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IDEA CAPACITY ASSESSMENT FOR PRODUCT INNOVATION

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1. Introduction

In the near future, organizations must become more effective in encouraging and managing innovation processes. In order to succeed in this, they must become more efficient in understanding, management and evaluation of innovations, or simply, they need to know how to estimate the resources required and select the best strategy [BoozCo 2012]. In the period from 2001 to 2011, the world's top 1000 companies ranked by expenditures on R&D have increased spending on R&D from $353 to $603 billion per year, with an average annual growth of 6 %, the growth in the last three years being an average of 9.5 %. R&D budget of 20 leading companies reaches $154 billion. Of the top 10 companies on the list of spending on R&D, only three companies (Toyota, Microsoft and Samsung) are at the same time on the list of 10 leading companies according to results of innovations as measured by financial indicators: revenue growth, market cap growth, and EBITDA as a percent of revenue. This confirms the assumption that the financial success of innovation is usually not correlated with investments in research and development, but is dependent on the innovation strategies of companies, and the conduct and management of innovation processes [BoozCo 2011].
Product innovation is a process that consists of preparation of product development (PPD), product development (NPD) and commercialization of products (PC). Preparation of product development (PPD) is a process that precedes the formal process of product development (NPD) [Cooper 1997], [Khurana and Rosenthal 1998]. The creation, evaluation and selection of ideas are the most important activities during the preparation of product development [Khurana and Rosenthal, 1998], [Montoya-Weiss and O'Driscoll 2000], [Koen et al. 2001], [Husig and Kohn 2003], [Griffith-Hermans and Grover 2006], [Hansen and Birkinshow 2007], [Cooper 2008], [Westerski 2011], [Stevanović et al. 2012]. Numerous models, methods and techniques have been developed that encourage creativity and idea generation [Glassman 2009], [Bassiti and Ajhoun 2013]. Creation of new ideas, both by individuals and by a large number of participants and teams is the process which ensures the idea as a key component of product innovation. [Alves et al. 2005]. After completing the creation and collection of ideas, the question of quality and relevance of collected ideas is raised [Rebernik and Bradač 2009]. The number of collected ideas, especially in cases where the collection of ideas is done through open systems for idea gathering, can be extremely large. On the one hand, a large number of ideas is an advantage, since it allows different views of the observed innovation problem, while on the other hand, it requires extraordinary commitment in order for the collected ideas to be reviewed and key values presented in them recognized. An additional aggravating circumstance is the fact that during the preparation of product development, the participants do not possess the notion of what will be the final product, not only in terms of its looks, but also in terms of its functionality and other features. Therefore, classification, assessment, evaluation and selection of ideas are usually conducted on the basis of expertise of multidisciplinary participants in the innovation process [Soukhoroukova et al.

2010]. Such estimates are usually based on a limited number of criteria or insufficient number of attributes that describe specific criteria. Detailed and precise evaluation is conducted for the specific conditions of development of a particular product and can rarely be applied generically [Montoya-Weiss and O'Driscoll 2000], [Xie and Zhang 2010], [Chin et al. 2010]. A much smaller number of studies deal with the general approach of describing, assessing and comparing ideas, and qualitative and quantitative evaluation of ideas in the process of product innovation [Roussel et al. 2012], [Stevanović et al. 2012].
In this research, we therefore tried to develop a data model which will, on the basis of attributes, provide a description of ideas with the goal of their qualitative and quantitative evaluation in the process of product innovation, develop criteria and methods to detect qualitative and quantitative evaluation of ideas, and to propose methods and methodology for the selection of relevant ideas for the process of product innovation [Stevanović 2012]. In this paper, a segment of the study is given, which includes defining the methodology of selection of ideas for product innovation, defining the criteria and attributes for assessing the capacity of the collected ideas on the basis of the conducted empirical research and recent publications in the field and the associated metrics suitable for quantitative evaluation of ideas. Verification of the proposed ways to estimate the capacity of an idea is demonstrated by applying the selected set of ideas using methods of multi-attribute evaluation.

