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## THE IMPORTANCE OF INNOVATION IN BUILDING MATERIALS IN TERMS OF SUSTAINABLE GROWTH

**Abstract:** The paper deals with the importance of innovation in building construction materials for sustainable growth focusing on assembled wooden houses. We compare the conventional building materials and innovated alternate materials used in building construction. We compare and demonstrate the advantages of these materials based on selected indicators. The results confirm the importance of material innovation for sustainable growth in all pillars of sustainable development.

**Key words:** innovation, innovated building materials, sustainable growth.

### INTRODUCTION

The concept of sustainable development deals with the economic growth covering the society requirements by creating the welfare conditions in short term, medium term but mainly in long term horizon. Demographic and economic development naturally increases the demand for natural resources. The mining, processing, usage and disposal of non-renewable resources cause a wide range of environmental problems such as the increase in waste and emissions. Generally applied methods for assessing the business performance such as product life cycle analysis, portfolio analysis or material flow analysis are the tools helping to analyse and manage the processes and subsequently influence the impact on environment. Long-term sustainable development will then result in optimizing the use of resources, information flows, improving communication between the offer and everybody in the chain, increasing coordination and cooperation, as well as education of individual stakeholders in the sector. Constant innovation of approaches to corporate social responsibility support the continual commitment to contribute to the sustainable development. It secures company competitiveness on the global market with the help of innovations of individual key elements adapted to customers and the trend in world markets in applying the principles of sustainable development and environmental protection.

The European Union accepted the Strategy of sustainable development in order to enforce the sustainable development principles in different sectors. This is a strategy that is based on the assumption of an increase in the effort to meet current needs so as not to endanger the possibilities of continued growth for the next generation. Its goal is to ensure high level of environmental protection, social equality and economical prosperity. The strategy is based on the need to change the society in various spheres such as more responsible consumption, detection of new and sustainable forms, strengthening the economic growth, new alternative sources of energy, use of smart natural resources, more effective transport and global society, what implies the involvement of all actors of social life. Each principle is moving to national level and to each society. National strategy of sustainable development (MINZP SR, 2005) stated solving of the issues in the field of environment, agriculture, trade, production, science and technologies and fiscal policy on macroeconomic level. In particular, it focuses on achieving sustainable economic growth, employment and raising the standard of living while maintaining financial stability in connection with global sustainable development. Within the priorities to ensure the above principles, an environmental strategy is presented to implement sustainable country policies with an emphasis on

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cooperation in the area of institutional and personnel capacity building and technology transfer. Sustainable development securing is actually one of the priorities of European Union policy. Cardiff Initiative of Council of Europe proposed to apply the two-pillar model of sustainable development. It was supplemented by the third pillar, socio-economic, at Lisbon Summit in March 2000, in order to ensure the integration of environmental policy with economic policy. The effort to introduce a new economy based on higher competitiveness and the dynamics of knowledge is included among other strategic objectives of the strategy. Subsequently, the Sustainable development strategy proposal "Sustainable Europe for a Better World" was developed. It focuses on 6 priority issues – climate change, negative impacts on population health, increasing pressure on the use of natural resources, poverty and social disparities, population dynamics and environment pollution. The dominant sectors are: agriculture, energy, transport, industry and tourism, whose development is not taken into account without regard to environmental conditions and perspectives (Loučanová a kol, 2014).

In total the environmental requirements in innovative product management in relation to corporate social responsibility (CSR) based on the principles of sustainable development are implemented through the program of environmentally oriented management (Kollár V., Brokeš P. 2005). By means of environmentally oriented management of product portfolio it is necessary to realize activities which help to overcome the contradictions among market, society and environment. Therefore the companies make the most of their efforts to improve the environmental performance of their products. The environmental performance of the product evaluates its environmental considerations at all stages of its life cycle, from procurement of materials, research and development, production, distribution, use, disposal and recycling. The company takes into account also social and economical aspect during the environmental performance assessment for more secure product use by consumer when creating added value of a product. The connection of innovation product management and corporate social responsibility when applying environment protection creates the system of environment management based on three pillars – product environment performance, innovation quality for customer and added value of the product (Figure 1).

