

SIMULATION OF ECOLOGICAL INNOVATIONS PERCEPTIONS IN SLOVAKIA

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Abstract: Ecological innovations are the object of interest in many areas what has subsequently reflected in the fact that the interest of companies in their implementation has increased. Research, development and implementation of eco-innovation is a global phenomenon supported by the policies of most countries as well as the EU. However, not only research and development of innovation is significant, but especially their implementation and adoption should be in the interest of companies. The paper brings the results of the survey in which we have monitored the perception of ecological innovations in different age categories of Slovak respondents. The Kano model is the primary used survey method. The results denote a low level of acceptance of environmental innovations by domestic customers

1 Introduction

The findings from previous period show that it is not sufficient only to innovate, but companies should focus on the creation of innovations applied on the principle of sustainable development represented by ecological innovation. Also the European Union (EU) emphasizes the necessity of ecological innovations realization which increases the environmental protection and the EU industry competitiveness that rests in more effective technologies introduction and more effective resources using in business processes and models. The aim of the idea is to transform Europe into a low-carbon economy which is able to use resources more effectively. The notion fulfilment requires the environmental technologies application which are the essential part of the EU economy [1].

Lešková [2] states that ecological innovations reduce the material requirement. Other benefits of ecological innovation lie in closed material flows utilization and new materials creating or using. They are also focused on energy requirements reducing by alternative energy sources creating or using. In the area of healthy lifestyle and sustainable consumption, ecological innovations minimize a total amount of emissions or existing environmental load and health risks.

Ecological innovations are in charge of Innovation Management. It implements them through innovation of sustainable resources and material from the environment using. It takes into account the growing importance of socio-economic development [3-6].

The Slovak Republic also supports ecological innovation creation through the Slovak National Strategy of sustainable development in cooperation with effective principles.

Ecological innovations can be understood as a tool which enables companies to transform environmental restrictions into opportunities to decrease the costs. Their benefits also include obtaining the better reputation and advantage on new markets. The companies are primary interested in promoting the performance of environmental innovations of the product to customers, as well as to make the realisation of these innovations better [7-9].

The ecological innovations are important because of their impact on decision-making process of the consumer. It results in the marketability of the product itself [10]. It is necessary to consider the product at different levels during the product innovations creating, while each level increases the value of the product to the customer [11-13]. Companies realizing innovations should follow modifications in preferences of their consumers and also to notice the new manufacturing technology of its eco-friendly products when they choose and launch the products on the market.

Regarding the mention information, the aim of the paper is to monitor the perception of the ecological innovations among various age categories of Slovak respondents and to present the perception in the 3D simulation method.

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2 Methodology

The research is focused on the perception of ecological innovations. We have applied the Kano model in order to recognize customers' attitudes towards the demands or requirements of the surveyed object [14]. This model realizes a research where the Kano questionnaire is applied. The questionnaire obtains couples of questions about customer's requests. Every question involves two parts: customer's feeling about presence of a certain feature in a product (functional section of the issue), and customer's feeling about absence of a certain feature in the product (dysfunctional of the issue).

These couples of positively and negatively formed issues include the performance of monitored parameters (specifically for ecological innovations) – price of products, quality of products and ecological innovations of products. We have monitored in detail ecological innovations in the area of:

Environmental product safety, The importance of eco-innovation, The origin of ecological innovation, Slovak products with enviro brand, Ecological innovation, The concept of eco-innovation, Availability of ecological-innovation, Information on eco-innovation, Attractiveness of eco-innovation, Advertising of ecological innovation, The price of ecological innovation. Taking into account the methodology respondents were able to answer each question (statement) on a scale from 1 to 5 representing strong agreement or strong disagreement with the question (statement).

The respondents sample consisted of 740 consumers in Slovakia, keeping the same size of respondents for each determined age category. The answers were elaborated according to the cross rule [14], that allows to categorize monitored parameters in the following categories how respondents perceived ecological innovations [14-23]:

- M (must be requirements) – are obligatory requirements that customers consider as normal and are automatically expected. Their fulfilling is reflected in customers' satisfaction.
- O (one-dimensional requirements) – are those attributes of the product that lead to fulfilment and

satisfaction. Compared to the obligatory requirements customers do not expect them automatically.

- A (attractive requirements) – have an obvious impact on customer's satisfaction because it is a requirement that customers did not expect, but it is attractive for them.

- R (reverse requirements) – are contradictory, they bother customers, as they require some additional action from them.

- I (indifferent, irrelevant requirements) – are requirements not influencing customer's satisfaction or dissatisfaction.

- S – are sceptical, questionable requirements.