2. Previous research

Opportunity identification, idea generation, gathering and selection, and concept development and testing are the usual parts of PPD. Idea assessment, evaluation and selection are the most important activities during the PPD or as stated in [Koen et al. 2001] „*...The critical activity is to choose which ideas to pursue in order to achieve the most business value*". The process of assessment, evaluation and selection of ideas reduces the risk and uncertainty in the future product development, which has been discussed by several researches [Sherman et al. 2005], [Salomo et al. 2007]. Unlike the process of creating ideas, which is primarily a creative process, a process of evaluation and selection of ideas is primarily analytical process. The process of evaluation and selection of ideas is based on estimation of "goodness" of ideas and conformity to the overall set of goals: business, strategy, development, production, customer, etc. [Feyzioglu and Buyukozkan 2005]. The more risk factors and uncertainties over the PPD are discovered, there will be fewer opportunities for errors in the specification and conceptualization of the future product. Evaluation and selection of ideas have been the subject of many researches [Montoya-Weiss and O'Driscoll 2000], [Feyzioglu and Buyukozkan 2005], [Alves et al. 2005], [Binz et al. 2007], [Aagaard 2008], [Ferioli et al. 2008], [Messerle et al. 2010, 2012], [Paasi and Valkokari 2010], [Roussel et al. 2012], [Stevanović et al. 2012]. In the research reports authors have approached the problem from different angles, depending on the particular case of their research. Thus Aagaard [2008] describes examples of new product idea evaluation emphasizing "*the metrics are critical in idea evaluation and idea improvement ...*", and specifying criteria defined by [Montoya-Weiss and O'Driscoll 2000] as follows: marketing, technology, business and human factor. [Alves et al. 2005], state that in the process of reducing the number of ideas they were looking for convergence techniques based on analytical and logical processes. In study, "*How do you measure the success potential and the degree of innovation of technical ideas and products*" [Binz et al. 2007] claim that for the technical products is not enough just to be a new (novelty criteria) but it is also necessary to be successful in the market (*success potential*). Application of unremarkable multi-attribute methods and processes of group decision making may be found in the work of [Chang et al. 2008], in which the authors present a model of ideas evaluation process for product development, and clarify the application of methods. While implementing the evaluation, they used following evaluation criteria: compatibility with the business strategy, synergies with other products, technological feasibility, market attractiveness and competitive advantage. In the process of idea evaluation for new product development [Feyzioglu and Buyukozkan 2005] propose the eight step model, based on artificial intelligence and fuzzy logic. In a detailed study on the selection of ideas for new product development [Ozer 2005], possible approaches in new idea selection process are considered. In this context, the author emphasizes the possible implementation a large number of analyses. As part of the EU project "*Creative Trainer*", a significant number of methods and techniques for evaluating ideas have been

analyzed and presented for a variety of purposes [Rebernik and Bradač 2009]. Despite a significant number of papers and significant research findings, there is still a large gap between the process of idea generation for product development and innovation of product. There is no unique methodology for description, assessment, evaluation and selection of ideas. The above activities are studied and implemented on a case-by-case basis. According to the report of (AMI) comprehensive global survey that included over 1,300 respondents, and that is based on a series of interviews with companies that are considered the best-in-class in innovation management, nearly half (48 %) of the respondents reported that they "don't have a standard policy for evaluating ideas,". The next common responses: about 17 % said that they use an "independent review and evaluation process", while 15 % said "ideas were evaluated by the unit manager where the idea was proposed". Stated clearly indicates that there is no obvious strategy for selecting or even evaluating ideas.

3. Idea evaluation and assessment

The focus of the study [Stevanović 2012] represented a way of determining the transformation of the cognitive processes of content analysis of collected ideas into a formal process which can be used to define a uniformed methodology. Due to the complexity of the problem, a decomposition process of assessment and evaluation of ideas on four levels has been conducted. The first level starts after collection, and consists of filtering or *screening* of collected ideas. After the first level, the ideas retained in the system are described by means of attributes, categorized and sorted. After that, the second level of assessment is conducted, the one which includes qualitative and quantitative estimation. The qualitative assessment primarily seeks to improve, group, clarify and complete ideas. Quantitative assessment determines the *idea relevancy factor*, which attempts to measure the value the idea brings to the company. The criteria for the purpose of early identification of extremely good and extremely bad ideas and creating a subset of ideas for further evaluation are: benefit, novelty, risk and cost. .At the third level the capacity of collected ideas is estimated (*idea capacity factor*), which is used in trying to determine how acceptable, usable, and creative the ideas are, and what is their potential for innovation. It should be noted that the product still has no clearly defined objectives at this innovation stage; they are created and complemented by assessing the capacity of ideas. At the same time, the requirements the product needs to meet are not yet clearly defined. Therefore the list of requirements will in part depend on the content of the analyzed ideas. At the fourth level the *idea efficiency factor* is determined, i.e. the evaluation of the subset of ideas is performed according to objectives, requirements and constraints defined for a specific product in order to maximize the technical, market, financial, and social effects of innovation, and creates a subset of ideas for the selection and implementation. The following figure (Figure 1) shows the model of the methodology for assessment and selection of ideas derived from conducted research.