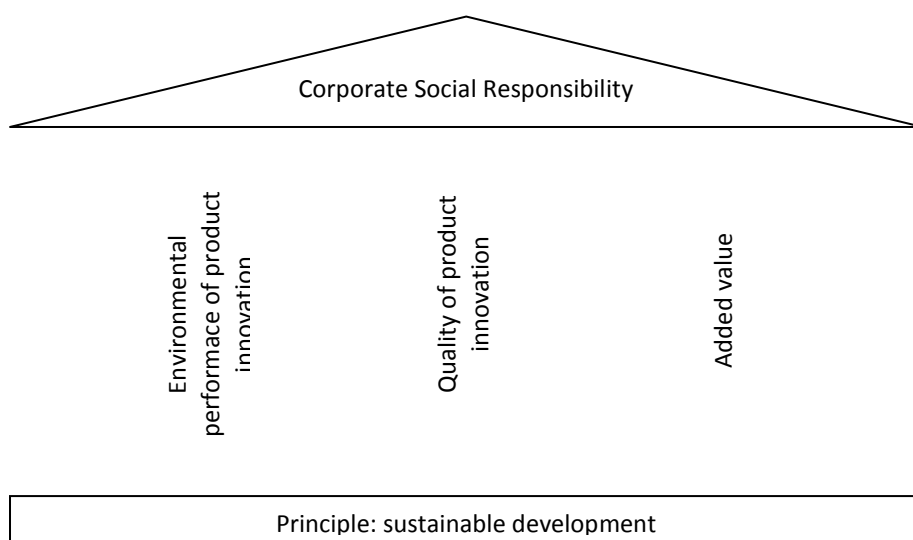


Figure 1. Pillars of corporate social responsibility based on the principle of sustainable development

Sustainable development is a strategy of development based on sustainable sources use within the increasing importance of socio-economic approach. It concerns also environmental issues with regard to development of quality social conditions and society. Innovation product management and CSR based on sustainable development represent the continuity of product innovation with environment oriented strategy of the company for ensuring a long-term perspective on the market. These modern approaches to system management and innovation activities assessment lead to creation of a product respecting responsibility. It helps to create complex system which definitely ensures environmental sustainability as well as socio-economic development.

The role of innovation in this effort will be explained in this paper, which aim is to evaluate importance of innovation of material for building construction in terms of sustainable growth.

## METHODS

The analytical-synthetic method was used to examine the importance of building materials innovations for sustainable development with a focus on wooden assembled buildings. The analysis was conducted according to *heat transfer coefficient (U)* and *thermal resistance (R)* of analysed materials for building construction. Subsequently, through the comparison of the obtained data, the significance of the innovations for sustainable growth at the level of all three pillars ensuring the integration of environmental policy with economic policy was identified.

## RESULTS

The comparison of material characteristics was used for demonstration of the innovation importance for sustainable growth from the perspective of materials for buildings construction, see Table 1.

Table 1. Comparison of analysed characteristics of materials for building construction

Monitored variables	Masonry buildings				Wooden buildings	
	Ferro-concrete	Brick - full	Brick - perforated	Inovovative material YTONG – insulated/ non-insulated zateplený/ nezateplený	Wood	Assembled building structure
<b>R m<sup>2</sup>K/W</b>	0.31	0.35	0.47	7.42/3.45	2.67	7.45
<b>U W/(m<sup>2</sup>K)</b>	3.23	2.86	2.14	0.14/0	0.37	0.14
<b>Difference in contrary to innovated material YTONG</b>	-3.09/-3.23	-2.72/-2.86	-2.0/-2.14	0	-0.03	0
<b>Difference in contrary to assembled building structure</b>	-3.09	-2.72	-2.0	0	-0.03	0

Source: Vajová, 2016

Regarding the results presented in Table 1, the most suitable construction materials are the innovated ones – innovated construction material YTONG and assembled buildings, which achieved much better values in the monitored indicators compared with the traditionally used

materials. Traditionally used materials, such as ferro-concrete, full or perforated brick have high values of heat transfer coefficient and therefore are less cost efficient in contrary to innovated materials (difference  $-2.72 \text{ W}/(\text{m}^2\text{K})$  between full brick and innovated material, difference  $-2 \text{ W}/(\text{m}^2\text{K})$  between perforated brick and innovated material).

