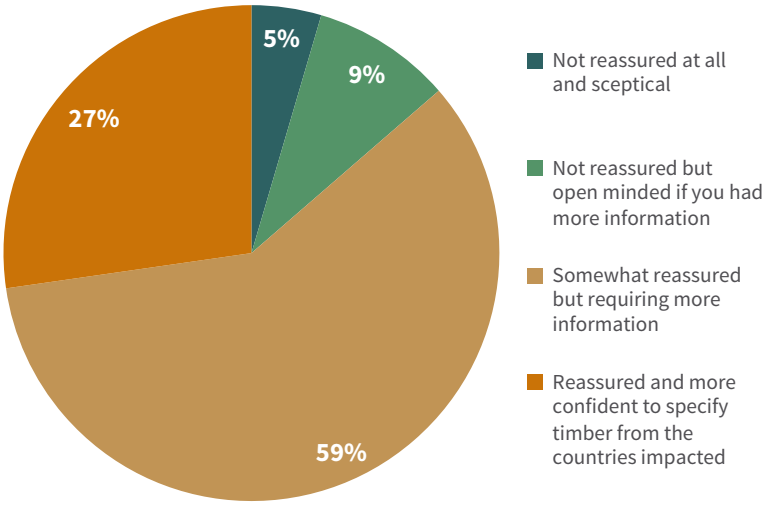

Figure 34: Reaction to the EU Timber Regulation description

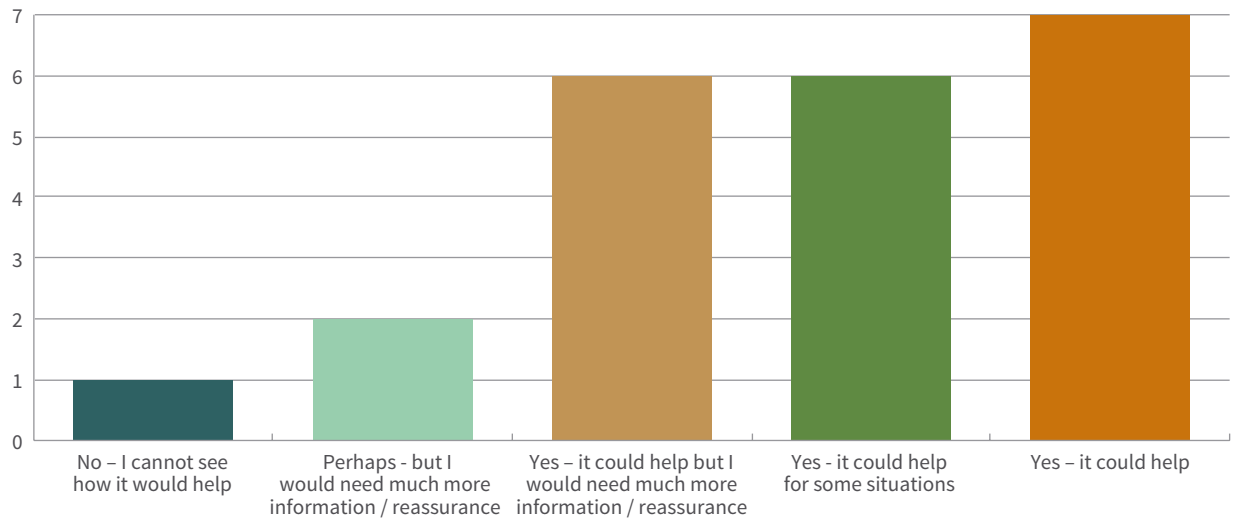

Figure 35: Knowledge of forest governance and design narrative *(n= number of responses)*

More than half of respondents were reassured though requiring further information. Over a quarter were reassured and feeling more confident following the statement.

The architectural narrative

"Narrative architecture evolves from an introspective exploration of the client's mission and passion; the building program or function; its site context; and often its place in history. Editing the message into a simple theme and then expanding it into a complete story creates the fullness of the experience. Materiality, structure, form and detail become the vehicles to impart the message(s)."[69]

The interviewees were asked if knowledge around forest governance help with the narrative for choice of materials.
With one exception all respondents stated that, to a degree, knowledge of forest governance *could* play a role in developing the narrative of their design or specifically with respect to their choice of materials.