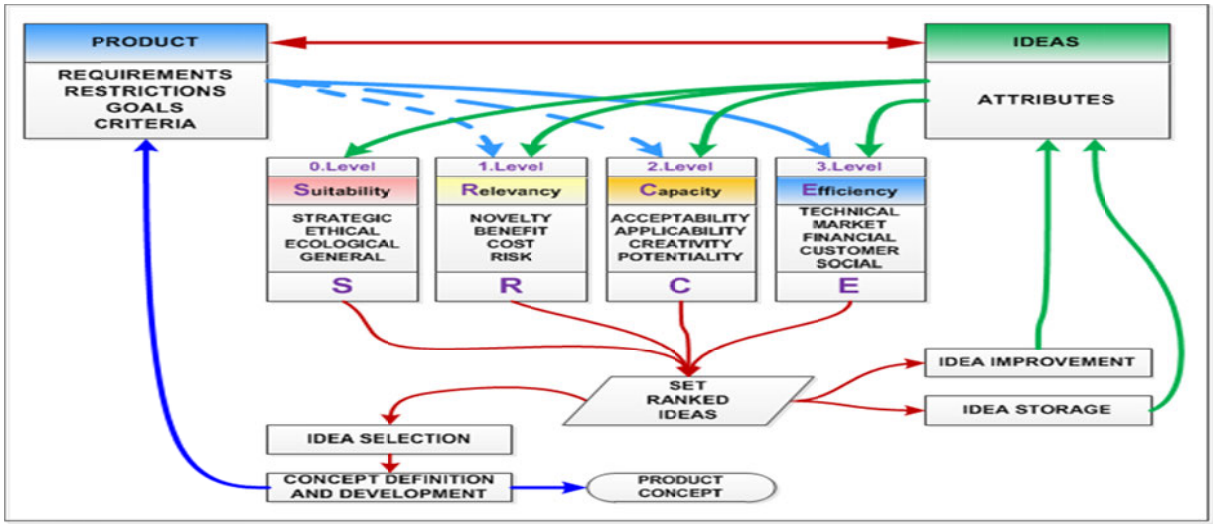

Figure 1. Methodology for assessment and evaluation of ideas

3.1 Elements of conducted empirical research

In addition to using available literature, the data for this study was obtained through an empirical survey conducted in December 2011. The survey was conducted in 123 companies which are engaged in product development in the Republic of Croatia, and that in the last two years have had at least two certified product innovations. All companies in which the research was conducted operate successfully (more than 50 % of companies that participated in the survey account for more than 25 % of their revenues in the international market, and approximately 37 % of companies for more than 50 % of their revenues on the international market).Most companies (over 75 %) have from 10 to 500 employees.

The initiator of the development of a new product in most cases is necessity (expected customer orders (30 %), the necessity of improving the product due to competition (20 %), previous customer orders (11 %)).In a number of cases the sources of ideas for new product development are internal (65 %), of which 12% of companies derive their ideas from within the company.

Most collected ideas come through meetings or brainstorming activities (31 %), or via email messages (23 %). In a number of cases (47 %), assessment of the benefits of some ideas is left to the decision of the Board (the owner), of which in 31% of cases the board (owner) directly decides which ideas will be used in the product development process, while only 2 % of respondents use certain systems for decision support.

The respondents ranked what is a dominant value in some of the collected ideas by using a Likert scale. The highest average grade (4.4) was given to the acceptability of an idea, grade 3.8 to the applicability of an idea, grade 3.5 to the creativeness of an idea, and the potential inherent in the collected idea was given 3.3. Other values received below average ratings.

4. Idea capacity assessment

As stated in the previous section, the evaluation of idea's capacity represents another level of value contained in the collected ideas. The main objective of the assessment of the capacity of an idea is to detect the observed subset of those ideas that independently and / or in correlation with other ideas may, in existing development and production environments, contribute the most to product innovation.

