

# Market Development Barriers for the Swedish Wooden Multi-family House Industry

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**Abstract**—The Swedish industry for wooden multi-family houses have in comparison with houses in concrete had a relatively small market share. This contradicts EU’s ambitions defined in the Europe 2020 strategy, focusing on development towards innovation, bio-economy and sustainability. These strategies highlight the importance of developing the wooden multi-family houses industry to fulfil the increased market demand combined with increased sustainability in the building industry.

This study aims to identify barriers enabling market growth for the Swedish industry producing wooden multi-family houses. Current barriers within the industry are reviewed by identifying areas restricting the development, e.g. the building process and procurement cycle. Thus, the goal is to find ways in which wooden multi-family houses could improve competitiveness compared to established solutions and increase its market share. The study was conducted with representatives from municipalities, developers, contractors, architects and real estate companies providing insights on new strategic possibilities in the building process.

The result identifies different barriers that exist in various stages of the value chain, from procurement to construction. Furthermore, it indicates that wooden multi-family houses could be a competitive solution by developing new strategies, mitigating the identified market barriers facilitating growth towards sustainable building solutions. These instructions give you basic guidelines for preparing camera-ready papers.

**Index Terms**—Market barriers, wooden multi-family houses, sustainable development, competitive advantage, market strategies, urban planning.

## I. INTRODUCTION

The increased focusing on sustainability is on the agenda for the European Union and the development of sustainable economies is in line with the Europe 2020 strategic initiative, enabling a shift towards green economies [1]. Additional initiatives, linked to the Europe 2020 strategy, were launched to highlight the effect of climate change. One of these initiatives is the EU Forest Strategy working towards sustainable sourcing and use of raw materials. This strategic advancement influences wood-based industries, highlighting the importance for the EU to enhance investments in green building solutions to have an ability to comply with the climate and environmental targets [2]. Therefore, the EU has recommended the use of wood as a sustainable building material, where Sweden faces a particularly challenging situation based on the current construction rate, combined with a demand to develop building techniques complying

with a sustainable economy [3], [4].

The necessity to increase the construction phase in Sweden is based on a prolonged period of insufficient number of available housing units. Approximately 700 000 housing units are required to be constructed until 2025 to fulfil the projected housing [5]. Thus, the average annual construction rate is estimated to be approximately 70 000 new housing units throughout the next five years. Therefore, it becomes important to enhance the positive effects of green economies by developing sustainable building solutions using wooden multi-family house solutions. Despite the benefits of environmental alternatives, construction of multi-family houses traditionally use concrete as building materials, whereas solutions based on wood only constitute 8.7 %, Table I [6].

TABLE I: MARKET DEVELOPMENT, \* CONCRETE, STEEL AND OTHERS ARE GROUPED TOGETHER SINCE SEPARATE STATISTICS ARE NOT AVAILABLE [6]

Year	Number of apartments	out of wood	concrete	steel	other	% wood
2007	16,310	1,190	15,675	356	89	7.3%
2008	9,019	983	7,928	0	108	10.9%
2009	6,961	859	6,005	27	70	12.3%
2010	12,127	1,047	11,018	62	0	8.6%
2011	13,398	882	12,258	129	129	6.6%
2012	12,520	1,267	11,035	143	75	10.1%
2013	16,951	1,711	14,917	293	30	10.1%
2014	19,216	1,691	17,019	506	0	8.8%
2015	26,727	2,322	23,916	489	0	8.7%
2016	33,121	3,599	29,206	316	30	10.9%
2017	37,467	3,797		33,669*		10.1%

A possibility to fulfil the increased building requirement is to investigate the pre-requisites for producers of wooden multi-family houses to develop and increase its market share producing multi-family houses [7]. The relatively low proportion of housing units constructed using a wood-based building solution, according to Table I, provides development potential for companies to differentiate their current business model adjusting to the requirements found in the market for multi-family houses [8], [9]. Also, development of technologies and standards, in combination with the environmental benefits of wood construction, have resulted in an increased usage of wood in various constructions during the last decade [10]. This further reinforces the positive development trend of wood as a sustainable solution for the construction of multi-family houses and have a positive effect on the supply, lowering prices and rents for consumers, thereby increasing its competitiveness towards traditional building materials [11]. Despite the potential for producers of wooden houses to

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enter into the multi-family building segment several areas within their current business models are required to get adjusted in order to facilitate a transition to the new market segment. Therefore, companies producing wooden multi-family houses are required to develop their organisational strategy to adjust towards this market environment, which includes identifying entry barriers that restricts the development and competitive advantage.