In their own words

The following sections are direct quotes taken from the interviews. They are grouped around a range of general themes.

Getting the message out

"I think there is a general trend of awareness. In the light of climate change and the circular economy society tries to seek 'green' alternatives. I think this trend can and should be used to stimulate the use of natural resources such as sustainable timber. "

"I think the general public and professionals would benefit from more publicity around these processes – including how they work and their overall success."

"The initiatives described [FLEGT & EUTR] should be communicated better to the sector of architects. They are relatively unknown."

"[This] knowledge needs to be simple and easily understood."

Inspired thoughts

"We are particularly keen to understand the labour issues related to the timber industry and how these are covered within the various schemes as this does not seem consistent. "

"We have also launched our own Responsible Sourcing Questionnaire which we require suppliers to complete – particularly prior to them visiting us to market their products. This is in part to address gaps in the various certification schemes."

"RIBA approved CPD seminars would be very useful"

"I am really convinced of the opportunities that this material brings to rural economies as source of value added products."

[69] Browne, W. (2010) *Story telling in architecture.* www.planetizen.com/node/46878

FLEGT thoughts

"FLEGT seems to me even more difficult to control in so far as it covers not just one specific producer but the forest resources of a whole country. This seems all the more difficult for a country like Indonesia which is spread out in a number of islands."

"FLEGT seems an interesting approach worth looking into further but we would still ask for FSC certification in addition. More should be done to promote tropical hardwoods."

"Those programs [FLEGT & EUTR] could help and improve things in tropical forestry. But I would rather use domestic wood instead."

"In the climate change debate it seems pointless transporting building materials such a long way if you have alternatives in short distance."

Certification ingrained

"Tropical hardwoods are only specified in design projects where they can be sourced locally so these are never EU based suppliers. Moreover they must demonstrate they can provide all the required guarantees in terms of wood certification"

"Generally speaking we don't exclude tropical hardwood as a material providing it is labelled (third party certified)"

Sticking with wood

"In Austria, building with wood is much more advanced and more common, even in commercial buildings you see a lot of wood constructions."

"Wood is very much part and parcel of our design brand. It contributes to our preference for natural materials."

"Maybe for windows and decking there will always be a small niche/ need for tropical wood. But I cannot see other building objects made of tropical timber."

"Using wood in architecture has a future due to environmental impact.

"Building with wood gives the building sector a positive image."