The evaluation of ideas in order to select the best ones in the process of product development, as well as being an extremely poorly structured process, is a typical example of problem solving by ranking of alternatives, on the basis of assessing the criteria and valuation of attributes for a specific set of criteria. Such problems are usually solved by multi-attribute valuation (decisions) methods. The application of these methods is based on a hierarchical model of the process with a defined purpose, criteria and attributes, and unambiguous metrics for evaluating the implementation of attributes. In this, the hierarchy must be structurally and functionally stable in order to add and remove individual components and in order for the information to flow from top to bottom.

Following the conducted empirical research, and the answers to the question of which criteria would be best to represent the quality of some development ideas, we assess the capacity of the idea by assessing the attribute values according to following criteria: acceptability, applicability, creativity and potentiality. The acceptability of an idea shows how the idea falls in line with the strategy of the company, technological, economic and other capabilities for the implementation and available resources. The applicability of an idea indicates how ready an idea is for concept development, i.e. how elaborate, viable, scalable and adaptable it is. The creativity of an idea is estimated through originality, attractiveness, provocativeness and focus on innovation that the idea brings. The potential of an idea, through the criteria of novelty, variety, competitiveness and usefulness shows the level of diversity that the product should obtain through the implementation of the idea.

Given the necessity for evaluation of ideas by a large number of assessors, it is necessary to define a clearer framework for the implementation of the assessment, i.e. unambiguous metrics for the transformation of common qualitative, linguistic values of assessment into quantitative, numerical values. With the practical process of idea valuation, often presented in very different ways, being primarily a cognitive process, a framework for guiding assessors to certain metric values has been defined. The defined metric is simple and unambiguously applicable to all ideas from a group. To convert the linguistic values, that correspond to the criteria, into numerical values, we apply a

numerical interval scale with values from 1 to 9, with the core values being 1, 5, 9, intermediate values being 3, 7 and auxiliary values being 2, 4, 6, 8. This scale gives greater breadth to assessors, makes fuzzy gradation possible and directly corresponds to scales used in some multi-attribute methods (AHP). The following table (Table 1) shows the attributes, metrics and linguistic values for assessing the eligibility of a certain idea.

Table 1. Atributes and framework for the assessment of the idea's acceptability

ACCEPTABILITY	Value		
	1	5	9
STRATEGIC	The idea is poorly matched with the key components of the strategy of the company	The idea is well-matched with all the key elements of the strategy of the company	The idea is completely coincides with the strategy and changes in the company
ECONOMIC	The idea has very limited economic viability	The idea offers good opportunities for profitability with moderate risk	The idea offers great opportunities for profitability with low risk.
TECHNOLOGICAL	For the realization of idea we need technologies that we don't have and that is not available.	Fotr the realization of the ideas we need additional technologies that are available.	The technologies required for the realization of ideas are available
LOGISTICS	For the idea realization we need resources that we don't have (equipment, staff, money, time)	Fot the realization of the ideas we need additional resources that are procurable.	We have available all necessary resources for the realization of the idea

The following table (Table 2) shows the attributes, metrics and linguistic values for assessing the applicability of a certain idea.

Table 2. Atributes and framework for the assessment of the idea's applicability

APPLICABILITY	Value		
	1	5	9
ELABORATION	The idea was elaborated only in summary	The idea is well elaborated but there are still ambiguities	The idea is good and precisely elaborate. Everything is defined in detail.
FEASIBILITY	The idea is hardly feasible with the available resources, technology and knowledge.	The idea is partly feasible with the available resources, technology and knowledge.	The idea is quite feasible with the available resources, technology and knowledge.
ADAPTABILITY	The idea is limited in terms of adaptability	The idea has only partial ability to upgrade	The idea offers very good opportunities for adaptability.
SCALABILITY	The idea can not be adapted to other	The idea can be partially adapted o other	The idea is easily adaptable to other ideas and goals

The following table (Table 3) shows the attributes, metrics and linguistic values for assessing the creativity of a certain idea.

Table 3. Atributes and framework for the assessment of the idea's crativity

CREATIVITY	Value		
	1	5	9
ORIGINALITY	The idea has already been seen many times in many different forms.	The idea has already been seen but not in this application (unexpectedly for this product)	The idea was not previously seen (something quite unexpected)
ATTRACTIVENESS	This idea does not offer an attractive solution.	Such a solution might be attractive to a specific group of users.	This idea provides a solution that could be attractive to most users.
PROVOCATION	This idea offers a little provocative and does not encourages the desirability of purchase.	The idea offers a provocative solution and encouraged to reflect on the desirability	The idea is provocative and encourages the user to desire to purchase.
FASHIONABILITY	The idea is based on old solution	The idea encourages existing trends	The idea indicates a new trend for this products

The following table (Table 4) shows the attributes, metrics and linguistic values for assessing the potential of a specific idea.

