

SYSTEM OF EVALUATION OF EFFECTIVENESS OF COMMUNICATION TOOLS IN SLOVAK HOTELS WITH THE POSSIBILITY OF OPTIMIZATION OF MARKETING COMMUNICATION STRATEGY

Dominika Moravcikova⁸¹

Anna Krizanova⁸²

Jana Kliestikova⁸³

Maria Kovacova⁸⁴

<https://doi.org/10.31410/itema.2018.212>

Abstract: *The purpose of the contribution is to measure and evaluate the efficiency of communication tools on the principle of data envelopment analysis (DEA) in Slovak hotels. The first part of this contribution describes the importance of tourism in the conditions of the Slovak Republic and the theoretical and conceptual definition of the data envelopment analysis method, whose main objective is the evaluation of the effectiveness of decision-making units. The communication tools used in the communication between the Slovak hotels and their guests are used for the needs of the decision making units. Data on input and output variables were obtained from the Ministry of Transport and Construction of the Slovak Republic, the Union of Hotels and Restaurants of the Slovak Republic, and a marketing survey of the completed questionnaire forms. The second part of the contribution evaluates the effectiveness of the communication forms in question on the principle of the DEA method of input-oriented models in order to minimize expenses related to the realization of marketing communication in the hotel industry. Appropriate efficiency calculations for the communication tools in question were performed using the DEA Excel Solver, a simple application that uses the internal excellence solver to solve optimization tasks. Depending on the application of the DEA methods, effective and inefficient communication tools were identified, followed by a process leading to the optimization of the communication portfolio in the hotel industry.*

Keywords: *Marketing communication, data envelopment analysis, efficiency, tourism sector in Slovakia*

1. INTRODUCTION

The pressure on the company's competitive ability and the additional problems caused by the slow pace of economic growth insist on greater efficiency and better business efficiency. This is particularly important in the hotel industry, which is characterized by a high degree of seasonality. Efficiency therefore belongs to the key factors of management control and the necessary prerequisites for improvement. This fact acts not only on consumer

⁸¹ University of Zilina, Faculty of Operations and Transport of Economics and Communications, Univerzitna 8215/1 Zilina, Slovakia

⁸² University of Zilina, Faculty of Operations and Transport of Economics and Communications, Univerzitna 8215/1 Zilina, Slovakia

⁸³ University of Zilina, Faculty of Operations and Transport of Economics and Communications, Univerzitna 8215/1 Zilina, Slovakia

⁸⁴ University of Zilina, Faculty of Operations and Transport of Economics and Communications, Univerzitna 8215/1 Zilina, Slovakia

preferences but is often associated with the psychological effect in interaction with communication tools, individual interpretation, brand perception and product values, respectively services. Therefore, the company has to answer the question: "Do we use communication tools efficiently or just effect?" As a result of telecommunication and growing competition rivalry, it is necessary to consider not only the correct communication medium but also the time of its application to reach the target audience.

2. LITERATURE REVIEW

With the emphasis on the importance and growth of tourism in the Slovak Republic, in the domestic and foreign literature, the interest in research has increased over the past two decades with the emphasis on quantitative analyzes of risk management, capital structure, financing methods and bankruptcy. In examining more than 152 contributions from scientific and professional literature dealing with the performance of hotel business and its indicators, [1] identified four primary operational areas, including strategy, production, marketing and organization. Measuring and evaluating the effectiveness of hotels and their activities under the DEA principles represents a certain line of research as its principles can be applied in assessing economic and environmental behavior in the tourism sector [2], [3]. This fact can be useful for the Slovak Republic as tourism in this country gains economic importance.

Parkan, in 1996, first applied the DEA technique to the performance of hotel companies. Based on [4], they focused their research on sample efficiency development on 45 hotels that operated either on their own or were part of international hotel chains. Based on the analysis, the authors state that franchising hotels, as well as those run by international presenters, work better and more efficiently than independent non-international hotels. Authors [5] and [6] use the non-radial DEA model in their works to assess the performance of hotel facilities in Taipei. The result of their study was the fact that 8 out of 23 hotel facilities were inefficient, suggesting a strategic direction for hotel management to increase performance at steady inputs. The authors [7] analyzed the effectiveness of international hotels in Taiwan in 2005-2009 on the principles of the DEA and Malmquist index methodology, on the basis of which they proposed corrections of inputs and outputs leading to efficiency gains. Using the data envelopment analysis method as a tool for strategic analysis of hotel management, managers should focus on improving productivity through changes in entry and exit configuration and hotel size reduction [8].