This study uses the same definition towards entry barriers as Caves and Porter [12] and Porter [13], where entry barriers and market mobility barriers are interchangeable. The market mobility barriers are based on companies' difficulties to move from one strategic group to another and competitors are not necessarily competing with similar market profiles but with products with similar price and functionality. Therefore, the terminology relating to entry barriers can imply both new companies entering a market as well as those already present within the market [14]. Market entry barriers are not considered fixed over time, rather something that can vary depending on market condition and shall not be considered as unsurpassable hinders for new entrants since these might change and can pose as a barrier for incumbents over time [15].

Understanding the challenges associated with market growth to minimize the effect of existing barriers for new entrants. This study aims to identify barriers for the Swedish industry of wooden multi-family houses, thereby enable market growth through improved competitiveness by leveraging building strategies based in the identified market entry barriers. The barriers are identified and classified in accordance with the strategic importance for market growth. Thus, the goal is to find ways in which wooden multi-family houses can compete as a building solution compared to established solutions and increase its market share in Sweden.

This study is part of a research project in Sweden that focuses on the building process for a new development based on wood. This includes project areas from strategic planning and identification of developers, to building specific issues such as sound and vibration. These areas will increase the possibilities for companies within the wood building industry to improve its competitiveness. This is in line with the EU and Swedish government's ambition to increase the use of sustainable building material for a greener community. The intention from the municipality is to identify gaps in the building process enabling them to develop an accurate wood building strategy for the region.

## II. CONCEPTUAL FRAMEWORK

Having the ability to anticipate and understand development trends within an industry provides opportunities to react proactively to internal and external situations. The success is dependent on the companies' abilities to deal with the impact of industry forces in comparison to their competitors. Therefore, having the possibilities to manage entry barriers affects the competitive nature of both incumbents and new entrants [16].

Industries that are categorised with low entry barriers are defined by the high probability for companies to be faced with new competitors, which have a diminishing effect on

the competitive advantage. Although, as discussed by Niu *et al.* [17], most entry barriers are purposely created by incumbents to deter new entrants, reducing competition and improve profitability industries with high barriers tend to prolong their competitive advantage. These companies have the propensity to improve operational efficiency based on the competitive pressure in the industry, which is similar to the actions by producers of concrete multi-family buildings. Therefore, according to Pehrsson [18], new entrants, such as producers of wooden multi-family buildings, are advised to strive for a fit between entry barriers and the market strategy to improve the likelihood for a successful entry into these markets. Reviewing the development possibilities within an industry includes several areas, including power held by suppliers and buyers, existing competitors, the nature of competition and similar products that can act as substitutes for those products provided by the industry, Fig. 1, Porter [19], [13].

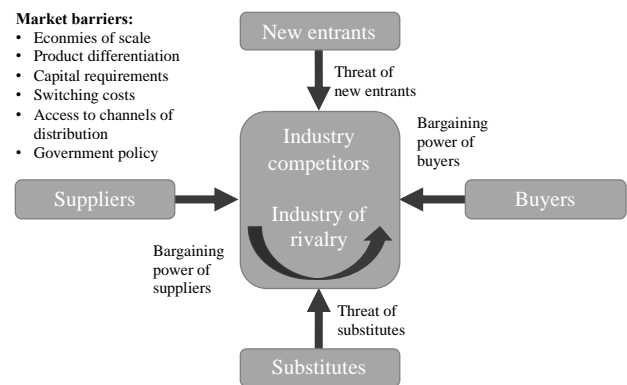


Fig. 1. Market barriers, adaptation of the five-force model [19].