Table 4. Atributes and framework for the assessment of the idea's potentiality

POTENTIALITY	Value		
	1	5	9
NOVELTY	The idea does not offer anything new that has not already been practiced	The idea offers a significant novelty for the core values	The idea offers a significant novelty and new core values
VARIETY	The idea is little or insignificantly different from the well-known.	The idea is in detail very different from others, but conceptually is the same	The idea is conceptually and in detail significantly different from other ideas.
COMPETITION	The idea does not offer significant advantages over competitive solutions	The idea offers certain advantages over the competition	The idea offers a completely new solution over the competition.
USEFULNESS	The idea has very small practical usefulness	The idea has considerable usefulness for a certain number of users	The idea has great utility for all users.

The following figure (Figure 2) shows a hierarchy of criteria and attributes for assessing the capacity of ideas. The assessment process itself is carried out according to the methodology of applied methods of multi-attribute decision making.

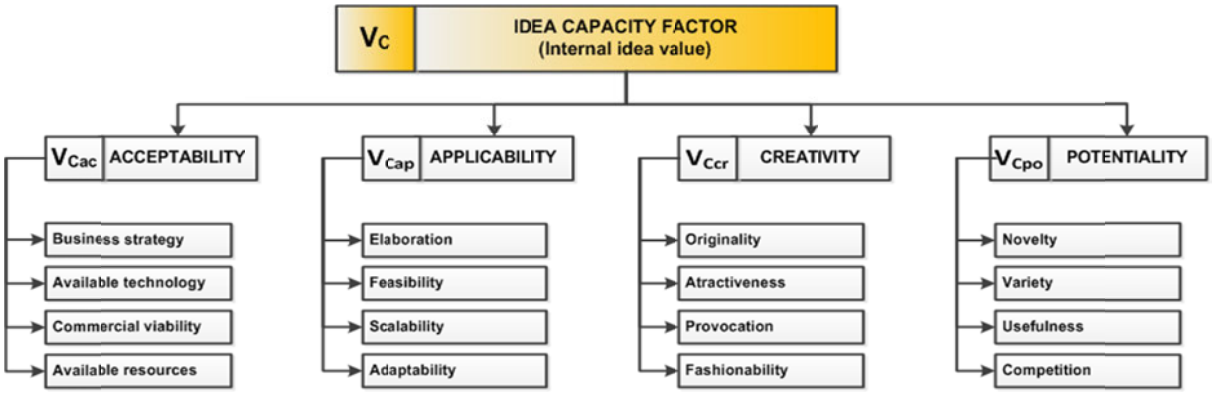

Figure 2. The hierarchy of attributes and criteria for assessing the capacity of ideas

Determining the value of the vector of criteria priority can be carried out on the basis of research or on the basis of consensus among evaluators. Assessment of attribute values is performed by using the above-mentioned metrics or comparing in pairs based on the preference of an estimator based on the framework of defined linguistic metrics. Assessment of the priority vector of goals is carried out on the basis of the calculation based on values of the vector of priorities of a criterion and values of alternatives. After determining the priority vector of a goal, an analysis of sensitivity of a certain value of a goal is carried out in relation to changes in vectors of criteria priority within defined boundaries. An essential element of the application of a multi-attribute method for decision making, specifically the AHP method, also lies in the possibility of the consistency verification of the evaluation process of alternatives.

5. Assessment in practice - case study

The defined model for assessing the capacity of ideas for product innovation should ensure the correct implementation of the evaluation process of ideas. Due to the cognitive nature of the processes of practical comparison of two ideas, the question of application of a defined model arises. According to the research and the analysis of studies [Bothos et al. 2008] it seems that better results will be achieved by involvement of a large number of assessors among the participants of the process of innovation, and by conducting a process of evaluation in several stages with the same or different assessors. During research, the effects of applying different multi-attribute methods were unknown, although it is expected that the application of a certain method should not have a decisive influence. During the evaluation process, the assessor is unaware of a large number of facts about the transformation process (construction) and the final state (final product). The number of alternatives, the number and variety of criteria, the methods of presentation of ideas, the lack of unambiguous features of comparability, the number of assessors and the complexity of the procedure are the main features of the complexity of the problem of estimation of the capacity of ideas.
Therefore, in the process of verification of the proposed methods of ranking the set of ideas based on the capacity factor of ideas, we have selected one individual method for valuation of criteria and attributes (Simple Additive Weighting [Afshari et al. 2010]) and one method for evaluation by comparing pairs (Analytical Hierarchy Process [Saaty 1980]).

