

EVALUATION OF THE E-COMMERCE DEVELOPMENT STRATEGIES

Dragisa STANUJKIC
Darjan KARABASEVIC
Mladjan MAKSIMOVIC
Gabrijela POPOVIC
Miodrag BRZAKOVIC

***Abstract:** The Internet revolution has led to substantial changes in modern business conditions. The rapid progress of technology and its application in the business was accompanied by similar changes in terminology: e-business, e-marketing, e-commerce and more specialized terms such as e-CRM, e-procurement, and so on. Therefore, in the situation of a dynamic market and increasingly demanding consumers, there is a need for more efficient business in organizations. The aim of the paper is to evaluate e-commerce development strategies by using grey relational analysis.*

***Keywords:** E-commerce, Strategies, MCDM, Grey Relational Analysis.*

INTRODUCTION

With the development and the widespread use of the Internet and ICT, there is a significant change in the way business operates. In the past, companies used the trade fairs as the main information channel for getting to know business partners with their production programs and where contracts and jobs were most often concluded. Other great constraints were that only a small part of the companies participated in them.

With the development of the Internet, all companies have the same chances to show for example, their product line on the Internet, which is accessible to everyone. Such a trend led to major changes in the way of organizing and doing business.

Zwass (1996) e-commerce defines as “Electronic commerce (E-commerce) is the sharing of business information, maintaining business relationships, and conducting business transactions by means of telecommunications networks.” The concept of modern business affects not only transactions between parts of the market, but also the way it is structured. Traditionally, market links have been created based on the

exchange of products, services and money. A new element has now been added: information. Global market, international production systems and information economy with global marketing are the basic characteristics of today's business.

The increasing use of ICT and the advancement of the Internet enable creation of powerful tools and make them available to citizens, government agencies, large and small businesses around the world. As a result, there are changes in the internal organization of enterprises, state bodies, and educational institutions as well as in relations between enterprises, citizens, educational institutions and state authorities. Under such conditions, electronic commerce becomes more and more important and becomes an unavoidable factor in today's business (Vasković, 2008).

Multiple Criteria Decision Making (MCDM) is one of the most important branches of operational research and considers problems when a decision is made to choose between two or more possible alternative solutions (Stanujkic et al., 2018). There are numerous studies that are dealing with the application of the MCDM methods for solving problems in the area of e-commerce and e-business, such as: Özkan et al. (2019), Aggarwal & Aakash (2018), Stanujkic & Karabasevic (2018), Karabasevic et al. (2018), Ivanov et al. (2018), Stanujkic et al. (2017), Liang et al. (2017), Kang et al. (2016) and so on.

The manuscript is structured as follows: Section 1 – Introduction, Section 2 – E-commerce strategies, Section 3 – Grey Relational Analysis, Section 4 – Numerical example and Section 5 – Conclusion.

E-COMMERCE STRATEGIES

A business strategy specifies how a business model can be applied in the market and how it will contribute to the diversity of the company from the competition. A business model can be viewed as a missing link between strategy and business processes or, in other words, the links between planning and implementation.

The strategy defines the future direction and actions of an organization or part of an organization. The definition of a corporate strategy is most often related to the direction and framework of the organization for a longer period of time, which gives the advantage of meeting the market demands and fulfilling the expectations of the stakeholders through the structure of their resources, in a changing environment (Vasković, 2008).

The e-commerce strategy defines all business processes that have the ultimate goal of customer satisfaction and company profit. The

development and application of modern business leads to redefining the business strategy of the company. The e-commerce strategy is part of the business strategy and is related to supply chain management strategies, customer relationship management, and enterprise information systems. By achieving the goals of the e-commerce strategy, a part of the company's goals are achieved (Chaffey, 2009).

For effective e-commerce with rapid response, the most important is that situational analysis or monitoring of the environment takes place as a continuous process with clearly defined responsibilities for monitoring and acting in accordance with the acquired knowledge. Strategic goals are a key element in the process of defining the strategy. The overall success of the strategy is measured by comparing the achieved results with respect to the set goals.

Key elements of strategic goals are: vision-idea of guiding, strategic performance, reflection of expectations, hopes and desires about the future status and position of the company and the ways of their achievement. The vision stems from the mission. The mission is the testimony of the nature of the business of the company and is related to the essence of the reason for its existence. With the mission, the goals are achieved. Models of e-commerce strategy are: on-line exchange of information, provision of services by electronic means, Personalizing services, centralization of resources, Business intelligence, integrated offers and online cooperation (Porter, 2001; Plant, 2000).