It is important for incumbents to comprehend the impact of these factors to maintain competitiveness and having the ability to make good strategic decisions [19].

Focusing on the barriers described in Figure 1 includes several different components that limit new entrants' or incumbents' capabilities to operate in an industry, discussed by Porter [13], [19], [20], Jost *et al.* [21] and Robinson and McDougall [22].

The selected approach emphasises the company as the unit of analysis, assessing entry barriers as a mean for individual companies to develop their competitive advantage. Hence, focus on incumbents' ability to develop superior strategies generating competitive advantage, minimising the possibility for new competitors to enter the industry. Rangone [23] and Barney [24] discuss a contradictory assessment regarding the value of entry barriers and how it relates to companies', comparing it to the likely role played by competition in the industrial organisation versus a strategic approach. Irrespectively of theoretical approach, the ability to develop resources that are difficult to copy by competitors is still important. Geroski *et al.* [25] discuss that entry barriers are not important in themselves but matter only to the extent that they cause distortions in the allocation of resources, enhancing the entry barrier further.

The strategic approach, researched by Porter [19], [20], Jost *et al.* [21] and Robinson *et al.* [22], focus on the significance of strategic barriers. These barriers are not

considered as the result of the market structure alone. It is also considered as the strategic result derived from a company's development activities towards reducing threats of new entrants and/or competitors within the industry. Therefore, companies are suggested to develop a long-term approach towards competitive advantage, maximising the company's internal strength in response to environmental opportunities and external threats without deteriorating their strategic position [24].

Porter [19], [13] does not define specific entry barriers but identifies six main categories of barriers influencing market entry, or mobility activities for companies within an industry, presented below.

*Economies of scale.* Economies of scale occur when the unit cost of a product declines as production volume increases to the point reaching an optimum level for cost per unit maximizing the economies of scale [26]. Economies of scale requires new entrant to either develop towards a large-scale operation or face a possible cost disadvantage by competing on a smaller scale [27] and [28]. However, the volume/cost relationship is not the only factor influencing economies of scale, factors that are hard to duplicate such as experience, good access to raw materials, government subsidies and technological advantage also influence the cost [29].

*Product differentiation.* Already established companies within an industry have established brand awareness and customer loyalty through product recognition generated by advertising and well-known customer service levels. These activities act as barriers for companies striving to enter the industry forcing them to invest capital and time to differentiate their product overcoming company loyalty and gaining access to the market [30].

*Capital requirements.* This is perceived as a barrier since companies trying to enter into an industry requires significant investments in order to establish a viable market presence, which can include inventory and production sites [19], [13]. This can vary in importance based on project risk, general financial situation etc. [17].

*Switching costs.* Costs associated with switching from one supplier to another, which could, e.g. create a requirement to redesign products, technical support, need to retrain employees or changing license fees [31]. This works as an effective barrier forcing new entrants to provide incentives for potential customers, which is likely to erode their profit margins [19].

*Access to distribution channels.* An important success factor is the access to an efficient distribution channel facilitating sale, which often is developed over a long time-period forming strong relationships [32]. Therefore, the cost for new entrants to gain access to a distribution channel is high and can include various incentive schemes as discounts, promotions and financing options. All of these activities will add costs for a new entrant, which will reduce the profitability over time.

*Government policies.* Government policies have the ability to stop new entrants by posting various barriers, such as limits on access to raw materials, licensing requirements, pollution standards, product testing regulations, taxation etc. [33].

It is noteworthy to understand that barriers may change over time, despite the structural approach towards the process. Hence, entry barriers are not impossible obstacles

and some companies have different capabilities dealing with these barriers more easily and in a more cost-efficient way than others do, reducing the barriers to entry [15].