5.1 The case study implementation

Evaluation of the proposed method and the determination of the idea relevancy value are carried out on the set of collected ideas for the development of new functionalities in order to improve the snow and ice removing machine in confined spaces. The product requirements, goals, a framework for gathering ideas, and the evaluation process are described below.

The product:
The product is ice and snow removing machine, for the purpose of cleaning the surfaces where these activities are usually done manually.
Requirements:
The possibility of clearing snow from hard surface to depths of up to 25cm of snow; The possibility of removing ice from surfaces with a concrete base and ice thickness up to 2cm; The ability to access and clean up the poorly accessible areas: parking, sidewalks, walking trails, taxi and bus stops, yards; Working in temperatures down to -25 degrees C; Ability to control the transport of cleaned snow and ice.
Goals:
Clean snow and ice from the area where it is usually done manually; Enable the usage for the elderly; Provide more machine functions; Minimum energy consumption
Idea gathering:
Given that the existing database did not have any satisfactory idea, we started defining an event for the collection of new ideas. The event was created and in the given period we collected **189** ideas.
Checking suitability of collected ideas:
In the process of screening, we were checking the suitability of each idea by the four criteria: Strategic suitability, Ethic suitability, Ecological suitability, General suitability
After conducting suitability checks of collected ideas, **62** were thrown out and **127** ideas were kept for further assessment.
Qualitative assessment of the collected ideas
Qualitative assessment was conducted through describing the features and opinion reviewers about ideas. For some ideas it was estimated that they should be improved, while other ideas did not receive a passing grade by the reviewers. After completion of the qualitative assessment, 26 ideas were retained for the implementation of quantitative assessment. Part of the ideas are functionally correct but are associated with development of larger vehicles for snow removal, therefor have not been acceptable according to product criteria. In addition some of the ideas were incomplete, and were sent for refinement and improvement to the authors of the ideas. After completion of the qualitative assessment we kept **11** ideas to further assess and evaluate.

5.2 Idea capacity assessment by SAW method

The defining of the factors of the capacity of ideas was conducted on a completed evaluation of criteria and conducted evaluations of each attribute for each of the eleven ideas. Four criteria and sixteen attributes were valued in total. The value of an attribute is estimated using the framework defined in previous tables. The assessment involved several assessors, and the following table (Table 5) shows the results of one of them.

Table 5. Value of the idea capacity factor using SAW method

IDEA CAPACITY FACTOR (SAW)																							
IDEA		ACCEPTABILITY					APPLICABILITY					CREATIVITY					POTENTIALITY					V_C	V_{CN}
		Strategy	Technology	Commercial	Resource (Logistic)	V_{Cac}	Elaboration	Feasibility	Scalability	Adaptability	V_{Cap}	Originality	Atractiveness	Provocation	Fashionability	V_{Ccr}	Novelty	Variety	Usefulness	Competition	V_{Cpo}		
W_i		0,25					0,25					0,25					0,25						
1	1	7	7	5	7	**6,4**	3	7	3	3	**3,7**	3	3	3	5	**3,4**	3	5	5	3	**3,9**	**4,36**	**9,94**
2	2	7	7	5	7	**6,4**	3	5	3	3	**3,4**	3	3	3	3	**3,0**	3	5	3	3	**3,4**	**4,06**	**9,27**
3	3	7	7	3	7	**5,7**	3	3	3	3	**3,0**	3	1	1	1	**1,3**	3	3	3	3	**3,0**	**3,24**	**7,41**
4	4	7	7	3	7	**5,7**	3	3	3	3	**3,0**	3	3	3	1	**2,3**	3	3	3	3	**3,0**	**3,49**	**7,96**
9	5	7	7	5	7	**6,4**	5	7	5	5	**5,4**	5	7	5	5	**5,4**	7	5	7	7	**6,4**	**5,94**	**13,55**
13	6	3	5	3	7	**4,2**	3	3	3	3	**3,0**	3	3	1	1	**1,7**	3	3	3	3	**3,0**	**2,99**	**6,82**
21	7	3	5	3	7	**4,2**	3	3	3	3	**3,0**	3	3	1	1	**1,7**	3	3	3	3	**3,0**	**2,99**	**6,82**
22	8	5	5	3	7	**4,8**	3	5	5	5	**4,4**	3	3	1	1	**1,7**	3	3	3	3	**3,0**	**3,48**	**7,94**
23	9	3	5	3	7	**4,2**	3	5	3	3	**3,4**	3	3	3	3	**3,0**	3	3	3	3	**3,0**	**3,41**	**7,77**
24	10	3	3	3	7	**3,7**	3	5	3	3	**3,4**	3	3	3	3	**3,0**	3	3	3	3	**3,0**	**3,28**	**7,48**
25	11	7	7	7	7	**7,0**	7	7	5	7	**6,4**	5	7	7	5	**5,9**	7	7	7	7	**7,0**	**6,59**	**15,04**
																						43,81	**100,00**