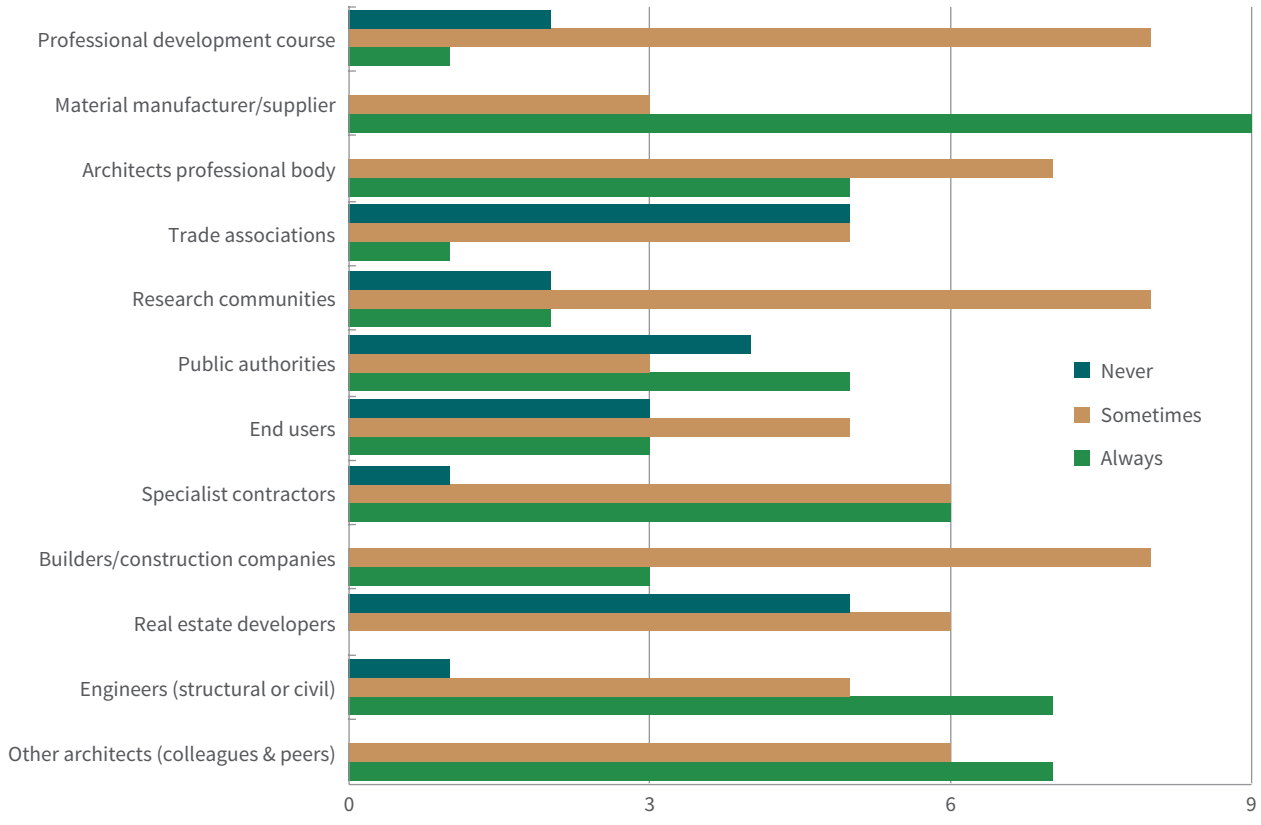

Figure 36: Sources referred to when comparing the properties and suitability of materials *(n= number of responses per source / option)*

Sources of information

Insight to where architects gain their information on using wood generally is of vital importance to those that seek to influence their decisions and choices.

The interviewees were asked to indicate which sources of information are referred to when comparing properties and suitability of materials.

The results reveal a clear preference for receiving information from the manufacturer or supplier. Peer to peer learning amongst professional colleagues or peers and structural engineers also dominate the responses. Overall the results indicate a strong technical bias.

Influence on the choice of materials

The interviewees were asked about the influence on the choice of materials - *for a typical project you are involved in, which stakeholder group holds the most influence in the choice of materials?* The interviewees were asked to rank in order eight different stakeholder groups, with rank number being the most influential stakeholder in the process of choosing materials.

In *Table 2 Summary of stakeholder attitudes towards timber in construction* previous studies had indicated that generally architects had a "weak" level of influence over the choice of materials in a typical project.

The results indicate that the architects themselves believe that they have the most influence in the choice of material. Other stakeholder groups with strong influence include the developer and public body clients (i.e. the direct clients).

Discussion

The results of the current study, whilst limited in terms of the numbers of participants stand some comparisons with previous studies of architect attitudes towards wood as a material. As with previous studies architects "like" wood and perceive it having many positive attributes as a material. The "naturalness" of wood as a material combined with strong aesthetic values and its physical properties and versatility ensure that it is widely used and favoured. Across the range of indicators used within the current study wood as a material performed very highly in terms of its perception and is seen favourably overall and stand comparison with concrete and steel. Overall it is indicated that the architects surveyed have positive attitudes towards wood *per se* as a construction material.

The 2010 Swedish study[70] found that both engineers and architects believed they had only a limited power in the material selection which contrasts sharply with the limited sample obtained for this study. Overall the architects interviewed were of the opinion that they have the most control and influence over the choice of materials. The 2010 study focused only on Swedish architects whilst the current study had input from across the European Union. A further point of differences arises from methodology – the 2010 study involved the different stakeholder groups in weighting the levels of influence, the current study solely focused on architects. An element of wishful thinking may have had a bearing on the responses of the architects.

The results of the study focusing on tropical wood offer some interesting insights to attitudes. Whilst the overall attitude towards wood as material is positive, the attitude towards *tropical* wood is much less clear and not universally positive.