The results of Kano model enable to divide the monitored ecological innovations into categories of mandatory, attractive, indifferent and reverse functions. Subsequently the weight was assigned to these requirements in identified categories as follows: $M = 3$, $A = 2$, $O = 1$, $I = 0$, $R = -1$ [5,17,18]. Based on the sum of values, we can compare customers' perceptions of ecological innovations and we identify the target age group for ecological innovations [18].

Subsequently, a 3D simulation was applied to forecast the respondents' perception of ecological innovations in Slovakia.

3 Simulation of perceptions of ecological innovations by respondents in Slovakia

The KANO model was used in order to detect requirements of respondents on the ecological innovations within the determined monitored age categories.

The customer's value (Table 1) was figured out as the sum of points which have been assigned to the individual categories of the questionnaire. The outcomes signify various attitudes towards ecological innovation of products according to the age.

Ecological innovations report the most substantial value for respondents aged from 27 to 40 years (as it is presented by the total customer value 6).

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Table 1 The comparison analysis of perceptions of ecological innovations in Slovakia

Ages	15-26		27-40		41-60		61+	
Price of products	I	0	A	2	I	0	A	2
Total Quality of products	X	2	X	4	X	4	X	2
- The brand	O	1	I	0	I	0	I	0
- The origin	I	0	O	1	O	1	O	1
- The standards	O	1	M	3	M	3	O	1
Total Ecological innovations	X	0	X	0	X	0	X	0
- Environmental product safety	I	0	I	0	I	0	I	0
- The importance of eco-innovation	I	0	I	0	I	0	I	0
- The origin of eco-innovation	I	0	I	0	I	0	I	0
- Slovak products with enviro brand	I	0	O	1	I	0	I	0
- Ecological innovation	I	0	I	0	I	0	I	0
- The concept of eco-innovation	I	0	I	0	I	0	I	0
- Availability of eco-innovation	I	0	I	0	I	0	I	0
- Information on eco-innovation	I	0	I	0	I	0	I	0
- Attractiveness of eco-innovation	I	0	I	0	I	0	I	0
- Advertising of eco-innovation	I	0	O	1	I	0	I	0
- The price of eco-innovation	I	0	R	-1	I	0	I	0
Total		2		6		4		4

Ecological innovations are the most valuable for the customers at the age of 27 to 40, for whom these innovations represent one-dimensional requirement. It represents those innovation attributes that lead to fulfilment and satisfaction of customers. The higher the degree of compliance with these requirements are, the customers are more satisfied. They appreciate mainly Slovak products with enviro brand, however they perceived exactly oppositely price of ecological innovations of products. That means that price of ecological innovation is perceived negatively.

On the other hand, the younger ones at the age less than 27 and the older generation than at the age less than

41 years are more interested in classic products than in eco-innovations.

The most important thing for respondents is the quality that products must fulfil (must by requirement), respectively age categories 16-26 and 61+ higher. The higher the quality is, the more sufficient they are (one-dimensional requirement).

On the other hand, for ages 61+ and 27-40, price of products belongs among attractive requirements. It has an obvious influence on customer satisfaction because it is a requirement that customers do not expect, but it is attractive for them. Other products prices do not influence them (indifferent requirements), Figure 1.

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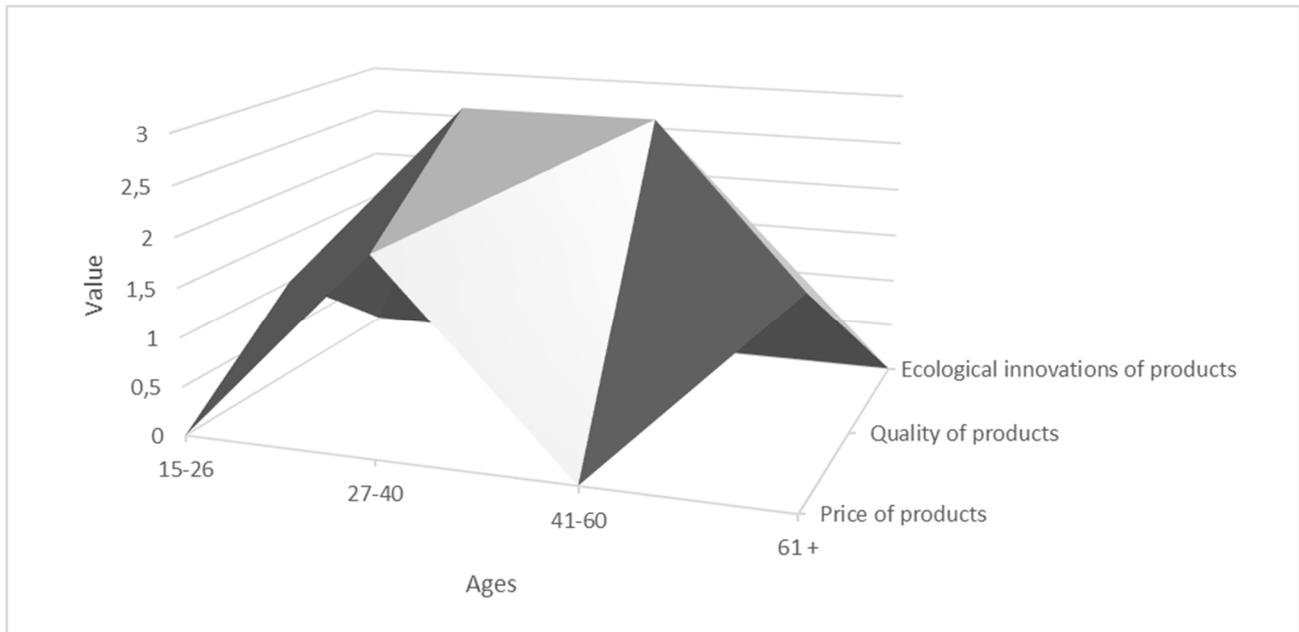


