

## PERCEPTION OF WOODEN HOUSES IN THE SLOVAK REPUBLIC

Mária Moresová – Mariana Sedliáčiková – Jozef Štefko – Dana Benčíková

### ABSTRACT

Trends in construction industry lead to using natural renewable materials; that is why the interest in wood as a material in the construction field has greatly increased (globally) in the past decades. The main objective of the paper is to define the perception of wooden houses in the changing customer behavior over the time. Moreover, the key factors and economic and social aspects, in the context of tradition, competitiveness, and green economy affecting the way of establishing the houses and entrenching the market are identified. Future perspectives of the wooden house development in a selected region in the Slovak Republic are influenced this way as well. Empirical research was conducted in a form of a questionnaire, and surveyed the given issue in the Žilina region. The results enabled identification of the main economic and social aspects affecting the perceptions of wooden houses in the contemporary society. The age, income, historical events in the given region and the promotion of wooden houses in the market are the main reasons which influence the perception of wooden houses in the Žilina region. In conclusion, specific measures were proposed. Their implementation into business practice will help eliminate the bias with regard to wooden houses as perceived by non-professional and professional public, and thus, help wooden houses to establish faster and more effectively in the Žilina region. The results proved that so-called myths about wooden houses should be removed, and thus, the awareness of the issue among both non-professional and professional public must increase. The best way to achieve this aim is to implement effective marketing to attract consumers.

**Key words:** wooden houses, silicate houses, economic and social aspects, green economy.

### INTRODUCTION

In the history of mankind, people have always attempted to build a shelter to live in, which would comply with the basic needs with regard to their survival. WILE (1920) highlights the fact that living cannot only be considered a form of retreat or shelter from the outside weather influence, but the house itself should be evaluated as a space for family life. At present, there are tendencies that make us overlook this aspect of living. Authors WOOLLEY *et al.* (2006), ALMUSAED *et al.* (2015) and KLEMENTOVA *et al.* (2016) agree that conditions of living are mostly affected by family income, both in towns and in the countryside. The climate change has made the building contractors and construction workers search such solutions which serve people and their comfort, and at the same time reduce the influence on the environment (ALMUSAED *et al.* 2015). One of the materials which appears suitable in this regard is wood. Last years have brought in extensive discussions (ADAMUČŠIN 2012; FÁBRI 2016) about the role of wood in construction in Slovakia. Wood

as a construction material holds an irreplaceable position in the industry, due to a complex of mechanical, thermal, esthetic, utility and technological qualities, as well as due to its effect on the environment. In European countries, wood is considered to be a strategic, while at the same time renewable, raw material, which is highly profitable for national economies.

Authors COOPER (2006), JANSEN (2014), and BROTO (2015) point out the worldwide development of numerous construction materials, systems, and technologies that relate to the sustainability problem. At the same time, innovative researches (KOLB 2011; RIVERS 2015; POTKÁNY *et al.* 2018) have been conducted while taking account of ecological characteristics of these materials, systems, and technologies. On the other hand, social and economic questions related to sustainability have been discussed insufficiently. It is essential to realize that requirements to be sustainable bring higher requirements for construction, includes not only the environmental, but also economic and social aspects, which greatly influence the society's welfare. With regard to the above stated, the main objective of the paper is to define the position of wooden houses in the contemporary society; as well as to identify the key factors, and economic and social aspects in the context of traditions, competitiveness, and green economy, which have an impact on the way these houses establish and entrench in the market, and also influence the future perspectives of their development.

## THEORETICAL BACKGROUND

As noted by KOČNER *et al.* (2015) and BIKAR *et al.* (2018), sustainability is now an important issue for every country in the world. In order to maintain the ecological and economic balance of utilizing the natural resources, bio-economics (green economics) is beginning to grow in importance. As agreed by BROTO (2015), ALMUSAED *et al.* (2015) and MALA *et al.* (2018), the definition of sustainability is of a multi-dimensional character, within which such economic, environmental and social solutions should be elaborated that would ensure better understanding of this context. Majority of researches conducted with regard to sustainability have only focused on two dimensions: the economic, and the environmental one. WOOLLEY *et al.* (2006) have investigated buildings made from natural materials, and techniques of their construction; JONASSON *et al.* (2014) focused on comparing houses in passive standard, and on how they affect the environment; and ALMUSAED *et al.* (2015) looked into the ecological and energetic demands of construction materials. The social issues are permanently underestimated with regards to the discussed problem. In a specific example of construction technology, as claimed by DE LOTTO (2008), and AFsoon *et al.* (2016), it is not just the technology developed in response to the society's demand, but it has a potential to define the future society. In each and every environment, culture and work relate to production, and reflect not only the strategy of local development, but also the characteristics, esthetic preferences, as well as climate, financial, cultural, historical, and other specifics of the given field.

An effort to improve human life and raise its quality has become an immanent part of human history. The idea of a rightful and happy life, which represents an essential part of the world history, religious and philosophical teachings, utopian and visionary doctrines, as well as the political requests for change of systems, is implicitly incorporated within them. This can be seen in the development of wooden constructions (WOOLLEY *et al.* 2006, KOLB 2011, HONTUS 2015). The current wooden houses (THURZO 2004, KOLB 2011) which have gone through a long-term development, fulfill all the requirements for living, and at the same time minimize the effects on the environment. However, fulfillment of the living need, as one of the basic human needs, is generally greatly determined by the level of social and

economic development of the society. Within the conditions of market economy, the responsibility for acquiring one's own living is mainly shifted towards the citizens themselves (WILE 1920, ADAMUŠČIN 2012, STURGILL *et al.* 2016), while the availability of living is thus directly proportional to the financial possibilities of individuals and households. Therefore, the construction is affected by numerous factors, e.g. social, economic, cultural, ethical, religious, etc. These factors significantly influence people's preferences, which, naturally, reflects in the choice of construction material. With regard to the above stated, we may claim that the immediate satisfaction of the living need is rather differentiated in individual countries, and also in different regions within a country.