In contrast to the literature, this contribution deviates from the following facts, i.e. one contributes to the relevant literature, since it is a contribution aimed at evaluating the effectiveness of marketing communication in hotel facilities in Slovakia and also contributes to the discussion of proposals for increasing the efficiency of hotels and their marketing activities in destinations similar to the Slovak Republic.

Podľa [9] je analýza obalových dát (DEA – Data Envelopment Analysis) disciplínou, ktorá sa zaoberá porovnávaním efektívnosti tzv. rozhodujúcich jednotiek pri použití väčšieho počtu vstupov a väčšieho počtu výstupov. Pre lepšie pochopenie je vhodné si podrobnejšie osvojiť pojem produkčná (rozhodovacia) jednotka, ktorá produkuje nejaké efekty (výstupy) a pre ich produkciu spotrebovávajú nejaké zdroje (vstupy) [10]. V kontexte predmetného príspevku je danou DMU komunikačný nástroj, ktorý na dosiahnutie svojich výstupov (napr. celkové príjmy, obsadenosť, počet hostí) transformuje viaceré zdroje (napr. marketingové náklady, počet zamestnancov). DMU je hodnotená ako efektívna v prípade, že miera jej efektívnosti je rovná 1 alebo 100 % [11].

The early DEA models can be found in Debreu and Koopmans works of 1951, later followed by Farel (author of the 1957 Model of Efficiency Rating). Farel's findings were subsequently reworded by Charnes, Cooper, Rhodes (DEA CCR), respectively. Also, Banker, Charnes and Cooper (DEA BCC) [12]. The aim of both models is to divide the objects under investigation into efficient and inefficient in terms of consumed resources, produced production or other types of outputs [13]. This asserts the advantage of determining the source of inefficiency and determining how the production unit can become effective by reducing / increasing inputs, respectively outputs.

$$\text{Minimize} \quad e(\text{DMU}_j) = \frac{\sum_{k=1}^r u_k y_{kj}}{\sum_{i=1}^m v_i x_{ij}} \rightarrow \max, \quad (1)$$

$$\frac{\sum_{k=1}^r u_k y_{kj}}{\sum_{i=1}^m v_i x_{ij}} \leq 1, j = 1, 2, \dots, n, \quad (2)$$

$$u_k \geq \varepsilon, k = 1, 2, \dots, r, \quad (3)$$

$$v_i \geq \varepsilon, i = 1, 2, \dots, m. \quad (4)$$

For the purposes of this submission, we will maximize the objective function reader that is equal to 1 for the denominator. It is the CCR DEA entry model.

$$\text{Maximize} \quad e(\text{DMU}_j) = \sum_{k=1}^r u_k y_{kj} \rightarrow \max, \quad (5)$$

$$\sum_{i=1}^m v_i x_{ij} = 1, \quad (6)$$

$$-\sum_{i=1}^m v_i x_{ij} + \sum_{k=1}^r u_k y_{kj} \leq 0, j = 1, 2, \dots, n, \quad (7)$$

$$u_k \geq \varepsilon, i = 1, 2, \dots, r, \quad (8)$$

$$v_i \geq \varepsilon, j = 1, 2, \dots, m, \quad (9)$$

For an input-oriented CCR DEA model, the rating is equal to 1. This means that the DMU is at an effective boundary. Once the efficiency rating is not equal to 1, the DMU works ineffective [14]. Entry-oriented models of CCR DEA are listed as multiplier models. To solve these models for each DMU unit, we need to evaluate the efficiency level [15]. In the case of multiple sets, a double model for previous models is available. These models are listed as an envelope model [9]. The CCR DEA Dual CC model has the following form:

$$\text{Minimize} \quad \theta_q - \varepsilon (\sum_{i=1}^m s_i^- + \sum_{k=1}^r s_k^+), \quad (10)$$

$$\sum_{j=1}^n \lambda_j x_{ij} + s_i^- = \theta_q x_{iq}, i = 1, 2, \dots, m, \quad (11)$$

$$\sum_{j=1}^n \lambda_j y_{kj} - s_k^+ = y_{kq}, k = 1, 2, \dots, r, \quad (12)$$

$$\lambda_j \geq 0, s_i^- \geq 0, s_k^+ \geq 0. \quad (13)$$

Each "λ" represents the weight of the input and output variables. The purpose of the model is to find a linear input / output combination of all analyzed samples. Therefore, for the effective DMU, the optimal value $\theta_q = 1$, the optimum value of all other variables $s_k^+, k = 1, 2, \dots, r$, and $s_i^-, i = 1, 2, \dots, m$ equals 0 .

Then Banker, Charnes, and Cooper formed the BCC DEA model base for variable yields (VRS). In this case, the tapered shape of the effective border changes to a convex shape. This

shows that the number of effective units is higher compared to the CCR DEA model [14]. When analyzing VRS-based efficiency, it is necessary to add a double model of the state of convexity:

$$\sum_{j=1}^n \lambda_j = 1 \quad (14)$$

3. METHODOLOGY

The aim of the contribution is to quantify the degree of efficiency of the most used communication tools in the hotel equipment sector in the Slovak Republic, based on the data analysis of packaging data based on collected data from the Ministry of Transport and Construction of the Slovene Republic, the Hotel and Restaurant Association of the Slovak Republic and a marketing survey form of a questionnaire.

The data on the use of communication tools in hotels in the conditions of Slovakia, we found on the basis of a marketing survey conducted through a questionnaire. These data served to find out what are the most used forms of communication between hotels and their customers. The questionnaire was distributed by e-mail form in the period August - September 2018. In the survey conducted, the respondent was designated as hotel manager, manager, marketing department employee or PR department employee. The size of the base file was determined (806) on the basis of the organizational statistics of the Statistical Office of the Slovak Republic on the number of economic subjects as of 31.12.2017. The materiality level was determined in this case at 0.046, which corresponds to 95.4% of the confidence interval and the permissible error of estimate was determined to be 5.1%. As 334 respondents participated in the survey, the condition of the minimum sample value was met and the respondents' answers to the questions asked during the survey can be considered relevant and qualified based on the established reliability and maximum perceived error rates.

Since the DEA models require input and output variables, we have used information for input variables - marketing costs in the field of communication policy, the frequency of use of individual communication forms in the reference period and the number of staff responsible for the implementation of communication activity over the reference period. Output variable was revenue from a specific marketing communication tool [16]. Subsequently, we have put the required data (inputs and outputs) into land-based DEA models (our goal is to minimize input variables) based on consistent and variable range yields to classify the communication tools in question effectively and inefficiently in a particular hotel operating in the district of Zilina. Finally, we propose measures, respectively. A possible procedure for evaluating the effectiveness of communication forms by which hotels operating in the Slovak Republic can increase the effectiveness of these tools.

4. RESULTS

From the results of the questionnaire survey, which focused on the use of communication tools in hotel facilities in Slovakia, we found on the basis of a marketing survey that the use of communication tools with input and output data (Table 1).

Table 1: Input and output values for CCR and BCC DEA models

<i>DMU</i>	<i>Marketing costs v € in the monitored period</i>	<i>Frequency of use of individual communication forms in the monitored period</i>	<i>The number of employees responsible for implementing the communication activity over the monitored period</i>	<i>Revenue from a specific marketing communication tool</i>
advertising	22 850	7 568	4	437 800
personal sale	23 080	13 940	12	389 630
website	14 900	6 537	6	986 500
banner and text ads	2 400	5 731	10	412 800
electronic mail	6 500	5 200	12	896 352
sending newsletters	15 300	5 200	12	765 342
social networks	7 900	4 870	48	968 521
affiliate marketing	10 200	12 567	24	389 652
forums and blogs	7 600	9 734	12	458 963
mobile apps	21 300	18 980	6	396 825
product placement	18 600	16 370	4	437 800
viral marketing	6 500	11 654	8	389 630
guerilla marketing	5 960	6 523	1	398 420

Technical efficiency, clean technical efficiency, and efficiency score scores for each communication tool in the sample are shown in Tables 2.