On the basis of the assessment, the value for each criterion was calculated. The value of criteria is calculated as a geometric mean score of attributes from a set of specific criteria. In order to ensure comparability of results with other methods, a normalization of values was carried out according to the sum of the values of the criteria. On the basis of normalized values of capacity factors of ideas, the ranking of ideas was carried out as the basis for selection of ideas for innovation or further evaluation. The following figure (Figure 3) shows the values of the capacity factors for each idea by SAW.

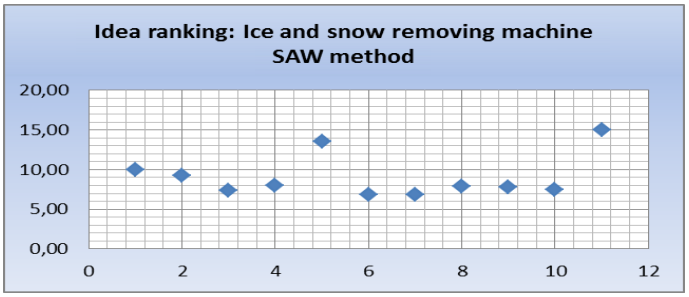

Figure 3. Idea prioritization and ranking by idea capacity using SAW method

5.3 Idea capacity assessment by AHP method

The verification of methods for estimating the value of an idea, on the basis of capacity factors of an idea by using the AHP method, was carried out with another set of estimators. The evaluation was conducted with the web version of MakeItRational computer program. Assessors, according to their preferences and their best knowledge, have first ranked the criteria by comparing them in pairs with a consistency check. Below, a group of assessors have determined the value of an attribute through direct evaluation without consistency checks, according to the defined metrics, and the other group performed a comparison of the properties of attributes in pairs with consistency checks. Figures below show the results of one of the conducted evaluations (Figure 4) and the results of the sensitivity of the estimated value (Figure 5).

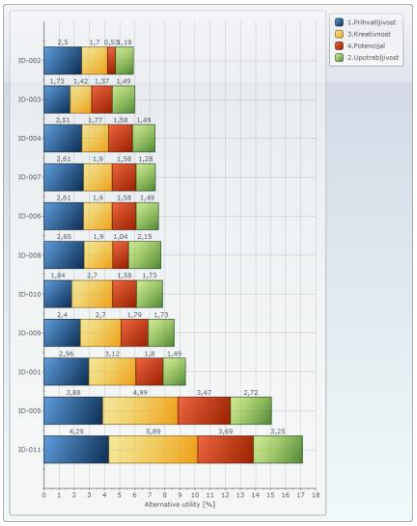

Figure 4. Ideas ranking by the AHP method (grp 1)

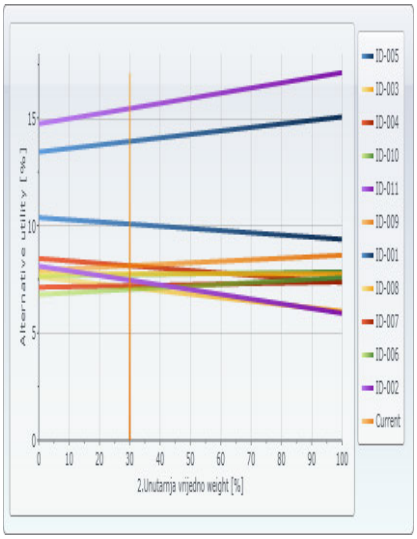

Figure 5. Sensitivity analysis

6. Discussion

With implementation of assessment for the considered case of the 11 ideas, we collected the results of assessment of a group of assessors through the SAW method, and the results of two groups of assessors through the AHP methods. These results are marked as **SAW**, **AHP$_1$** and **AHP$_2$**. Since are the results obtained by different methods, we can check the correlation between them by calculating Pearson's and Spearman's rank coefficient. For this purpose, the results are shown in Table 6, conducted by ranking the results for each set. For the case of the values of the idea capacity factor,

calculated correlations are positive and have a value greater than 0.8, therefore it is possible to conclude that there is a correlation between the capacity factors obtained by SAW and AHP methods for both groups of peers, and that is a strong positive correlation.