### III. RESEARCH PROCESS

The information collection process was based on companies involved in building processes associated with wooden multi-family houses in Sweden. The data collection started by identifying the framework of the study and the key stakeholders, which is consistent with the convenience sample strategy [34]-[36]. The intention was to gather information regarding the perceived market situation as interpreted by stakeholders relevant to this study, which included buyers of building solutions, i.e. municipalities and real estate companies and those actors involved in the building process, i.e. developers, contractors, producers and architects [37]. After that, an additional selection process of the key respondents within the building process was conducted, based on the key informant approach for data collection [38]. Additional selection criteria's were used, and companies had to build wooden multi-family houses higher than three floors to be selected. Approximately 63 % of the companies build higher than three floors, and 54 % construct buildings higher than five floors. Also, the companies included in this study are represented in one or more roles within the building process, i.e. procurer, developer, architects, contractor, sub-contractor and real estate company. Out of these companies, more than 55 % are represented by higher-level functions in the building process, i.e. procurer, developer and architects, which provided an opportunity to understand the key stakeholder's perception to the research question [39], [40]. Thereby identifying potential patterns within the building process by understanding key stakeholder's perception to the research question, which is in accordance with discussions made by Davis [41], [42].

The primary objective was to identify barriers for the Swedish industry of wooden multi-family houses, thereby enable market growth through improved competitiveness by leveraging sustainable building strategies. Thereafter, find ways in which wooden multi-family houses can compete as a building solution compared to established solutions and increase its market share in Sweden. This is a different research focus regarding the studied field, which means that not much has been studied about this concept in current research. Furthermore, both the research objective and research question influenced the selected research design in different ways. This research process is perceived as primarily exploratory with descriptive components [43], [44]. Further, using online data collection methods is seen as a good choice for collection and analysis of the empirical data [44]. Also, the research design selection is influenced by the research aim and when addressing the questions associated with this study make interviews more beneficial [44].

The questions included in the online survey were developed to gain an understanding of the industry barriers at all levels within the building process, intending to identify discrepancies in opinion dependent on the respondent's function within the building process and company size.

Another condition for this study was that all the companies were operating on the Swedish market and had an interest in the wood-frame construction industry. The respondents selected within the building process intend to offer a comprehensive picture from procuring/commissioning a building, through construction and finally operation and use

of the building. The survey was sent out to 157 respondents, with a response rate of approximately 42 %. The survey consisted of 27 main questions. Most of the questions were designed to use a 10-graded Likert scale. However, some question were open-ended, which allowed the respondents to elaborate on specific industry information.

TABLE II: SUMMARY INDUSTRY BARRIERS AND THE PERCEIVED IMPORTANCE BY THE RESPONDENTS

Barriers	Score		Importance		
	Yes	No	0% - 33%	34% -66%	67%-100%
1. Perceived market strength of concrete	8.3 (83%)				X
2. Insufficient understanding of wood as a building material	6.7 (67%)				X
3. Actively working to increase the competitive advantage	Yes = 81%	No = 19%			X
4. Limitations regarding investment possibilities (Based on 8 sub-questions)	Yes =100%	No = 0%			X
<i>Instable political situation</i>	9.2%				
<i>Cost of land</i>	20.2%				
<i>Building regulation</i>	21.0%				
<i>Insufficient infrastructure</i>	3.4%				
<i>Competition</i>	19.3%				
<i>Financial situation</i>	5.0%				
<i>Lack of suitable personnel</i>	20.2%				
<i>Other</i>	1.7%				
5. Requirement to invest in order to optimize competitiveness	Yes = 50%	No = 50%		X	
6. Economies of scale, a requirement for sustained market development	7.2 (72%)				X
7. R & D a necessity for market development	7.6 (76%)				X
8. How much of the production cost is connected to R & D	< 5% = 79%	6-10% = 21%	X		
9. Final cost is higher for wood buildings than traditional building materials	Yes = 56%	No = 44%		X	
10. Importance of factors for higher final cost (Based on 6 sub-questions)	Yes = 100%	No = 0%			X
<i>Cost of material</i>	24.2%				
<i>Personnel cost</i>	12.1%				
<i>Inefficient building process</i>	22.7%				
<i>Insufficient knowledge of wood building</i>	16.7%				
<i>Unclear project management in the building process</i>	19.7%				
<i>Other</i>	4.5%				
11. Governmental legislation and regulation as a barrier towards an efficient competition on the market	Yes = 63%	No = 37%		X	
12. Essential for legislation to change	6.2 (62%)			X	
13. To what degree can you change rules or legislation	3.8 (38%)			X	