Table 2: Efficiency evaluation results for input CCR and BCC DEA model

<i>DMU</i>	<i>Index CCR</i>	<i>Index BCC</i>	<i>Efficiency score</i>
advertising	0,2971	0,6435	0,4617
personal sale	0,1524	0,3508	0,4344
website	0,7596	1,0000	0,7596
banner and text ads	1,0000	1,0000	1,0000
electronic mail	1,0000	1,0000	1,0000
sending newsletters	0,7401	0,9365	0,7903
social networks	1,0000	1,0000	1,0000
affiliate marketing	0,2596	0,4319	0,6011
forums and blogs	0,4074	0,5611	0,7261
mobile apps	0,1332	0,2737	0,4867
product placement	0,1686	0,3167	0,5324
viral marketing	0,3765	0,4819	0,7813
guerilla marketing	0,4635	0,8190	0,5659

The main finding of an analysis of the effectiveness assessment carried out on the DEA principle has led us to conclude that the main source of inefficiency of the communication tools is their respective input and output configuration, hotel size. This finding is confirmed by the Union of Hotels and Restaurants of the Slovak Republic, according to which there is an

excessive supply of tourist accommodation facilities in Slovakia [17]. Based on this, hotel management should review the accommodation capacity and use the marketing communication to make more efficient use of room transformations in entertainment, leisure and other services. Furthermore, our findings point to the seasonality problems of hotel facilities, which could be removed by increasing revenue by extending the arrival of tourists beyond the current. This could be effective through pricing strategies.

Based on the use of the CCR DEA models, we have come to the conclusion that effective communication tools in Slovak hotels include banner and text advertising, electronic mail and social networks, j. their effectiveness is 1. Other marketing communication tools that are used inefficiently, respectively by hotel facilities, do not achieve I / O efficiency of 1 or 100%.

Depending on the VRS model based on the BCC DEA, communication tools are more effective as these models assume variable yields on a scale. Effective communication tools include: websites, banner and text advertising, e-mail and social networks. The least effective marketing communication tools include personal sales, affiliate marketing, mobile apps, product placement, and viral marketing, as they achieve an efficiency score of less than 50%. These ineffective communication tools should take appropriate action on the input and output side, which serve to increase their efficiency, i.e. optimize communication portfolio by using online marketing communications platforms.