The basic requirement for contemporary family houses is mainly for them to possess an optimal layout. At the same time, the interest in high quality technical and esthetic solutions of the interior is rising, and so is the technical equipment of the house. What is brought forward is the question of thermal regulation, reducing the living (operational) costs, and saving the energies and water. More and more frequently, there are requirements regarding healthy environment, i.e. such environment that tends to prefer use of safe and harmless construction products and materials (RHEE 2018). Wood as a construction material (KOLB 2011) can fulfill all these requirements. Preference of construction materials depends on many factors. Besides environmental orientation of individuals, an important role is played by social, economic, climate or religious preferences. At the same time, as noted by KOLB (2011) and ZIMMER *et al.* (2017), the lack of trust towards wooden constructions at present is still rather high, and is affected by – sometimes untrue – myths, among which rank: higher probability of fire, low lifespan of the construction, more complex and complicated mortgage deal, worse heating conditions, woodworm, mold, and fungi susceptibility, etc.

According to KOLB (2011), silicate houses have a dominant position in Slovakia. According to RIVERS (2015), among the advantages of silicate houses belong: no need for additional protection by conservation of materials, resistance against insects and mold, and, furthermore, the ability to protect against electric smog. Thanks to their long lifespan and economy, the investments into silicate houses guarantee their permanent value. However, on the other hand, ecological thinking is what currently becomes a very important issue for people (ALMUSAED *et al.* 2015, VILUMA 2017), while having an impact on the choice of material. Moreover, the requirements placed on construction in a form of norms, regulations, and standards, are constantly growing. In line with this, the state provides support to construction of wooden houses, which can significantly contribute to preferring them among others.

The choice of construction material, as pointed out by ADAMUŠČIN (2012) and AFSOON *et al.* (2016), does not only affect the current economic and social factors, but has an impact on everything we have lived through, and what we have learned from our ancestors. According to DVOŘÁKOVÁ (2008), the main reason for restrictions, and later for almost complete replacement of wooden houses by other types, was the early regulations of Maria Theresa and Joseph II, known as “Fire Decrees”. Later, in 1950s, reinforced concrete (ferroconcrete) was used on a large scale. The changes in preferences of construction materials stopped concerning solely cities and towns, and started penetrating into the lives of Slovak villages. Gradually, radical social and economic changes in the process of rural conversion were occurring. As noted by THURZO (2004), in 1960s, an extensive fire engulfed wooden houses built mainly in the northern part of the Žilina region. This fact had a significant effect on the follow-up construction. Slowly, a radical social and economic change arrived, and the process of rural conversion was accelerated. Time-wise, this process connected with a more and more significant penetration of global technological development, which impacted all aspects of social life. The result was a complete

reconstruction of villages into their current look. Silicate houses became a symbol of higher living standard, and a higher quality of life.

Construction of a family house is a complex and demanding process (CRUZ NOIA 2015, ZIMMER *et al.* 2017). For many people, this is one of the most serious and most important decisions, which accompany them for the rest of their life. Construction of a family house must be planned and prepared. Before the actual construction, the future owner should be clear on the choice of the building procedure and methods, as well as the choice of materials and technologies used in construction. However, the construction may be performed in multiple ways, while the most economical one appears to be building the house on one's own. This is suitable for those who do not have sufficient financial resources to build a house through a construction enterprise. This method is cheaper, however, it is more time-demanding. A silicate house, as claimed by RIVERS (2015), is the best solution for future owners if they build it themselves, and it is quite common in Slovakia. On the other hand, with wooden houses, this method is not recommended since the construction process is more complex and requires not only practice, but also certain professional knowledge (KOLB 2011, ZHAO *et al.* 2012). At the same time, the process of building a silicate construction by individuals themselves can be interrupted, or even stopped, at any time, due to lack of finance.

## METHODOLOGY

The methodology of the paper consisted of three phases. In the first phase, it was necessary to perform the analysis of Slovak, but mainly foreign, literature, while elaborating a summary of various authors' views. In this phase, the following methods of scientific research were used: summary, synthesis of knowledge, and the methods of analogy and deduction. The second phase focused on the analysis of primary sources obtained via the empirical research, by the questioning method. The questionnaire aimed at finding out how well people living in the Žilina region are informed about wooden houses, as well as to identify the main determinants which represent barriers to wooden houses being established in the market. The questionnaire was hierarchized into four independent parts, as described below:

- Part A – Demographics, and economic and social characteristics of inhabitants of ZSK.
- Part B – Preferences with regard to building a family house.
- Part C – Awareness of wooden houses among ZSK inhabitants.
- Part D – Wooden houses vs silicate houses.

In the first part of the questionnaire research, it was necessary to identify the economic and social profile of respondents. Questions focused on finding out the gender of the respondents, their permanent residence, their current living situation and the location (town or village). We were interested in the respondents' family status, age, education, number of children, current job, and their monthly income. Part B aimed to find out the respondents' preferences as to building a family house. The questions asked about the type of house the respondents prefer, the construction material, the sources they used to finance (or will use to finance) the construction, and how much they are willing to invest in their own living. The third part of the questionnaire contained questions which aimed at finding out the awareness of ZSK inhabitants with regard to wooden houses. Questions were phrased to ask the following: if respondents consider wood to be a suitable construction material to build a family house, what type of wooden object they would choose to build, what they understand as a wooden house, if they currently own a wooden house (wooden construction), if they use this building for business purposes, and which sources they obtained the information related

to wooden houses from. In the last part of the questionnaire (D), the questions asked the respondents to compare the qualities of wooden and silicate houses. All questions used in the research were constructed as closed questions. Respondents were always offered a selection of answers, in order to achieve a higher validity of the collected information.

The questionnaire research was conducted between May 14 and October 4, 2018. The online questionnaire was distributed among 3,428 inhabitants of ZSK via the Internet. The reason why this particular number of ZSK inhabitants was addressed was to ensure the representativeness of the selected sample. In total, 728 filled in questionnaire returned, therefore the return rate was 21.24%.