Figure 1 Simulation of perceptions of ecological product and innovations by respondents in Slovakia

Ecological innovations have the least impact on respondents. The respondents are mainly influenced by the price of the product. Following the results, we can state that the quality of the product has the average impact. However, the quality is a mandatory requirement, the price is an attractive requirement and total eco-innovations are an indifferent requirement for respondents. The respondents

perceive the quality of the product based on its standards and origin of the product. Respondents evaluate Slovak products with enviro brand one-dimensionally, but the price of eco-innovation is perceived negatively. These conditions are presented in a simulation in Figure 2: 3D Simulation of perceptions of ecological product and innovations by respondents in Slovakia.

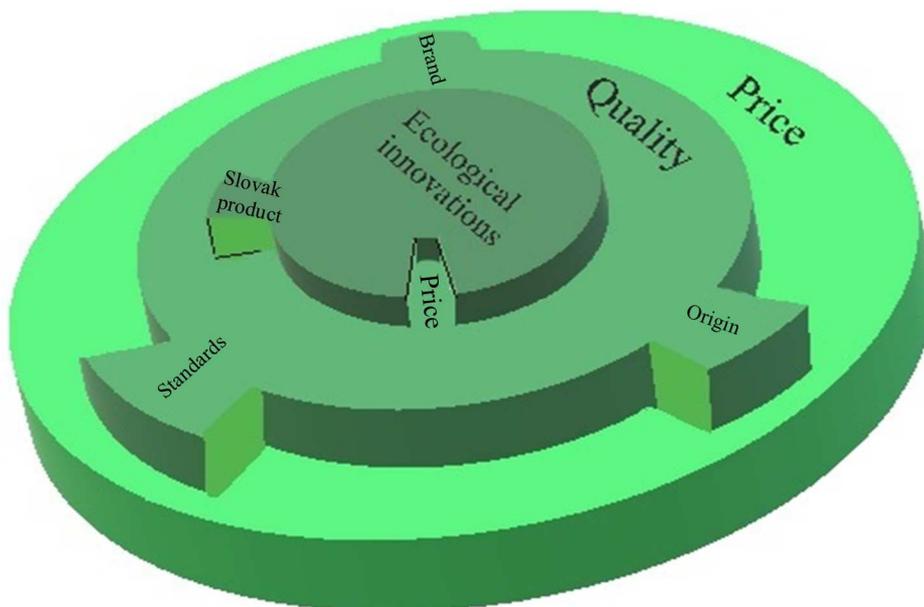


Figure 2 3D Simulation of perceptions of ecological product and innovations by respondents in Slovakia

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4 Conclusion

The importance of ecological innovations is still growing, so it is necessary to monitor the adoption of these innovations by respondents. At present great importance is emphasized in the introduction of eco-innovation. Companies implementing ecological innovations should realize that, it is inevitable not only to implement them, but also to monitor their acceptance by customers. The results just point out that in Slovakia customers place the main emphasis on price and product quality. Eco-innovation does not affect them. Ecological innovations have the most significant impact on respondents at the age from 27 to 40 years. Customers belonging to this age category are more satisfied with Slovak products with enviro brand than customers from other age categories. The results and information about customers' perceptions and preferences in the area of ecological innovations from respondents of different age can be subsequently used during communication and innovation of ecological products.

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