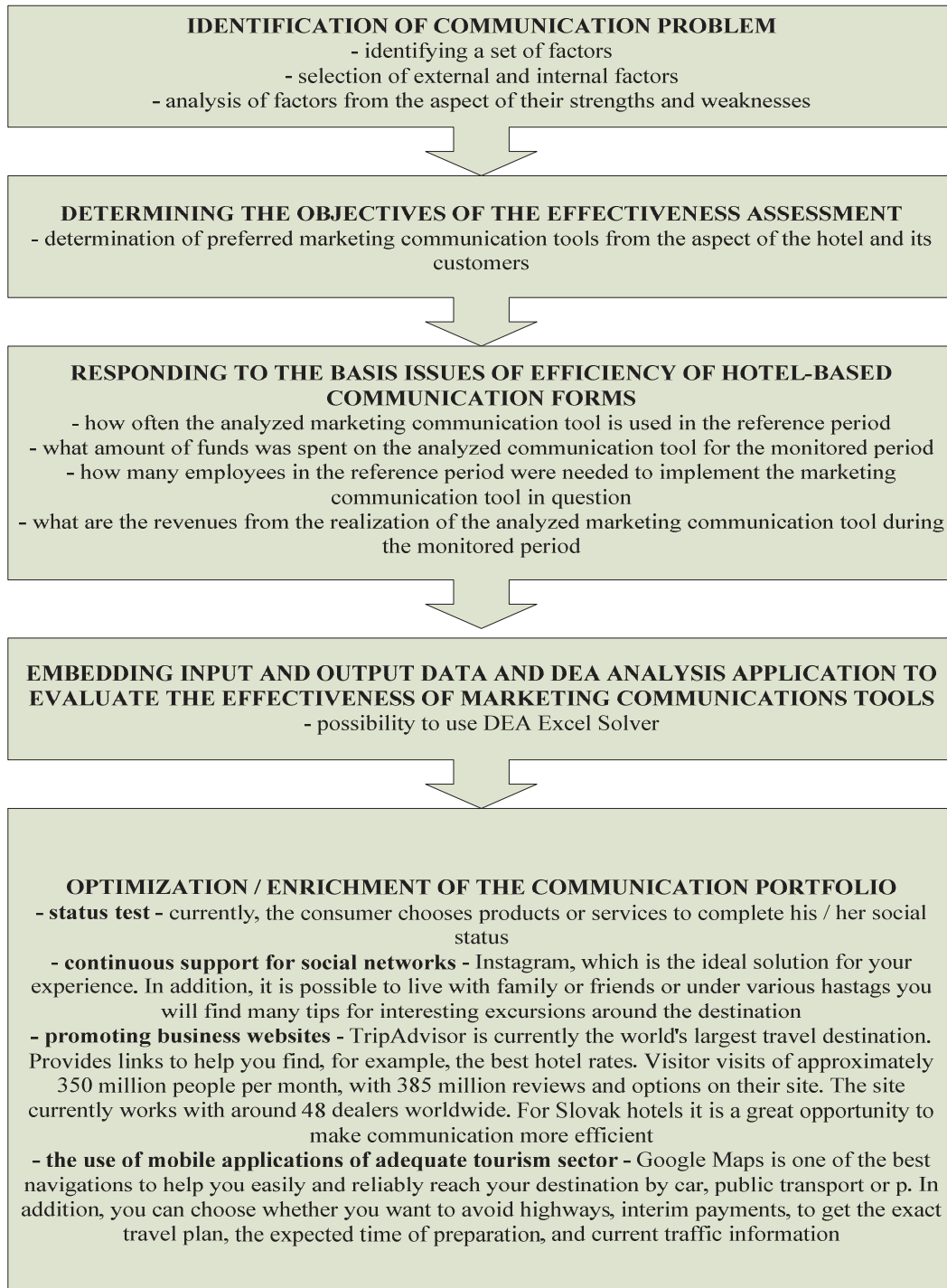
When looking at the results of the DEA method in terms of marketing communication, inefficient production units in the form of communication tools need to reassess their activities as they have insufficient input rates, outputs. Unfeasible marketing communications practices have an impact on the inefficiency of accommodation services. This inefficiency can cause a decrease in total income and inadequate occupancy of hotel facilities. This is a problem that requires the optimization of the marketing communication strategy.

5. DISCUSSION

On the basis of the information provided, we believe that most of the communication tools in question should focus on optimizing its communication portfolio resulting from advances in telecommunications and information technology. Changing the communication portfolio due to the use of new communication tools can thus have a positive impact on the profitability ratio, respectively the level of effectiveness, and the goal of which is to create a community of customers or social network users participating in brand value, is to pull the product, service from tramlines and introduce it in a new light.

As each hotel has a unique communication portfolio, there is no universal formula to increase its effectiveness. For this reason, we have focused on the area of hotel management in this paper. Based on the above, we propose to optimize the communication portfolio through the following steps, with each hotel taking into account the identification of the key success factors that lead to an improvement in the overall profitability and competitiveness of the hotel (Figure 1).

Figure 1: Optimization of the communication portfolio



The DEA methodology we have used in this paper is essential as it is the first study on the effectiveness of communication tools used by hotel facilities in Slovakia. As tourism and hotel industry are dynamic, future Malmquist index could be the subject of future research. It is a quantitative tool that accepts a time factor. The index evaluates multiple inputs and outputs without pricing data. When evaluating effective changes over time, the index generates decomposition on two components - a relative change in the efficiency of the unit being analyzed in the sector, and the change in boundaries of production options due to technology. The basic DEA models can be considered static i.e. they do not take into account the

development or change in the efficiency of business activities over time. We will remove this deficiency by using the Malmquist index.