In order to determine the representativeness of the selected sample, we used a statistical method most likely to be applied in economic and marketing surveys, while being referred to as one of the most exact methods. In order to obtain the correct calculation of sample representativeness, which is quoted below (RIMARČÍK 2007), it was necessary to substitute the right variables into the formula. The result of the relation is the “n” variable, which refers to the minimum necessary number of respondents. The variable “z” is the coefficient of reliability of a statement. If  $z = 1$ , then the minimum of 63% reliability of the research is proved. At the value of  $z = 2$ , the reliability is proved at 95.4%, and at  $z=3$ , the reliability of the research is 99.7%. The variables “p” and “q” are numbers of questioned respondents, expressed as a percentage, who are/are not familiar with the given problem; or who incline to one or the other alternative. Regarding the fact that the choice of respondents is purely random, and the extent of knowledge of respondents with regard to the problem is unknown, the whole sample is divided in half, in order for the product of values p and q to be the maximum, i.e.  $p$  and  $q = 50\%$ . The value “ $\Delta$ ” is the maximum acceptable error. The goal of the research was to obtain a holistic view of the researched problem, therefore, the coefficient of reliability was determined to be at value 2, with the 95.4% reliability of a statement. The value of maximum acceptable error was determined at 5%. Based on the methodology of determining the size of the representative sample, according to formula (1), we may determine the minimum size of the sample of respondents:

$$n \geq \frac{(z^2 \times p \times q)}{\Delta^2} \quad (1)$$

After substituting the relevant values into the formula, we were able to calculate the size of the representative sample (minimum number for the sample):

$$n \geq \frac{(z^2 \times p \times q)}{\Delta^2} \quad \rightarrow \quad n \geq \frac{(2^2 \times 0.5 \times 0.5)}{0.05^2} \quad \rightarrow \quad n \geq 400$$

It is clear from the calculation that the sample must be formed by at least 400 respondents, inhabitants with permanent residence in ZSK. Since there were 728 research participants, the results of the research may be generalized to the whole basic sample; thus the research is representative.

Based on the available literary sources, four basic hypotheses were formulated as follows:

*H<sub>1</sub>: We assume that more than 60% of people living in the Žilina region prefer a silicate house to a wooden house.*

Preference of construction material depends on many factors. Besides the ecological way of thinking of individuals, an important role should be seen in social, economic, as well as climatic, religious, or personal preferences. At the same time, as noted by KOLB (2011) and Zimmer et al. (2017), the distrust for wooden houses is currently still rather high, and it is highly influenced by – often untrue – myths. That is why, according to KOLB (2011), silicate houses have a dominant position in Slovakia.

*H<sub>2</sub>: We assume that the majority of people who have made a decision to build a wooden house in the Žilina region, and have built it, use it for business purposes in the field of accommodation and catering services.*

As stated by Michalová (2010), the service sector has long been considered to be the fastest growing sector since 1990s. As wooden houses are a part of folklore architecture in the Žilina region, entrepreneurs in tourism attempt to attract customers by the region's unique atmosphere, which is created by shepherd's huts and chalets, or wooden houses built from solid wood.

*H<sub>3</sub>: We assume that the main reason for preferring silicate houses to wooden houses in the Žilina region is building the house by individuals themselves.*

The construction of a family house is a complex and demanding process. For many people, it is one of the most serious and most important decisions, which accompany them throughout their further lives. The construction of a family house must be well-planned and prepared. The most economical way to build a house is by people themselves. This is suitable for those builders who do not possess a sufficient amount of finances to build the house through a contractor (CRUZ NOIA 2015; ZIMMER *et al.* 2017).

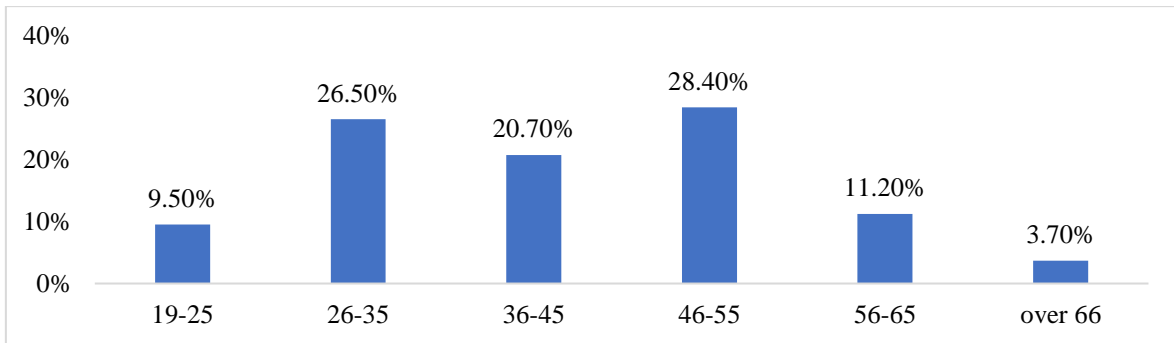
When verifying the hypotheses, we used the statistical software Statistics10. In order to evaluate the stated hypotheses, the selected mathematic-statistical methods were used: binomial test, Friedman test, Wilcoxon test. In the third phase, such measures were proposed, the implementation of which into practice will help eliminate the bias with regard to wooden houses as perceived by non-professional and professional public, and thus help wooden houses to establish faster and more effectively in the Žilina region.

## RESULTS AND DISCUSSION

The results of a questionnaire survey, as well as verification of hypotheses focused on finding out the preferences of construction material to build a family house in the Žilina region, the awareness of the inhabitants of ZSK with regard to wooden houses and the identification of the main determinants representing barriers to the establishment of wooden houses in the market are presented in the following section.

The respondents who participated in our questionnaire survey consisted of 384 women (52.7%) and 344 men (47.3%), all from the Žilina region. The addressed respondents live primarily in rural areas/villages (396 or 54.4%), while 332 (45.6%) respondents live in a town/city. As to permanent residence of the respondents from the Žilina region, 25.5% live in Orava, 23.1% respondents in Liptov, 16.3% in Turiec, 18.4% in Kysuce, and 16.6% are from Horné Považie. The most populated representation as to age was by respondents between 36–45 years of age (28.4%), followed by the group between 26–35 (26.5%). Respondents at 18 years of age and below did not participate in the research. The results are shown in Figure 1.

The largest group of respondents (according to their relationship status) is represented by married couples (49%), followed by single respondents (25.5%). Living (unmarried) spouses represent 12.6% of the addressed respondents, and 12.8% of respondents are divorced. Most respondents have two children (35.6%), or one child (26%). 15.5% of our respondents have three, and 11.4% have four or more children. 11.5% of respondents do not have any children. 45.6% live in a silicate house, while the second largest group is people living in an owned apartment (18.4%). Living in a wooden family house was claimed by 14.8% inhabitants of the Žilina region. 10.3% live in a rented apartment, and 7% in a small studio. The category “other” was chosen by 3.8% respondents.