Table 6. Comparison of the results of the ideas capacity factor

Idea	SAW_{12}	AHP_{12}	R_{SAW12}	R_{AHP12}	d_i	di^2	AHP_{22}	R_{SAW12}	R_{AHP22}	d_i	di^2
1	9,94	9,54	3,0	3,0	0,00	0,00	9,36	3,0	3,0	0,00	0,00
2	9,27	6,47	4,0	11,0	-7,00	49,00	5,92	4,0	11,0	-7,00	49,00
3	7,41	7,44	9,0	9,0	0,00	0,00	6,01	9,0	10,0	-1,00	1,00
4	7,96	7,94	5,0	6,0	-1,00	1,00	7,35	5,0	9,0	-4,00	16,00
5	13,55	13,40	2,0	2,0	0,00	0,00	15,06	2,0	2,0	0,00	0,00
6	6,82	6,78	10,5	10,0	0,50	0,25	7,58	10,5	7,0	3,50	12,25
7	6,82	7,69	10,5	8,0	2,50	6,25	7,38	10,5	8,0	2,50	6,25
8	7,94	8,81	6,0	4,0	2,00	4,00	7,74	6,0	6,0	0,00	0,00
9	7,77	7,74	7,0	7,0	0,00	0,00	8,62	7,0	4,0	3,00	9,00
10	7,48	8,29	8,0	5,0	3,00	9,00	7,85	8,0	5,0	3,00	9,00
11	15,04	15,88	1,0	1,0	0,00	0,00	17,12	1,0	1,0	0,00	0,00
	100,0	100,0			Σ	**69,5**	100,0			Σ	**102,5**
			Pearson's Coefficient			**0,934**		Pearson's Coefficient			**0,926**

To the existence of a strong positive correlation points out the display of the results obtained by assessment of the idea capacity factor (Figure 6) (SAW12-The first assessment by SAW, AHP12,.AHP22-The first and the second assessment by AHP).

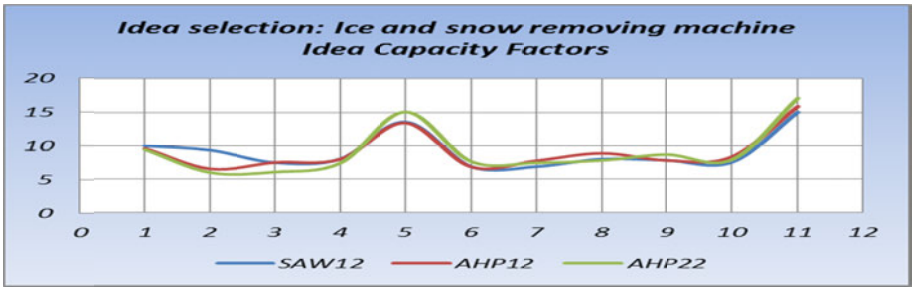

Figure 6. Results of the assessment of the idea capacity factor

7. Conclusion

The aim of this study was to define the criteria and attributes for assessment of certain values contained in the ideas in the process of product innovation, to define a method for estimating the factors of idea's capacity and to verify defined methods. On the basis of empirical research and analysis of available literature, the following criteria were defined: applicability, acceptability, creativity and potential of ideas. Attributes of description and metrics for an unambiguous assessment of the value of the idea for defined attributes were defined. By applying two multi-attribute methods: SAW and AHP, an evaluation was conducted on a group of collected ideas for product innovation which pointed to the correlation of the results. The disadvantages of this method are the complexity of the application in the case of a large number of ideas, and the need for more involvement of assessors from the set of participants in the process of innovation. Its advantages are uniformity, ensuring transparency in the process, definition, integrity and consistency. In subsequent experiments, it is necessary to point out the justification for the selected criteria and attributes and encourage the selection of multiple attribute simple methods of decision making in order to speed up the process.

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