6. CONCLUSION

Hotel facilities are constantly trying to maximize their potential and find ways to achieve it. Therefore, information about efficiency measurements has a high value for them. The effectiveness of DEA's effectiveness is to identify sources of inefficiency of production units. This paper proposes a potential framework for evaluating the effectiveness of a sample of communication tools in hotel facilities in Slovakia, which can be applied in other countries similar to Slovakia.

Finding an optimal solution to increase efficiency is a demanding issue that must be addressed by the hotel management together with the accounting, sales and marketing departments. We believe that only with a reasonable and balanced relationship between income and cost management Slovak hotels can achieve an optimal strategy to increase efficiency.

ACKNOWLEDGMENT

This contribution is an output of scientific project VEGA no. 1/0718/18: The impact of psychographic aspects of pricing on the marketing strategy of companies across products and markets.

REFERENCES

- [1] Sainaghi, R. (2010) Hotel performance: state of the art, *International Journal of Contemporary Hospitality Management*, vol. 22, pp. 920-952.
- [2] Cao, X., Yang, F. (2011). Measuring the performance of Internet companies using a two-stage data envelopment analysis model. *Enterprise Information Systems*, 5, pp. 207–217.
- [3] Bosetti, V., Cassinelli, M., Lanza, A., (2004) Using Data Envelopment Analysis to evaluate environmentally conscious tourism management, *SSRN Electronic Journal*, USA, working paper no. 59.
- [4] Hwang, S.N., Chang, T.Y., (2003) Using data envelopment analysis to measure hotel managerial efficiency change in Taiwan, *Tourism Management*, vol. 24, pp. 357-369.
- [5] Wu, J., Tsai, H., Zhou, Z., (2011) Improving efficiency in international tourist hotels in Taipei using a non-radial DEA model, *International Journal of Contemporary Hospitality Management*, vol. 23, pp. 66-83.
- [6] Chiang, W.E., Tsai, M.H. and Wang, L.M. (2004), "A DEA evaluation of Taipei hotels", *Annals of Tourism Research*, Vol. 31 No. 3, pp. 712-715.
- [7] Lee, Y.-H., Ly, L.-T. , Sung, A.-D., (2011) A measure to the operational performance of international hotels in Taiwan: DEA and Malmquist approach, *Review of Economics and Finance*, vol. 2, pp. 73-83.
- [8] Neves, J., Lourenco, S., (2009) Using data envelopment analysis to select strategies that improve the performance of hotel companies, *International Journal of Contemporary Hospitality Management*, vol. 21, pp. 698-712.
- [9] Fiala, P. (2008). *Modely a metody rozhodovani*. Praha: Oeconomica.
- [10] Jablonsky, J., Dlouhy, M. (2015). *Modely hodnoceni efektivnosti a alokace zdroju*. Praha: Professional Publishing.

- [11] Kliestik, T. (2009). The quantification effectiveness activities traffic company by the rules of data envelopment analysis. *E + M Ekonomie a management*, (12), pp. 133-145.
- [12] Banker, R. D., Charnes, A., & Cooper, W. W. (1984). Some models for estimating technical and scale inefficiencies in data envelopment analysis. *Management Science*, (30), pp. 1078-1092.
- [13] Coelli, T. et al. (2005). *An introduction to efficiency and productivity analysis*. New York: Springer.
- [14] Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision-making units. *European Journal of Operational Research*, (2), pp. 429-444.
- [15] Frajtova-Michalikova, K. et al. (2015). Comparison of nonparametric methods for estimating the level of risk in finance. In *International Conference on Applied Economics*. Conference proceedings, 228-236.
- [16] Carrillo, Z., Gomez, A. Y. (2017). Measuring the efficiency of hotels: Colombia case study. *Revista Virtual Universidad Catolica del Norte*. vol. 51, pp.143-155.
- [17] Zväz hotelov a reštaurácií Slovenskej republiky
<http://www.zhrs.sk/index.php/aktuality/statistiky/606-statistika-podla-rokov#.WoazGqjwaUk>