Further, some questions had a yes and no option intended as a filter for some of the subsequent questions in the survey. The data were initially analysed qualitatively to establish general trends, after that, data were analysed quantitatively by using a mixed methodology to provide greater depth and range than a single method could deliver [45], [46]. Thus, the choice of combining qualitative and quantitative deliverables in this study was motivated by entry barriers and market mobility barriers not being reviewed in this context earlier. This research approach provides a structured approach of the complexity faced by the respondents by identifying the most important factors influencing the market development activities for the wooden multi-family house industry [47]. This is based on the complexity exemplified in the building process, which have not been reviewed in this perspective earlier [45], [46]. Hence, it allowed to capture the full scope of the processes within a

complex context and to identify transferable understandings by the respondents [48].

The qualitative response options were compiled, after that analysed by reviewing the responses, and summarising into shorter value statements using systematic text condensation [49], [50]. Systematic text condensation provides a process of inter-subjectivity and feasibility while sustaining a responsible level of methodological structure. The quantitative data was analysed using a 10-graded Likert scale, where 1 indicates no importance or no focus and 10 indicates high importance or high focus [51]. The quantitative information was based on the respondent's perception based on importance or focus regarding the studied process. The Likert scale items are created by calculating a composite score from 10 Likert-scale criteria's; after that, the composite score for Likert scales was analysed at the interval measurement scale [52]. This provided an

opportunity to classify the perception of the respondents regarding the procurement process, which in combination with the qualitative responses generated a comprehensive picture of the barriers identified in the building process.

The study was developed using a dynamic research process where the respondents had an integrated part. This increased the understanding of the respondent's perception of the context, which added to the credibility and also reflects how well the researcher communicates the respondent's view of the context [53], [54]. The online survey was transparent and objective to enhance the credibility, after that, summarised for commented within the research group or with key respondents within the industry [53]. Additionally, triangulation was applied to enhance the findings of the study [55]. Also, investigator triangulation was applied since the research was discussed among the research group and certain respondents for possible adjustments enhancing the result based on their interpretation. [56].

Furthermore, the study has addressed validity and reliability by conduction pre-interviews with respondents and having a defined selection process of key stakeholder to be included in the study. Thereby, capturing their perspective and experience to validate the questions and result regarding market development barriers for Swedish wooden multi-family house industry. By using systematic analysis of the result and by ongoing discussions between involved researchers and industry stakeholders provided improved validity and reliability of the study [57].

#### IV. RESULT AND ANALYSIS

The data from the survey combines the responses from the participants with the appropriate industry barriers, displayed in Table II below. The table is based on 13 main questions and 14 sub-questions, where the average result from the question in the survey has been classified into three levels based on importance, thereby provide an ability to classify the different barriers. The evaluation of question 4 and 10 were incorporated into the three graded scale in Table II, based on the percentage, i.e. if more than 66.7 % answers Yes; equals major importance. Question 8 is based on the same structure, i.e. if fewer than 66.7 % spend less than 5 % is perceived as being of minor importance.

The data reviewed in this study presents an overview of how the respondents within the industry for wooden multi-family houses perceive the impact of several important industry barriers. The first identified barrier is the strength of concrete as a building material in comparison to wood. Respondents included in this study perceive the average value as an eight or higher on a ten-graded scale, evaluating it to be of major importance. Further, 92 % of the respondents consider this as a five or higher, making the market strength of concrete as an important development barrier. Therefore, their view on how an insufficient understanding, or knowledge, of wood as a building material can pose as a barrier by the previously defined buyers in the building process. This is discussed in the study by Karakaya and Parayitam [16] and Jost *et al.* [21], highlighting the value for the incumbents to create barriers similar to the market strength displayed by concrete as a building solution, Table I, which provides a competitive advantage over wood-

based building solutions.