Architects do not live in a bubble remote from society and as a group are extremely well educated and conscious of the society they operate within. Therefore their views towards the issues surrounding tropical wood are as much open to the forces of the media and societal opinions as any other individual with an interest. The study revealed most of those interviewed were aware of issues surrounding tropical wood and the majority expressed concern over potential association with illegality, deforestation and biodiversity loss. Perhaps most interestingly the issue of local sourcing was strongly expressed with the distance to market for tropical wood being the issue of greatest concern. The study also revealed that cost issues feature strongly (as might be expected) and choosing tropical wood over other materials is seen as a costly option.

Based on other studies the age profile of working architects is typically 40-60 years, meaning that most graduated at least 20 years ago. The survey here reveals that most of those interviewed did not cover any of the issues associated with tropical timber as a part of their initial training or studies. Around a third of those interviewed felt that they had been able to learn more about these issues, either privately or through continuing professional development. Other studies corroborate this finding; a 2016 UK study[71] found that having established the age range

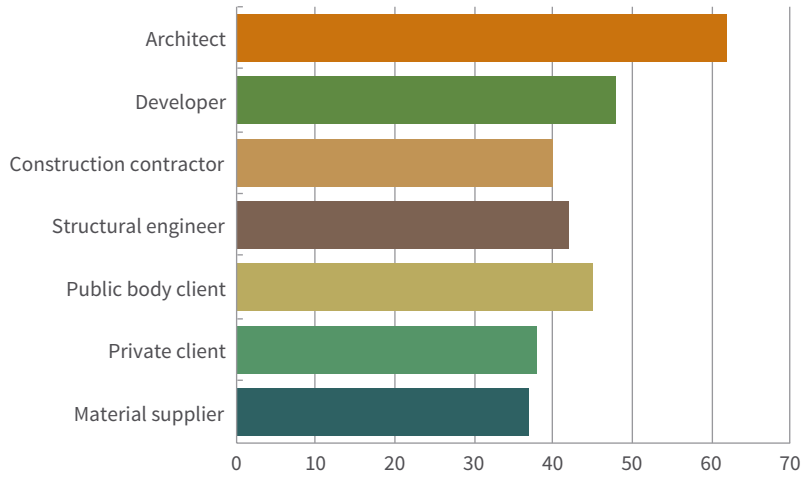

Figure 37: Ranking of stakeholders in choice of materials
(n= inverted total number of selections from 1 to 8)

[70] Omoregie, A. and English, M. (2016) *op. cit.*
[71] Omoregie, A. and English, M. (2016) *op. cit.*

and educational background of the respondents, a large proportion (45%) gained their experience and knowledge through workplace learning and self-education.

The vast majority of respondents were able to name at least one scheme that they considered offered assurance of sustainable production and FSC and PEFC certification were by far the most dominant spontaneous responses. Over two decades of growth in certification and related marketing in Europe has clearly had an impact and has resulted in a high level of awareness. As seen within other sectors certification has become perceived as a by-word for sustainability and the simple answer to a complex question.

Levels of awareness of the FLEGT process and FLEGT Licencing and the EU Timber Regulation were very low, with over two-thirds of those interviewed not being aware. A small number of those interviewed though were aware, perhaps with a limited understanding.

When the FLEGT process was briefly explained during the interviews it revealed an interest in discovering more about the process and a general view that this was a positive outcome. The same could be said for the EUTR – whilst most were ignorant of its existence they were favourable to its message. Whilst there appears to be large gaps in knowledge the interviewees revealed a willingness to know more. At present the group tend to gain their knowledge of materials from amongst colleagues and peers and their professional organisations. As a technically astute group they are also influenced by research institutions and academics.

The design narrative remains an important aspect of the architect's work and a greater understanding of the modes of production could have a bearing on material choices. Local sourcing clearly features as a component of the current narrative for many interviewed. Choosing tropical wood over local wood will require a very strong rationale for some of those interviewed to change their opinions.

6 Conclusions

Architects in the main like using wood in their projects and view it very favourably alongside other materials. As a rule they understand why they like it – its adaptability, aesthetics, durability, physical properties and general low carbon status all making it a go-to material in many applications.