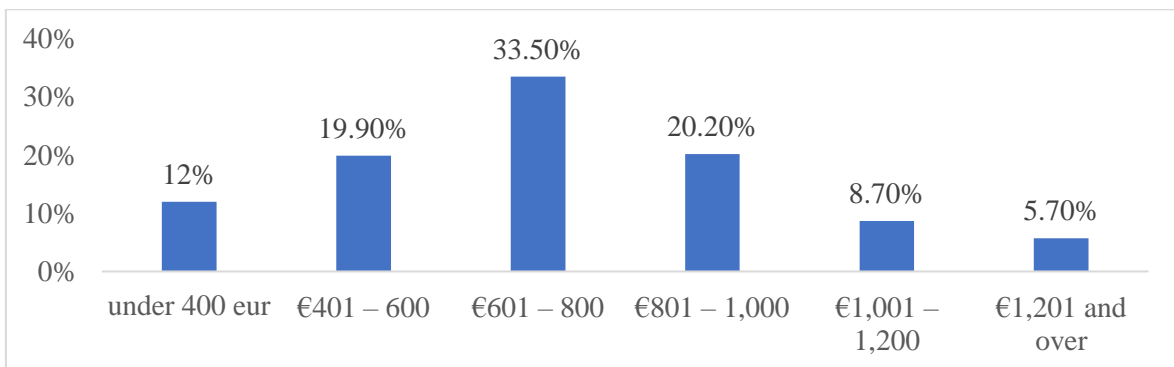


Source: authors; based on the results of the questionnaire survey.

**Fig. 1 Age of respondents.**

With regard to the highest achieved level of education, the largest group is represented by those respondents who have obtained the bachelor's (33.9%) and the master's degree (25.7%). High school without the final certificate was achieved by 13.5% of the addressed, high school with the final certificate by 22.3%, and only 4.7% respondents have achieved the doctoral degree. Respondents with highest achieved elementary level of education did not participate in our survey.

As to the employee status, 39% of respondents are employed in private sector, 33.7% are sole traders. Public sphere employees are represented by 3.6% of ZSK inhabitants, and 4.9% are students. Entrepreneurs who have actively participated in our research are represented by 3.8%, retired people by 6.6%, and 8.4% of respondents are unemployed. We have further inquired about the monthly income, while 12% of the addressed respondents earn up to €400. The most populated group of respondents earn between €601–800 (33.5%), and the income between €801–1,000 is claimed by 20.2% of respondents. The results are shown in Figure 2.



Source: authors; based on the results of the questionnaire survey.

**Fig. 2 Monthly income of respondents.**

In the next section of the questionnaire, attention was given to preferences of construction material when building a family house. This question relates to hypothesis  $H_1$ : *We assume that more than 60% of people living in the Žilina region prefer a silicate house to a wooden house.* Respondents could choose from the following materials: silicate house, wooden construction, steel construction, and other. According to the questionnaire results, when building a family house, 70.6% of respondents would prefer to use silicates, i.e. would build a silicate house. On the other hand, only 22.8% would prefer to build a wooden house. Validity of hypothesis  $H_1$  was tested through binomial test. The results have proved that

***hypothesis  $H_1$  can be confirmed***, i.e. it stands that ***more than 60% of people living in the Žilina region prefer a silicate house to a wooden house*** (p-value = 0).

Due to highly developed tourism in the Žilina region, it was further important to investigate if the respondents who own wooden constructions use them as a family house, or for business purposes in the accommodation and catering field. Of 728 respondents, 33.5% own a wooden construction, while it serves them in the above mentioned field. On the other hand, 14.8% claim to own a wooden construction while using it as a family house. 4.4% of respondents use their wooden construction for business purposes, however, in a different field than mentioned above (not catering or accommodation). Cottages and traditional cottages used for business purposes are owned by 63.4% of respondents, a wooden shepherd's hut (known as 'koliba') by 18.5%, ranch by 8.7%, and an eco-house by 5.10% of respondents. The option "other" was indicated by 4.30% of our respondents. The presented results ***confirm the validity of hypothesis  $H_2$*** , i.e. it stands that ***the majority of people who have made a decision to build a wooden house in the Žilina region, and have built it, use it for business purposes in the field of accommodation and catering services*** (validated by binomial test, with p-value = 0.000).

In the third phase of our research, we tried to find out what respondents consider to be the main benefit of silicate houses when compared to wooden ones. The main benefit silicate houses provide to respondents is the possibility to build the house themselves (33.1%), and to conserve the construction (17.4%). While building a house on one's own enables the builder (future owner) to save finances, conserving the construction (interrupting it temporarily) is mainly used in situations when the builders use their own finances and do not want to borrow money. Among other reasons that respondents view as benefiting them with regard to silicate houses are the fast construction process (17%), and lifespan (durability) of the house (12%). This question relates to hypothesis  $H_3$ , which was tested by the Friedman test, followed by the Wilcoxon test. The result of the Friedman test has confirmed that the individual benefits of a silicate house are not of the same significance (p-value = 0.00). By Wilcoxon test, we identified the rank of significance of the individual benefits. It can be stated that ***the main reason for preferring silicate houses to wooden houses in the Žilina region is building the house by individuals themselves*** (p-value = 0.000). Hypothesis  ***$H_3$  was confirmed***.

In the following section, the paper presents the perception of respondents of selected qualities of wooden houses when compared to silicate houses.