Furthermore wood as a construction material achieves significantly better values than the original materials used for building construction and, compared to the innovated material YTONG has minimal differences, but positive. According to that we can state that building materials innovations are of great importance for sustainable growth as they act economically, as demonstrated by the savings of the heat coefficients of the innovated materials against the traditionally used materials. At the same time, these innovations also fulfil the ecological function by saving energy for heating the buildings where innovated materials are used, due to lower heat transfer coefficient and thermal resistance. Additionally, wooden assembled buildings, in contrary to innovated material YTONG, are constructed from heterogeneous natural material, which is more consistent with nature. Moreover, less energy will be used to produce these innovated materials than to produce original materials used for building construction, what is making these innovated materials more environmentally friendly (zdravydom.sk). Owners of buildings from innovated materials can use economic savings from operating these buildings for other purposes and because of a much shorter construction time the social aspect of sustainable growth is fulfilled. It can be concluded that the innovations of building materials are of great importance for sustainable growth and wooden assembled buildings that underline even more.

## CONCLUSION

Innovation, as well as sustainable growth has a very important role in the current market economy. Sustainable growth is still an evolving and important component in a globalized world. It is built on three pillars, economic, social and environmental. Based on our findings, we can state that buildings from innovated materials are more affordable, thus fulfilling the economic aspect of sustainable growth. In addition to the price, however, a number of positive aspects can be mentioned. It is a considerable saving of time compared to the construction of buildings from the traditionally used materials, significant thermal resistance of the walls, almost half the thickness compared to the classical wall, which increases the useful area, the energy saving, fulfilling the social aspect. As the innovated building materials are health and environmentally friendly, also environmental aspect of sustainable growth is fulfilled. Thus, we can conclude that innovations are of great importance for sustainable growth in terms of building materials.

## Acknowledgement

*The author would like to thank the Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic and the Slovak Academy of Sciences. This paper was elaborated within the frame of Grant project VEGA 1/0756/16 "Identification of consumers' segments according to their affinity for environmental marketing strategies of business entities in Slovakia".*

## REFERENCES

1. KOLLÁR, V., BROKEŠ, P. (2005). Environmentálny manažment. Bratislava: SPRINT, 2005. 327 s. ISBN 80- 89085- 37- 7
2. LOUČANOVÁ, E., PAROBK, J. (2014). Inovačný manažment produktu a spoločensky zodpovedné podnikanie pri aplikovaní princípov trvalo udržateľného rozvoja. In *Koncepty udržateľnosti organizácií : zborník vedeckých statí [elektronický zdroj]*. - Poprad : Výskumný ústav ekonomiky a manažmentu, 2014. ISBN 978-80-970458-6-9, s. 177-186.

3. MINZP SR 2005. Národná stratégia trvalo udržateľného rozvoja slovenskej republiky časť 1-1, 2005, 33 s. [on-line] Ministerstvo životného prostredia SR. [04.02.2014]. Dostupné na internete: <http://www.minzp.sk/dokumenty/strategicke-dokumenty/>
4. Národná stratégia trvalo udržateľného rozvoja, (2016). [online] [www.rokovania.sk](http://www.rokovania.sk) [cit. 07.06.2016] Dostupné na internete: <http://www.rokovania.sk/appl/material.nsf/0/F34F511CC50CD268C1256ADA003D484F?OpenDocument>
5. Stavebné materiály SK (2016). moderné stavebné materiály. [online] [www.stavebnematerialy.sk](http://www.stavebnematerialy.sk) [cit. 10.03.2016] Dostupné na internete: <http://www.stavebnematerialy.sk/>
6. Stuba SK (2016). Funkčné požiadavky na obvodové plášte. [online] [www.svf.stuba.sk](http://www.svf.stuba.sk) [cit. 15.08.2016] Dostupné na internete: [http://www.svf.stuba.sk/docs//web\\_katedry/kps/prednasky\\_2013/funkcne\\_tepelnotechnicke\\_OP.pdf](http://www.svf.stuba.sk/docs//web_katedry/kps/prednasky_2013/funkcne_tepelnotechnicke_OP.pdf)
7. VAJOVÁ, P. (2016). Význam inovácií pre trvalo udržateľný rast. Bakalárska práca. Zvolen: Technická univerzita vo Zvolene. 2016.
8. Ytong SK (2016). Murivo ytong pre úspory energie. [online] [www.ytong.sk](http://www.ytong.sk) [cit. 02.02.2016] Dostupné na internete: <http://www.ytong.sk/sk/docs/murivo-ytong-pre-uspory-energie.pdf>
9. Ytong sk (2016). Ytong najvyššia kvalita bývania. [online] [www.ytong.sk](http://www.ytong.sk) [cit. 13.03.2016] Dostupné na internete: [http://www.ytong.sk/sk/docs/ytong-kvalita\\_byvania.pdf](http://www.ytong.sk/sk/docs/ytong-kvalita_byvania.pdf)