The strength of concrete as a barrier affects the development of wood as a building material based on the buyer's inclination to procure, or architects preference to design, solutions they are familiar to use. Approximately 46 % of the respondents consider the buyers to have an insufficient understanding of wood as a building material and places it as an eight or higher on a ten graded scale. However, 71 % of the respondents consider this a factor that is of greater importance than a six, with an average among the respondents of 6.7 making this a major hinder for the development of wood as a building material. Thus, it can be derived from the difficulties discussed by Barney [24], where companies or solutions with a dominant market share have created a market barrier towards external threats based on maximizing the strength of the provided solution.

Despite wood facing several entry barriers in comparison to the traditional building materials the development of the industry producing wooden multi-family houses is positive based on the general market trends. Approximately 81 % of the respondents actively seek to improve their competitive advantage towards the traditional building materials. This highlights the necessity to review it as a constraint for successful market growth for wooden multi-family houses. This is relatively equally distributed among the different groups included in the building process. The importance of improving the market position by understanding and developing a strategic fit to the market situation is discussed by Pehrsson [18], mentioning how new companies can improve the possible success by adjusting their market strategies towards the existing entry barriers, e.g. by bridging the existent knowledge gap and strength of concrete as a building material.

When comparing the requirements to improve companies' competitive advantages towards the established building materials, are financial implications perceived to be of importance to create advantages within the market. Hence, the included companies feel a requirement to reinvest in their business to enhance their competitiveness and minimise market barriers. The finding from the survey indicates an equal division between those that feel a requirement to reinvest and those who do not reinvest to develop their business. The study conducted by Karakaya and Michael [30] and Barney [24], mention the financial implications associated to reinvestment in the business reducing barriers and creating a competitive advantage.

Comparable to the perceived requirement to invest in order to develop and overcome barriers, is the importance having capability to identify specific areas posing as obstacles or barriers regarding the company's investment decisions. The respondents evaluated the significance of seven areas identified as limitations for company's investment possibilities. These areas vary from regulatory issues to financial situations and the availability of competent personnel. All act as barriers for continued development. Out of these areas, three have over 20 % each, which are building regulation with 21.0 %, cost of land and lack of suitable personnel with equally 20.2 %. The capital requirements as a barrier were discussed by Niu *et al.* [17] and Porter [13], which was based on an importance to identify required investments to overcome market barriers and create a competitive advantage, which also was mentioned by the respondents.

Several of these highlighted areas imply that market and governmental actions restrict the development and create barriers towards the successful development of wood as a construction material for multi-family houses. Furthermore, several of the respondents also brought forward that a limited market share combined with a lack of knowledge by public purchasers using wood as a building material are contributing factors. These factors pose as restrictions towards investments and required development, which was reinforced by Pehrsson [32], mentioning the importance having access to distribution channels and developing strong relationships to the market as an important barrier.

In addition to barriers regarding investment decisions, companies' ability to generate economies of scale is of significance for future development. Close to 60 % of the respondents consider the ability to gain economies of scale as an eight or higher, i.e. very significant. Similarly, more than 70 % of the respondents perceive having the ability to identify economies of scale within their organisation, of more than average important. Thus, the average score of 7.2, which further reinforces that most firms perceive this as significant for industry development. The importance of economies of scale as a barrier was reinforced in the studies by Porter [19], Auerswald [28] and Thomas [29], discussing how factors such as improved production methodology and knowledge can minimise the production cost per unit, thereby provide a competitive advantage or leverage an existing market barrier.

Yet, another factor that can limit the possibilities for market development is the significance companies place on research and development (R & D), which also is connected to the importance placed in economies of scale as a necessity for market development [27], [28]. Close to 90 % of the respondents consider this of more than average important for a successful development of their company. Further, the average score is 7.6, i.e. being of great importance. This emphasises the impact of R & D for successful development of wood as a sustainable building material.

The importance of R & D as a contributing factor towards market growth and as a barrier is emphasised by the insufficient understanding of wood as a building material by those procuring building solutions. This highlights the importance of R & D, yet, approximately 80 % of the companies included in the study spend less than 5 % of their production cost on R & D. Further, many respondents have indicated that no investment in R & D is being made and 50 % of the respondents consider this as a barrier for future development of the industry.