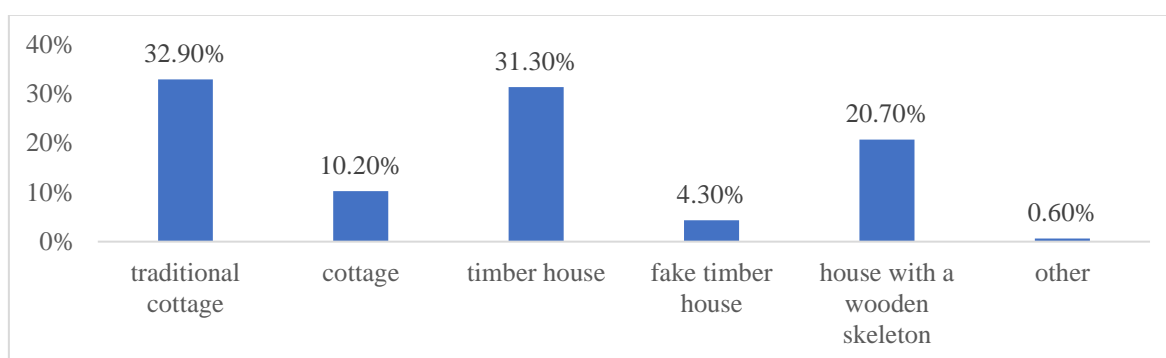
The length of the construction process of a wooden house is viewed negatively by 51.3% respondents, in comparison with a silicate house. On the other hand, 39.9% view this quality positively with regard to wooden houses. The fact that a wooden house may be built on one's own is viewed positively by 26% of respondents, while 62.2% view this quality negatively. These results were also confirmed by findings obtained in the previous question, where we inquired about the benefits of silicate houses. Resistance of the house against pests is viewed negatively by 66% of respondents, and positively by only 25.6%. Similar situation was observed with regard to resistance of wooden houses against weather conditions and natural disasters, where the negative view was presented by almost 50%, and positive one by only 27.6% of respondents (22.4% of respondents could not state their clear preferences). Lifespan of the wooden house (its durability respectively), was viewed positively by 22.7% of respondents. Interestingly, when asked about fire safety, wooden houses are not trusted by as many as 61% of the addressed respondents. This belief may be affected by historical events, as 23.5% of respondents have stated that the majority of wooden houses that were built in the past were destroyed by the fire. When evaluating the safety of wooden houses with regard to breaking in, 52.7% of respondents could not clearly decide if this was a positive or a negative quality of the wooden house. The ability to secure a wooden house



against breaking in and against burglary is trusted by only 8.5% of the addressed people. Changes in volume and shape of a wooden house due to temperature and humidity is perceived negatively by 53% of respondents. Among professional public, it is known that wooden houses have excellent acoustic qualities. When examining the opinions of respondents as to this feature, 39.6% of respondents provided a negative view, and only 20% view acoustics of wooden houses positively. From the obtained answers, it can be observed that non-professional public does not possess sufficient and/or relevant information about qualities of wooden houses. The obtained results correspond with the research of FÁBRI (2016). Similar to this, thermal-insulation qualities of wooden houses are viewed negatively by 40.2% of our respondents.

Among other examined factors belong financial demands to build a wooden house, trust for Slovak producers of wooden houses, operation costs, and the possibility to start the construction at any time of the year. With all the above factors, negative responses prevailed, which means that respondents perceive them in a more negative way with wooden houses than with silicate houses. The opposite trend was shown in factors such as natural and ecological material, simplicity of remodeling the house, house liquidation, size of utility space in relation to the built-up area, and the feeling of peace and well-being in the house. These factors were perceived more positively with regard to wooden houses when compared to silicate houses. The most positively viewed factors regarding wooden houses were: natural and ecological material (70.6%), feeling of peace and well-being in the house (68.3%), house liquidation (63.8%), and the size of utility space in relation to the built-up area (44.2%).

Besides the preference of construction material itself, it was necessary to find out what knowledge (awareness, information) prevails among non-professional public in relation to wooden constructions. The awareness of wooden constructions among non-professionals is one of the key areas that should be given an increased attention. Wood as a construction material for a family house is considered to be suitable by 40.4% of respondents. 46.8% have stated that they do not consider wood to be suitable as a construction material for a family house. 12.8% of respondents could not state their clear preferences. As noted in Figure 3, the term wooden construction (wooden house) is most frequently understood by respondents as a traditional wooden cottage (32.9%), and as a timber house (31.3%). 20.7% of respondents perceive a wooden house as a construction the skeleton of which is built from wood (which happens to be the current definition of a wooden construction).

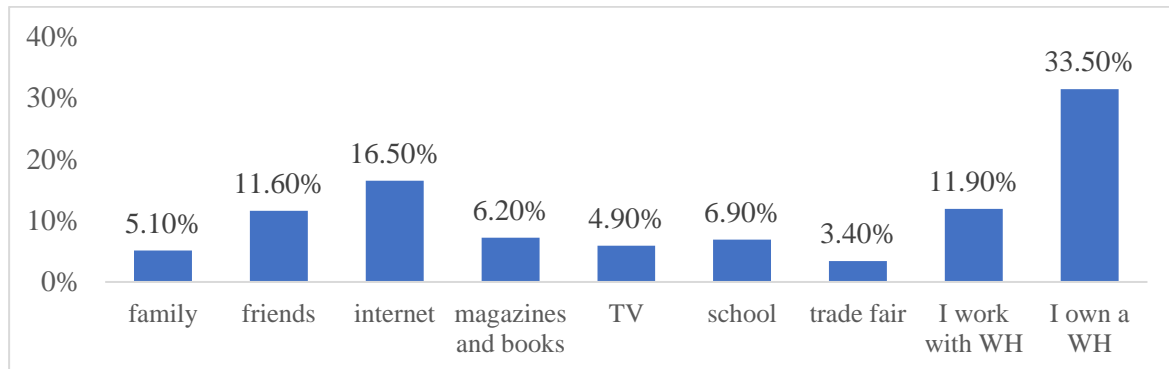


Source: authors; based on the results of the questionnaire survey.

**Fig. 3 What respondents understand under the term wooden construction.**

From the results, it can be concluded that as many as 79.3% of respondents do not perceive the term wooden construction correctly (the correct answer is ‘house with a wooden skeleton’). It is this fact that should be viewed as one of the main barriers to the successful establishment of wooden houses in the Slovak market.

The information that the respondents have about wooden houses was obtained mainly due to them owning a wooden construction (33.5%). Internet represented the source of information for 16.5% of respondents. 11.9% work in the wooden construction field, and 11.6% obtained the information from friends. The results prove that the awareness of wooden constructions among non-professional public is rather low.



Source: authors; based on the results of the questionnaire survey.