It is also important to note that E-commerce strategy covers three dimensions (Vasković, 2008): a) the first one is the business model and defining the ways to make profits; b) the second one is defining what the customer actually wants on the website. Therefore, it's necessary to learn how to achieve online interaction with customers and how to determine the target group; c) the third dimension is an assessment of technological capabilities and options, since it is primarily necessary to know which technology is most suitable for the work being done and which will first lead to the realization.

GREY RELATIONAL ANALYSIS

The grey relational analysis (GRA) was developed by Deng (1989), as part of the grey system theory. Since then, it has been widely used to solve many uncertainty problems involving discrete data and incomplete information, optimization problems and multiple criteria decision-making (MCDM) problems, such as the application of the GRA method on the performance evaluation of airlines (Feng & Wang, 2000), selection of the

development strategy of mining tourism by using GRA method (Maksimovic et al., 2016), the application of the GRA for the evaluation of financial performance (Kung & Wen, 2007), the application of the GRA method for the corrosion failure of oil tubes (Fu et al., 2001), the supplier selection based on the use of the GRA method (Hashemi et al., 2015; Yang & Chen, 2006), the application of the GRA method in the high-speed machining of the aluminum alloy (Kumaran et al., 2015), and so on.

The procedure of the GRA method can be shown as follows (Stanujkic et al., 2012; Maksimovic et al., 2016): Let $A = \{A_1, A_2, \dots, A_m\}$ be a discrete set of alternatives, $C = \{C_1, C_2, \dots, C_n\}$ be a set of criteria and $w = \{w_1, w_2, \dots, w_n\}$ the weighting vector, where $w_j = [0,1]$ and $\sum_{j=1}^n w_j = 1$. Then, the determination of the most acceptable alternative by applying the GRA can be described through the following steps:

Step 1. Determine the ideal solution. The ideal solution (the reference point) is a solution that maximizes the benefit criteria and minimizes the cost criteria, and can be determined by using the following formula:

$$A^* = \{r_1^*, r_2^*, \dots, r_n^*\} = \{(\max_i r_{ij} \mid j \in \Omega_{\max}), (\min_i r_{ij} \mid j \in \Omega_{\min})\}, \tag{1}$$

where A^* is the ideal solution, r_j^* is the j -th coordinate of the ideal solution, r_{ij} is the normalized rating of the i -th alternative to the j -th criterion, and Ω_{\max} and Ω_{\min} are sets of benefit and cost criteria, respectively.

Step 2. Calculate the grey relational coefficient of each alternative from the ideal solution by using the following formula:

$$\xi_{ij} = \frac{\min_i \min_j |r_j^* - r_{ij}| + \zeta \max_i \max_j |r_j^* - r_{ij}|}{|r_j^* - r_{ij}| + \zeta \max_i \max_j |r_j^* - r_{ij}|}, \tag{2}$$

where ξ_{ij} is the grey relational coefficient of the i -th alternative to the j -th criterion, ζ is the distinguish coefficient, and $\zeta \in [0,1]$.

Step 3. Calculating the grey relational grade of each alternative from the ideal solution by using the following formula:

$$G_i = \frac{1}{n} \sum_{j=1}^n w_j \xi_{ij} \tag{3}$$

where G_i is the grey relational grade of the i -th alternative, and w_j is the weight of the j -th criterion

Step 4. Rank the considered alternatives and select the best one(s) in accordance with G_i . The alternatives with a higher G_i are better ranked, and the alternative with the highest G_i is the most appropriate/preferable one.

A NUMERICAL EXAMPLE

In order to demonstrate the application of the grey relational analysis, as well as its efficiency, in this part will be conducted an example of applying a grey relational analysis to the problem of evaluation of the e-commerce strategies.

Suppose the decision maker should evaluate three e-commerce development strategies that we will designate as A_1 – E-customization and Personalization (Ansari & Mela, 2003; Klačnja-Milićević et al., 2011); , A_2 – Social E-commerce adoption model (Hajli, 2013), and A_3 – Strong search engine optimization – SEO (Sen, 2005), in relation to the five evaluation criteria: C_1 – The implementation of the strategy feasibility; C_2 – The speed of implementation; C_3 - Compliance with the corporate strategy; C_4 – Compliance of strategy with mission and vision of the organization and C_5 – General acceptance. Also, it is important to note that in terms of evaluation criteria, all criteria have the same weights.

At the very beginning of the evaluation process, the decision maker evaluates the alternatives in relation to the defined set of criteria. Ratings of decision maker regarding proposed strategies are shown in Table 1.

Table 1. Ratings of decision maker regarding proposed strategies

	C_1	C_2	C_3	C_4	C_5
A_1	3	3	3	2	2
A_2	5	4	5	5	5
A_3	3	3	4	5	5

Then it is then necessary to determine the ideal point using the Eq. 1. Ideal point A^* as well as the distance from the alternatives to the ideal point is shown in the table 2.