Further, the constructing cost of wooden multi-family houses has been considered as a constraint for market development. In comparison with other industries inflation has been close to zero and the comparable number for the building industry was approximately 30 % for the corresponding period. The actions discussed by the government is focused on increased subsidies for the building industry, whereas focus should be in addressing the fundamental issues driving the costs. This has also been brought forward in this study, where 56.2 % of the respondents consider the final cost of wooden multi-family houses to be higher than those of traditional building materials. Thus, it is perceived as a barrier for companies producing a wood-based solution, which is linked to discussions made by Porter [19], [13] and Blut *et al.* [31] as

a barrier associated to switching costs when customers strive to change from one solution supplier to another. The main barriers brought forward by the respondents are: cost of material, personnel costs, insufficient building process, inadequate knowledge of wood buildings and unclear project management structure within the building process. Out of these barriers, the cost of material is considered as having the greatest impact, and 24.2 % of the respondents perceive this to be the leading barrier.

Further, the problems associated with an insufficient building process receives 22.7 %, and an unclear project management within the building process reaches 19.7 %, placing them as number two and three based on importance by the respondents. Yet, when considering these two areas are relatively overlapping within the building process, provides an aggregated score of 42.4 %, increase their importance on the final cost of wooden multi-family houses. These barriers are linked to economies of scale as discussed by Schmalensee [27], Thomas [29], Porter [13] and Auerswald [28] emphasising the importance of access to raw material, stringent production process and management as factors providing a competitive advantage. Furthermore, the respondents consider knowledge development by municipalities, and plans to reform the building process radically as important factors to leverage the entry barriers for wood-buildings. In addition to these general areas, comments were made in relation to the municipality and governmental actions, which are perceived as being conservative in regards to product development towards new building technologies and material usage. This will further create development barriers since incentives towards new alternatives will be restricted, thereby erode the competitiveness in the market.

Approximately 63 % consider governmental legislation and regulation as a barrier towards an efficient market competition. Therefore, the respondents perceive their ability to change and influence the legislation as essential for the development of wood buildings. According to 36.2 % of the respondents consider it to be of great importance for the legislation to change, i.e. equal or greater than an eight on the ten-graded scale, and an average of 6.2. Respondents also perceive their possibility to influence changes in legislation as limited, where 45.8 % of the respondents see this as equal to three or less, i.e. very limited possibility to influence, and provide an average score of 3.8. The importance of how governmental policies can influence the market development is discussed by Porter [13]. Furthermore, the municipalities create their own regulation that contribute to confusion and delays, also their strategic approach tend to be long-term requiring 20 years to change, which is not comparable with the market requirements within a 3-5 year time span. Also, the government is perceived to have a conservative approach that can be contra productive for wood-building constructions regarding, e.g. energy requirements and an introduction of a more stringent taxation on CO<sub>2</sub> emissions linked to a demand of a life cycle analysis that could benefit the development sustainable building solutions.

These comments combined with the quantifiable data regarding governmental legislation as a barrier, presents a picture where legislation and governmental actions restrict the development of wooden multi-family houses in Sweden. The study by Riala and Ilola [33] brings forward the increased possibilities derived from governmental actions to

create, or dissolve, market barriers dependent on their strategic plan, which is reinforced by the respondents in this study.

V. DISCUSSION AND CONCLUSION

The aim of this study was to identify and classify market barriers for the Swedish industry of wooden multi-family houses that are perceived to restrict the development for companies involved within this industry. Further, find new ways how wooden multi-family houses could improve its competitive situation contributing to an increased market share and improved building capacity in Sweden. The result derived from the data has been combined with the entry barriers [19], [13] and is presented in Table 3, emphasizing the interconnection between the market activities and barriers beyond the framework presented within the specific barriers.

The general market projection for wooden multi-family houses is considered good [9]. However, the industry faces several challenges to fully live up to these market projections and identifying market barriers are imperative when developing strategies trying to achieving competitive advantages. Therefore, in order to generate a comprehensive picture of how the industry perceives these issues, key stakeholders throughout the building process were selected

to be part of this study, i.e. municipalities, developers, contractors, architects and real estate companies. Further, the collected data displayed similarities to the market structure and barriers discussed by Porter [19], [13].