**Fig. 4 Source of information of non-professional public about wooden houses (WH).**

By summarizing the results of the questionnaire survey, following conclusions were formulated. The obtained results correspond with the research of KOLB (2011), who found out that wooden constructions in Slovakia have a minority representation among houses. Similar to that, REGEC (2017) states that in Slovakia, it is approximately 1,000 wooden constructions that are built in the course of one year. Even 29.7% of ZSK inhabitants are considering to build a family house within the next three years. On the other hand, 25.1% of respondents prefer to live in a parental home. The sum that respondents are willing to invest into own living is mostly €50,001–100,000 (36.30%), or €100,001–150,000 (32%), followed by a group of respondents who are willing to spend maximum of €50,000. Own resources or financial help of relatives (parents, grandparents, etc.) are planned to be used for financing one's living by 36.1% of respondents. Own resources and a mortgage would be used by 30.9% of respondents, and own resources solely would be used by 20.2%. The most preferred type of house is a bungalow (40.9%), one storey house with the attic usable for living (29.7%), and a two storey house (25.5%). With regard to construction material, when building a family house, 70.6% of respondents would prefer silicate construction, i.e. would build a silicate house. Wood as a construction material would be used by only 22.8% of the addressed respondents. At present, only 40.4% of respondents consider wood to be a suitable construction material for a family house. Wood is mostly used by inhabitants of the Žilina region to build an arbor (28.4%) or a porch (21.3%). This situation was pointed out by authors THURZO (2004) and DVOŘÁKOVÁ (2008) explaining the reasons for significant limitation of existence of wooden constructions in Slovakia by historical events, such as the development of town wooden constructions as a result of the inability to solve the problems of fire safety, and the follow-up Fire Decrees (issued by Maria Theresa and Joseph II), which restricted, or directly prohibited wooden constructions in towns. Since 1816, the ban on building adjacent farm buildings and fences was introduced. Next reason for the above described situation may be the state program named "Savings and replacement of wood in construction" introduced in the end of 1950s and beginning of 1960s, which enabled forcing out wooden houses not only from construction but also from education and research, this being within the concept of developing prefabricated concrete systems. Wooden houses gradually began to be replaced by silicate houses, while this trend has – in majority – lasted

until the present day. The above stated knowledge is also supported by the results of our survey. We further focused our attention on finding out the amount of information and awareness of respondents about wooden constructions. Wooden construction (wooden house) is most frequently understood by inhabitants of ZSK as a traditional wooden cottage (32.9%) or as a timber house (31.3%), while 20.7% of respondents perceive it as a house the skeleton of which has been built from wood (which is also the current definition of a wooden construction). As a whole, the obtained results from the research have shown that as many as 79.3% of respondents do not understand the term “wooden construction/ wooden house” correctly. This fact may be considered a key barrier to proper establishment and development of wooden constructions in ZSK. The information which the respondents possess about wooden houses was obtained mainly because they own a wooden construction (31.4%). Similar findings were concluded by FÁBRI (2016) who claims that at present, wooden houses mainly address the young generation of people, i.e. those who are searching for healthy and good quality, while at the same time cost-effective, living. As to sizes and dimensions of family houses, people prefer to opt for an adequate proportion between simplicity, efficiency, and comfort. The type of houses in question mainly dominates in rural areas (villages), where traditional constructions are given new, modern look by the architects. Recently, the most popular and sought type of family house is an uncomplicated house with an inclined roof, built in a low-energetic (passive) standard, with a simple archetypal form.

The last question of the survey focused on finding out how the respondents perceive the selected qualities of wooden houses in comparison with silicate houses. The main benefit of silicate houses is seen in the ability of future owners to build the house themselves (27.6%), and the possibility to conserve the construction (20.20%). While the former option helps the builder save finances, the latter is used by those who use their own financial resources to build the house and do not wish to borrow money. Overall, it can be concluded that the respondents perceive the majority of the characteristic determinants related to wooden houses in a more negative way than those of silicate houses. More than a half of respondents evaluated the following qualities of wooden houses as negative: length of the construction process, possibility to build the house on one’s own, resistance of wood (as a construction material) against pests, resistance of wood to weather conditions and natural disasters, lifespan of the construction, fire safety, volume and shape changes caused by temperature and size, and the financial demands of the construction. On the contrary, among the positives of wooden construction belong, according to respondents: natural and ecological character of wood as a construction material, easier liquidation of the house, the proportion of utility space to the built-up area, and the feeling of peace and well-being in the house. From the outcomes, it can be concluded that among non-professional, as well as professional, public, the so called myths related to wooden constructions still prevail. These cause a distorted picture of people as to the real qualities of wooden constructions. Author KOLB (2011) and RIVERS (2015) clearly state that wood has always been used as a construction material for building houses, and fulfills all the requirements for being considered the healthiest construction material. REGEC (2017) identifies with the obtained results, claiming that the reason why wooden constructions are not popular in Slovakia (when compared to e.g. Germany, Austria, etc.) is the insufficient professional preparedness of construction enterprises, and a very insignificant influence of the “good” examples of constructed wooden houses in Germany or Scandinavia. As the same time, the author notes that in Slovakia, promotion of benefits and limitations of wooden constructions in comparison with silicate houses is rather insufficient. Wooden constructions in Slovakia do not have a large impact on the image of people who have built it/had it built, nor they raise the owners’ social status, as it is in other EU countries. This is despite the fact that at present, great emphasis is given to ecology, the condition that wooden houses undoubtedly fulfill.

Similar to the previous opinion, FÁBRI (2016) mentions several reasons for lower popularity of wooden constructions in our country, including: lack of financial resources of young families (which relate to low income and the inability to repay a long-term loan); the price of the construction site and utility systems and networks; the price of the wooden construction itself (mainly due to high prices of good quality construction material); insufficient support from the government; insufficient awareness of the public about the benefits and limitations of wooden constructions, etc. HAVLÍK (2013) points out that the current situation, i.e. low interest of Slovaks in wooden constructions is caused by almost no publicity, as well as by the existence of biases originating in the past. A wooden house is still perceived among people as living for the poor (FÁBRI, 2016). In the past, it was the low quality wooden constructions that contributed to the spreading and the long-term existence of biases in the society. The author also highlights wrong education in this regard, where the weakness of wooden houses is suggested in a fairy tale about three pigs, which people encounter from the very childhood. Apart from this, KOLB (2011) and JOCHIM (2012) suggest that the reason why the boom of wooden constructions in Slovakia is held back is mainly the old fire norms, which are out-to-date and do not allow construction of multiple-story buildings made of wood. Practice from western countries has shown that it is possible to build multiple-story buildings from wood, examples being from London or Milano, where nine-story wooden constructions were built; or Canada and Sweden, where thirty-story wooden buildings can be found.