Tropical wood though is viewed differently by many. Some will not use it, others need convincing to use it and some appreciate it as a viable alternative to the other materials which are offered. As architects become ever more conscious of carbon footprint they will continue to challenge the materials that they use to provide the lowest footprint whilst meeting other aspects of the technical requirement. Tropical hardwood cannot get away from the fact that the distance from Europe to the producer countries is fixed and it is not by any means `local'. Where distance equates to extra carbon and where the design narrative is that `local is better' - tropical wood will struggle to find a market. Efforts to identify the carbon footprint of tropical wood and to quantify its positive or negative impact when produced responsibly can feed in to data available for architects. If, even with long transport distances involved, tropical wood could be routinely demonstrated to have a lower carbon footprint than a comparable man made material there would be a receptive audience to this knowledge.

The number and diversity of architects offers hope. With enquiring minds and an openness to embrace new knowledge and well evidenced technical data there will remain an opportunity for tropical wood in European architecture. Important decisions are made using a mix of fact and prejudice and for tropical wood, supported by the FLEGT processes to make a positive impact and to become more widely specified the challenge will be to present the facts in an accessible way that overcomes some of the prejudices.

Developing awareness and basic understanding of the FLEGT process and its successes amongst the architect community alongside efforts to increase awareness amongst academia, research institutions and the all-important material specifiers show one way forward. Any efforts in this area can only be successful when combined with other efforts to increase understanding ranging from increasing specification in procurement policies, inclusion within the scope of green building programmes and efforts to bring the story to those that make the purchasing or procurement decisions.

Whilst the modest study of architect opinions here suggests that they feel that they as architects have most control over materials used within their projects it is also clear that many of their projects are, and increasingly will be shaped by the need to meet green building standards. As the study of these programmes indicates around half the programmes studies assessed in detail make reference to forest certification yet only a small proportion in theory might accept FLEGT Licencing. An architect might want to choose a tropical wood for green building certified project – a particular standard might prohibit this.

Architects in many ways shape many aspects of our society, though in turn they are also shaped by the society they operate within. Where society remains sceptical or even negatively disposed towards a material, some architects will shy away from embracing it. Others will remain open to persuasion and see opportunities to push boundaries and challenge opinion. The opportunity for the FLEGT process and those that support better forest governance is to provide the hard facts that the approach is working and that choosing FLEGT Licensed material is the right thing to do. This in turn can help to feed the narrative that supports the architects' vision.

Recommendations

Engage with the World Green Building Council to raise awareness of the value of FLEGT Licencing with a long term goal of gaining credits for its use in Green Building Council affiliated programmes.
Certified green building projects are set to increase and such programmes play a key role influencing material choices. Whilst some standards currently encourage the uptake of certified wood only a small proportion allow solely FLEGT Licenced materials to be used. Only through recognition and credit within these standards will FLEGT Licencing become of greater value to many projects and WGBC could play a pivotal role in raising awareness and increasing use of FLEGT within standards.

Support the efforts of the private sector within FLEGT counties, especially those with TLAS systems, to promote the benefits and positive impacts of these systems.
FLEGT Licensing and the supporting TLAS systems are business to business tools and systems which presently are not widely understood and whose benefits are either not known or which are poorly communicated. European buyers need to be able to see and believe the value of processes but they need to hear this message from their peers within the countries with active TLAS systems. Authentic communications originating within the VPA countries designed for a business audience are vital to building trust in the system. The evidence suggests that architects are mindful of the advice offered by their materials suppliers. Equipping these suppliers to confidently offer FLEGT Licenced products can build the market over time and better inform architects.

Actively engage those civil society organisations and private sector organisations that seek to influence the green building certification programmes and their standards.
Whilst many influential organisations already support FLEGT Licencing many others can be potentially influenced to be more supportive in their advocacy. Continued dialogue and trust building based on communication of the evidence based benefits and realistic limits to the value of the VPA process and FLEGT Licencing in particular is essential. Only through recognition and credit within these standards will FLEGT Licencing become of greater value to many projects.

Engage the professional bodies representing architects to increase awareness of the FLEGT process.
The study indicates a low level of awareness of FLEGT itself, Voluntary Partnership Agreements, FLEGT Licencing and the EU Timber Regulation. An important stakeholder group is daily making decisions on the choice of materials that has no understanding of the value and achievements of these processes. Many architectural bodies run continuing personal development courses for architects and these offer an excellent opportunity to increase awareness of FLEGT processes.

IMM

Independent Market Monitoring of FLEGT-Licensed Timber

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