Table 2. The Ideal Point and distances between the alternatives and the ideal point

	C_1	C_2	C_3	C_4	C_5
A^*	5	4	5	5	5
A_1	2	1	2	3	3
A_2	0	0	0	0	0
A_3	2	1	1	0	0

In the next step, using the Eq. 2, the grey relational coefficient for each of the alternatives in relation to the ideal point is calculated, as is shown in table 3. In this case ζ is set to 0.5.

Table 3. The grey relational coefficient of each alternative to the Ideal Point

	C_1	C_2	C_3	C_4	C_5
A_1	0.43	0.60	0.43	0.33	0.33
A_2	1.00	1.00	1.00	1.00	1.00
A_3	0.43	0.60	0.60	1.00	1.00

Finally, by using Eq. 3, the grey relational ratings of each alternative is calculated. The grey relational ratings, and the rank order of alternatives, are shown in Table 4.

Table 4. The grey relational ratings and the rank order

	G_i	Rank
A_1	0.08	3
A_2	0.20	1
A_3	0.15	2

The data in Table 4 indicates that the strategy labeled as A_2 is best ranked in relation to evaluated criteria.

CONCLUSION

The e-commerce strategy has a special importance for the organization, because it primarily defines a plan and approach based on which it is possible to determine the applications of internal and external electronic communications that can provide support and influence on the corporate strategy. Without the e-commerce strategy, it is unthinkable to expect the successful electronic business of an organization.

In this paper, the application of grey relational analysis for the problem of choosing e-commerce development strategies has been successfully demonstrated. Grey relational analysis has proved to be suitable for solving the problem.

In accordance with the conducted numerical example, the strategy i.e. alternative marked as A_2 represents the best ranked alternative in relation to the evaluation criteria. Grey relational analysis is an effective method that, in addition to the problem of strategy selection, can be applied to solve problems in other areas as well.

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NOTES ON THE AUTHORS

Dragisa STANUJKIC, Ph.D. is an Associate Professor of Information Technology at the Technical Faculty in Bor, University of Belgrade. He has received his MSc degree in Information Science and PhD in Organizational Sciences from the Faculty of Organizational Sciences, University of Belgrade. His current research is focused on decision-making theory, expert systems and intelligent decision support systems.

Professor Stanujkic is co-author of a Modified Weighted Sum Method Based on the Decision-maker's Preferred Levels of Performances (WS PLP), Additive Ratio Compromise ASsessment (ARCAS) and Pivot Pairwise RELative Criteria Importance Assessment (PIPRECIA) methods, as well as several extensions of MOORA, MULTIMOORA, ARAS, EDAS and SWARA methods. E-mail. dstanujkic@tfbor.bg.ac.rs

Darjan KARABASEVIC, Ph.D. is an Assistant Professor of Management and Informatics at the Faculty of Applied Management, Economics and Finance, University Business Academy in Novi Sad. He obtained his degrees at all the levels of studies (B.Sc. appl. in Economics, B.Sc. in Economics, Academic Specialization in the Management of Business Information Systems and PhD.in Management and Business) at the Faculty of Management in Zajecar, John Naisbitt University Belgrade. His current research is focused on the human resource management, management and decision-making theory.

Dr. **Darjan KARABASEVIC** is co-author of an Additive Ratio Compromise ASsessment (ARCAS) method, as well as several extensions of MULTIMOORA, ARAS and SWARA methods. E-mail. darjan.karabasevic@mef.edu.rs

Mladjan MAKSIMOVIC, Ph.D., is an Assistant Professor and a Chairman of the Quality Committee at the Faculty of Applied Management, Economics and Finance, University Business Academy in Novi Sad. His current research is focused on informatics, management and quality. E-mail. mladjan.maksimovic@mef.edu.rs

Gabrijela POPOVIC, Ph.D., is an associate professor of Project Management, Quality Management and Management of Natural Resources at the Faculty of Management in Zajecar, Megatrend University in Belgrade. She obtained her M.Sc. degree in Management and her Ph.D. degree in Management and Business at the Faculty of Management in Zajecar, Megatrend University in Belgrade. Her current research is directed towards decision-making theory, project management, quality management and natural resource management. E-mail: gabrijela.popovic@fmz.edu.rs

Miodrag BRZAKOVIC, Ph.D., is a Professor and Council President at the Faculty of Applied Management, Economics and Finance, University Business Academy in Novi Sad. His current research is focused on informatics, IT, management, quality and integrated management system.

E-mail. miodrag.brzakovic@mef.edu.rs