The key measure that may help wooden houses to be established in ZSK faster and more effectively is a change in marketing strategy of the existing enterprises which deal with wooden houses and their construction. It is essential to start to communicate actively with customers, and to present them with the most updated information about modern wooden constructions. As agreed by HINGSTON (2002), Ali (2003), and JUŠČIUS *et al.* (2016), there is no universal “magical” marketing strategy. Among the main questions that an entrepreneur should be able to answer are: What are the demographics of my customers? Where do they live? Where do they meet (in person or online)? How do they search for products of my enterprise? The answers to these questions determine which marketing strategies will be successful (which are viable), and, on the other hand, which may be a waste of time. In business practice, it stands that to find a universal strategy, which would be revolutionary, is impossible. It is essential to know one’s enterprise and its customers, and only then one can choose the right marketing strategy. The further text presents several selected methods of implementing marketing which are currently preferred and at the same time are successful, and which can thus help in the establishment of wooden houses in the market. It is up to each enterprise to select the right strategy, and to choose the right way how to present itself in the market. The first option is utilization of the *advertising platform on Facebook*. This is a cheap and effective way how to introduce virtually anything into the market. Its main advantage is targeting a specific group of customers according to their interests, age, gender, behavior in the online world, and many other factors. We may state that these days, doing business is practically impossible without making presence on social media. Another option is *Google My Business – GMB*. To use this tool to support one’s enterprise (JUŠČIUS *et al.* 2016) is suitable mainly in the case of local enterprises, as well as those which focus on the domestic market. It is GMB that represents the biggest strength that may be used. The GMB service combines multiple Google platforms into one package which contains Google+, profile of Google Maps services, Google reviews, access to data through the service Google Analytics, Google Statistics, etc. The third option is to use *content marketing*, which may be very useful with regard to wooden houses. Content marketing focuses (unlike paid advertising) on long-term results. Among the main recommendations as to content marketing belong: preparing a good quality content, dealing with relevant topics, optimizing

the content for readers, and creating and promoting the content. Content is not limited by a number of contributions. It includes videos, podcasts, online courses, and further possibilities of other media which people obtain the information from. This way, it will be possible to publish educational articles and videos which will teach potential customers about the real qualities of wooden houses, as well as about their advantages and disadvantages. Another method which can be applied is a so-called webinar. It is in fact a seminar which is conducted online. The webinar may take a form of a presentation, demonstration, or a discussion. Professional discussions on the Internet or on television, focusing on refuting the myths related to wooden houses, informing about their advantages and disadvantages, and on comparing them to silicate houses belong to the ways of promoting wooden houses in the market of the Žilina region. The help from employees of wood-processing enterprises may be desirable for building awareness of wooden houses, since personal recommendations are considered to be of the best ways to find new, suitable, customers these days. The last options we wish to mention are: a marketing campaign in printed media (e.g. regional newsletter), organizing events in the community – volunteering (exercising corporate social responsibility), mail campaign, active performances at public events, or co-financing these events.

The results of the conducted empirical research proved that it is essential to pay more attention to support and promotion of wooden constructions, which can help to eliminate biases held about them by non-professional and professional public, and thus enable faster and more effective establishment of wooden houses in the Žilina region.

## CONCLUSION

Wood has an irreplaceable position among construction materials due to a whole complex of mechanical, thermal, esthetic, utility, and technological qualities, as well as for its impact on the environment. The current wooden houses, which have gone through a long development process, fulfill all conditions for living, and at the same time minimize the impact on the environment. Satisfying the living need (need for a shelter), as one of the basic human needs, is generally highly determined by the level of social and economic development of a given society. In the conditions of the market economy, the responsibility for procuring one's own house is transferred to the citizen; while the accessibility to a place to live is thus directly proportional to the economic possibilities of individuals and/or households. Therefore, the construction of a house is affected by multiple factors, e.g. social, economic, cultural, ethical, religious, and others. These factors greatly influence people's preferences affecting the choice of construction material. Distrust towards wooden houses is currently still high, and is influenced by – often untrue – myths. These myths can cause an inaccurate (distorted or biased) opinion of the public with regard to wooden houses, mainly among those people who do not own this type of house.

## REFERENCES

- ADAMUŠČIN, A. 2012. Economic benefits of green building and certificates for sustainable construction. In *Nehnutelnosti a Bývanie*, 2012, č. 1, s. 15–26.
- AFSOON, M., HABIB, F. 2016. Explaining the role of cultural, social and economic factors on quality of residence in urban neighbourhoods: A case study of Kerman. In *Journal of Geography and Regional Planning*, vol. 9, 2016, no. 5, p. 59–69.
- ALIOVÁ, M. 2003. *Efektívny marketing*. Praha : Slovart CZ, 2003, 72 s. ISBN 80-7145-65-0-0.