Economies of scale is of great importance for the development of the industry, which also is connected to several other identified barriers, e.g. R & D, investment possibilities and an efficient building process. It is a requirement for the industry to reduce existing market barriers enabling the transition towards a larger market share. Thus, economies of scale are perceived as a key requirement developing the building solution, reducing the absolute cost advantage of the traditional building materials. The cost advantage of traditional building material is also evident in regards to the market share, which was 89.9 % for concrete during 2017. This pose a challenge for those producers of wooden multi-family houses striving towards a larger market share within this segment. The absolute cost advantage is not only associated with production costs, the understanding and perception of wood as a building material by those procuring building solutions is important. Hence, this can be considered as one of the largest challenges for sustained market development, which links to the procurement cycle and the requirements for new building projects.

TABLE III: OVERVIEW OF THE IMPACT ON STRATEGIC BARRIERS BASED ON QUESTIONS INCLUDED IN THE STUDY

		Barriers					
		Economies of scale	Product differentiation	Capital requirements	Switching costs	Access to distribution channels	Government policy
Questions	Market strength of concrete	X	X	X	X	X	X
	Insufficient understanding of wood as a building material		X	X	X		X
	Financial possibilities to develop the market segment			X			
	Limitations regarding investment possibilities	X	X	X			X
	Requirement to invest in order to optimize competitiveness			X			
	Economies of scale, a requirement for sustained market development	X		X	X		
	R & D a necessity for market development	X	X	X			X
	How much of the production cost is connected to R & D			X			
	Final cost is higher for wood buildings than traditional building materials			X	X		
	Factors for higher final cost	X			X		
	Are there any rules or regulation that limits competition						X
	Essential for legislation to change	X	X			X	X
To what degree can you change rules or legislation		X		X		X	

The absolute cost advantage is not only associated with production costs, the understanding and perception of wood as a building material by those procuring building solutions is important. Hence, this can be considered as one of the largest challenges for sustained market development, which links to the procurement cycle and the requirements for new building projects. These companies will have financial challenges being shortlisted as a viable and cost-efficient building solution considering wood buildings are perceived as more expensive, unless the overall understanding of the long-term benefits of wood constructions and e.g. LCC

analysis is made mandatory. Therefore, product differentiation will be of importance to reduce the market barriers compared to concrete, by means of increased understanding and a building process leveraging the advantages of wood as a building material.

The necessity for product differentiation to minimise market barriers is associated with additional capital requirements. This can be a constraint considering the recent financial recession depleting companies' assets, making investments towards market development activities challenging. Hence, entry- or development- costs pose as yet

another barrier for those companies producing wooden multi-family houses. Switching costs associated with a transition towards wood constructions are influencing development since the perceived understanding of wood as a suitable building material is low and established partnerships with contractors already exist. These factors combined create a barrier in relation to the cost advantage of traditional building materials since market penetration activities, i.e. marketing and education require financial resources. Changing the established buying patterns, from both private and public sector, can be a barrier to break through without the support of legislative actions. This is associated with the already existing infrastructure and production network developed around concrete, which requires significant financial investments to change towards wood constructions.

Finally, the governmental interaction, or lack thereof, has been brought forward as a contributing factor towards the limited development of wooden multi-family houses, compared to the traditional building materials. The general understanding is that the rules and regulations are favouring traditional building material, not highlighting the strength of wood as a sustainable building material. Taking the financial implications regarding switching production towards wood buildings, combined with the building requirement in Sweden until 2025, makes this transition less likely to happen organically. This requires a new approach promoting sustainability and LCC as main drivers lowering the existent market barriers. Further research should focus on how the procurement cycle is used in comparison with the existing theoretical framework, meeting the demand from both buyers and sellers respectively. This will contribute to highlight how wood constructions can improve its success by identifying barriers restricting an efficient procurement activity that facilitate market growth in Sweden.

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