- ALMUSAED, A., ALMSSAD, A. 2015. Building materials in eco-energy houses from Iraq and Iran. In *Case Studies in Construction Materials*, vol. 1, 2012, p. 42–54.
- BIKAR, M., SEDLIACIKOVA, M., VAVROVA, K. et al. 2018. Does the combustion of biomass increase the efficiency of heating companies? Evidence from Slovakia. In *Bioresources*, 2018, vol. 13, p.2452-2472.
- BROTO, E. 2015. *Bamboo design guide & 59 case study*. Barcelona : Leading International Key Services Barcelona, 2015. 300 p. ISBN 978-84-15492-81-8.
- COOPER, I. 2006. Cultural and Social Aspects of Sustainable Architectures. In *Building Research & Information*, 2006, vol. 34, p. 82–86.
- DE LOTTO, R. 2008. Assessment of Development and Regeneration Urban Projects: Cultural and Operational Implications in Metropolization Context. In *International Journal of Energy and Environment*, 2008, vol. 2, p. 24–35.
- DVOŘÁKOVÁ, V. 2008. *Ludová architektúra*. 1. vydanie. Bratislava : DAJAMA. 2008, 112 s. ISBN978-80-89226-25-2.
- FÁBRI, L. 2016. Drevostavby oslovujú najmä rozhl'adených mladých ľudí. In *Môj dom*, 2016, č. 6, p. 23–27.
- HAVLÍK, J. 2013. Konštrukčné typy drevostavieb. In *Dom a byt*, roč. 19, 2013, č. 5. s. 97–98.
- HINGSTON, P. 2002. *Efektívny marketing*. Bratislava : Ikar, 2002, 192 s. ISBN978-80-5510-199-0.
- HONTUS, A. 2015. Building a house – between traditional materials and patented organic materials. In *Series Manažment, economic engineering in Agriculture and Rural Development*, 2015, vol. 15, no. 3, p. 167–172.
- JANSEN, S. J. T. 2014. The Impact of the Have-Want Discrepancy on Residential Satisfaction, In *Journal of Environmental Psychology*, 2014, vol. 40, p. 26–38.
- JOCHIM, S. 2012. Drevostavby a životnosť – poruchy, chyby, rekonštrukcia. In *Stavebné materiály*, 2012, č. 6, p. 36-39.
- JONASSON, J., DANIELSKI, I., SVENSSON, M., FRÖLING, M. 2014. A two-family house built to passive house standard in the north of Sweden – environmental system performance. In *Linnaeus ECO-TECH 2014*, Kalmar, Sweden, p. 1–7.
- JUŠČIUS, V., LABANAUSKAITĖ, D. BARANSKAITĖ, E. 2016. The evaluation of online marketing channels efficiency. In *Regional Formation and Development Studies*, 2016, vol. 19, p. 44–53.
- KLEMENTOVA, J., SEDLIACIKOVA, M., MORESOVA, M. 2016. Custom manufacturing of furniture in context of globalization and quality management. In *16<sup>th</sup> International scientific conference on Globalization and its socio-economic consequences*, Rajecke Teplice, Slovakia, p. 905–913.
- KOČNER, M., ŠABÍKOVÁ, I., ČIERNIK, A. 2015. The importance of the Green economy in the context of Green growth. In *Economics and Agriculture*, 2015, vol. 15, p. 89–102.
- KOLB, J. 2011. *Dřevostavby*. 3. vydanie. Praha : Grada, 2011, 317 s. ISBN 978-80-2474-07-13.
- MALA, D., SEDLIACIKOVA, M., BANCIKOVA, D. 2018. How customers of small and medium wood-processing Slovak enterprises perceive a green product. In *Bioresources*, 2018, vol. 13, p. 1930–1950.
- MICHALOVÁ, V. 2010. Služby ako determinant rastu a konkurencieschopnosti ekonomiky. In *Ekonomický časopis*, 2010, roč. 58, s. 30–44.
- POTKÁNY, M., GEJDOŠ, M., DEBNÁR, M. 2018. Sustainable innovation approach for wood quality evaluation in green business. In *Sustainability*, 2018, vol. 10, p. 1–14.
- REGEC, J. 2017. Význam drevospracujúceho priemyslu pre národné hospodárstvo. In *Drevársky magazín*, roč. 18, 2017, č. 5, s. 3.
- RHEE, P. 2018. Beyond Green: Environmental Building Technologies for Social and Economic Equity, In *Architectural Design*, 2018, vol. 88, p. 94–101.
- RIMARČÍK, M. 2007. *Štatistika pre prax*. Bratislava : Marián Rimarčík, 2007. 200 s. ISBN 80-9698-131-1.
- RIVERS, M. 2015. Brick vs Wood: The Pros and Cons of Building Materials. In *Homebuilding & renovating*. 2015, vol. 15, no. 2, p. 32–36.
- STURGILL, B., GIEDEMAN, D. C. 2016. Factor shares, economic growth, and the industrial revolution. In *Essays in Economic and Business History*, 2016, vol. 34, no. 1. p. 165–207.

- THURZO, I. 2004. Ľudová architektúra na Slovensku. Bratislava : Vydavateľstvo PT, 2004. 166 s. ISBN 80-88912-76-8.
- VILUMA, A. 2017. The situation with use of wood constructions in contemporary Latvian architecture. In *Mokslas: Lietuvos Ateitis*, 2017, vol. 9, no. 1, p. 124–138.
- WILE, I. S., M. D. 1920. Sociological aspects of housing. In *The American Journal of Public Health*, 1920, vol. 10, no. 4, p. 327–331.
- WOOLLEY, T., PORRITT, J. 2006. *Natural building, a guide to materials and techniques*. Malaysia : The Crowood Press, 2006. 43 p. ISBN 1-861-26-841-6.
- ZHAO, Z. Y., ZHAO, X. J., DAVIDSON, K. *et al.* 2012. A Corporate Social Responsibility Indicator System for Construction Enterprises. In *Journal of Cleaner Production*, vol. 29–30, p. 277–289.
- ZIMMER, A. T., HA, H. 2017. People Planet and Profit: Unintended Consequences of Legacy Building Materials. In *Journal of Environmental Management*, 2017, vol. 204, p. 472–485.

## ACKNOWLEDGEMENT

The paper has been written as a partial result of the projects VEGA No. 1/0010/17 and projects APVV-17-0206, APVV-17-0456, APVV-17-0583 and APVV-18-0520. This publication was supported by the Operational Programme ‘Research and Innovation’, the project: LIGNOPRO - Progresívny výskum úžitkových vlastností materiálov a výrobkov na báze dreva (Progressive Research into Utility Properties of Materials and Products Based on Wood), ITMS project code: 313011T720, co-funded by the European Regional Development Fund (ERDF).

## AUTHORS’ ADDRESSES

Ing. Mária Moresová  
 doc. Ing. Mariana Sedliačiková, PhD.  
 Technical University in Zvolen  
 Faculty of Wood Sciences and Technology  
 Department of Business Economics  
 T. G Masaryka 24  
 960 01 Zvolen  
 Slovakia  
 maria.moressova@tuzvo.sk  
 sedliacikova@tuzvo.sk

prof. Ing. Jozef Štefko, CSc.  
 Technical University in Zvolen  
 Faculty of Wood Sciences and Technology  
 Department of Wooden Constructions  
 T. G Masaryka 24  
 960 01 Zvolen  
 Slovakia  
 stefko@tuzvo.sk

PhDr. Dana Benčíková, PhD.  
 Matej Bel University in Banská Bystrica  
 Faculty of Economics  
 Department of Language Communication in Business  
 Tajovského 10  
 Banská Bystrica  
 Slovakia  
 dana.bencikova@umb.sk

