DATA ENVELOPMENT ANALYSIS TO MEASURE TECHNICAL EFFICIENCY OF JKTDC ESTABLISHMENTS IN J&K STATE

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ABSTRACT

Measuring technical efficiency in tourism and hospitality industry is the outcome of its recognition as potential growth engine and urge to maximize market share by optimum utilization of resources through industry-oriented models. The present study is aimed to investigate whether JKTDC establishments in Jammu region of J&K State, operate efficiently i.e., is able to deploy the inputs at their disposal in an efficient manner to attract a maximum share of tourists ,using two modelling approaches (CRS and VRS) of DEA technique. According to CCR model of DEA, TRC Jammu, TRC Katra, Sanasar, Ramban and establishments are efficient where as Mansar, TB Katra, YN Katra, Kud, Patnitop, Batote and Chichimata are inefficient units of JKTDC. The mean efficiency score of the JKTDC establishments is 76 % i.e. the waste 24% of their total resources. Whereas the results of output-oriented BCC DEA models indicates that TRC Jammu, Mansar, TRC Katra, Sanasar, Batote , Ramban and Chichimata establishments are efficient where as TB Katra, YN Katra, Kud, Patnitop are inefficient units of JKTDC. The efficiency score is arrived at 86% and the JKTDC establishment waste at 13.1%.

Keywords : Technical efficiency, Data Envelopment Analysis, CRS, VRS

1. INTRODUCTION

The tourism sector is one of the world's largest industries, employing 200 million people and generating more than 10% of global GDP with expected growth rate of 7.8% yearly (2013-2023) besides promoting interconnectedness throughout the world. Tourism policy across nations tends to become a fierce competition effort between alternative tourist destination due to more international openness, more geographical mobility, cheap air fares, rising income levels in many countries, recognition of tourism as potential growth engine etc. In the light of the competitive behavior in tourism market, Tourism Corporations/Tourism Departments are strategically focusing on performance evaluation of their establishments by maximizing their market share on one hand and optimum utilizing resources through the application of industry-oriented models such as BCC, CCR etc. The growth rate of domestic and foreign tourists inflow to the states and UT in India is 9.59 and 9.24 respectively and the State of Jammu and Kashmir is no exception. The justification of the present study is based on several facts. *Firstly*, comparing the northern states of India having the similar topography and cultural heritage, the share of Jammu and Kashmir in the total tourist was 136.42 lakhs domestic and 0. 61 lakhs foreign, representing a growth of 9.78 and -22.79 respectively, while the corresponding growth rate in Himachal Pradesh was -5.95 domestic and -17.20 in 2012-13 over the previous year. Thus, J&K holds huge potentials for attracting tourist traffic. *Secondly*, according to the Economic survey of Jammu and Kashmir 2014-2015, over the last five decades, the share of primary sector has declined steadily from 28.16% in 2004-05 to 17.83% in 2014-15(AE) and the share of secondary sector has declined from 28.13% in 2004-05 to 25.53% in 2014-15 (advance estimates), while as the share of services sector has substantially increased from 43.71% in 2004-05 to 56.64% (A.E) in 2014-15.Amongst the various sectors coming under services ,tourism holds growth potential by contributing 13.68% in GSDP. *Thirdly*, during 2013-14, the inflow of tourist was 114.099 lakhs and the share of Jammu region was 101.962 (89.36%), Kashmir region 12 lakhs (10.52%) and Ladakh region 0.137 (0.12%) (Office of Directorate of Tourism, Jammu). The inflow of tourists are consistently rising throughout the year rather than seasonal. *Fourth*, literature on measuring technical efficiency is limited to advanced countries and no study has been undertaken so far in the context of tourism (JKTDC) establishments located in varied geographically terrain covering urban or rural areas in Jammu region of J&K State.

2. PROFILE OF THE JAMMU AND KASHMIR TOURISM DEVELOPMENT CORPORATION (JKTDC)

The Jammu and Kashmir Tourism Development Corporation (JKTDC) was established on Feb.13, 1970 to promote and operate schemes for development of tourist traffic in J&K state. The corporation provides lodging and boarding and other facilities to the tourist. The overall performance of JKTDC is declining and corporation has ignored many business trends to cash the opportunities of tourism prevailing in the market. The majority JKTDC establishments do not fulfill the customer expectations (Office of JKTDC).The reservation and package taken do not show any regular pattern even in the months, the corporation considers as peak season. The weaknesses identified in JKTDC are poor promotional activities, inadequate infrastructure, low information dissemination, poor services, security threats , lack of trained professionals and untrained guides , ignorance of high end and middle segment tourist and incomplete online tourism portal (SIDBI, 2014). The accumulated loss of JKTDC is Rs. 9.34 lakhs, capital employed Rs. 59.36 lakhs, return of capital employed Rs. 1.38 lakhs, percentage return on capital employed 2.32 as finalised on 2012-2013 (CAG, J&K -2014). The present study is aimed to investigate whether JKTDC establishments in Jammu region, operate efficiently, i.e., are able to deploy the inputs at their disposal in an efficient manner, in order to attract a maximum share of tourists. It uses two modelling approaches (CRS and VRS) to estimate the competitiveness of this region, viz. data envelopment analysis (DEA).

3. REVIEW OF LITERATURE

In the tourism literature, the analysis of efficiency is limited to a small number of studies, which focus the analysis on micro-units (e.g., hotels, corporate travel departments, etc.). Tedis Ramaj (2015) examined the efficiency of hotels units by Data Envelopment Analysis operating in Elbasan city, Albania. The data were collected through interviews with managers of each hotel. The input variables included are the number of full-time equivalent employees, the book value of the premises, and the number of rooms, while the output variables include sales, the number of guests, and the aggregated number of nights spent. Carlos Pestana Barros (2005) discussed, by means of Data Envelopment Analysis (CCR and BCC model), the efficiency of individual hotels owned by the Portuguese state-owned chain, Pousadas de Portugal, managed by the enterprise, ENATUR. He considered the output variables as sales, number of guest and night spent where as the input variables consisted of full time workers, cost of labour, rooms occupied, surface area of the hotel, book value of the property, operational costs and external costs. Foo Lee Yen, Mohhidin Othman (2011) in their paper examined efficiency of a Malaysian hotel by adopting an approach using a framework of non-parametric programming – Data Envelopment Analysis (DEA). G.M. Sanjeev (2005) in his study, evaluated the efficiency of 68 hotel and restaurant companies operating in India using the DEA methodology for the year 2004-2005. The study found that the average score for all the companies as a group stands at 0.73 and thus, the hospitality industry is perceived as doing well. C.P. Barros, & Dieke, P.U.C (2008) used revenue per room as the output variable, and total cost and investment expenditure as the input variables, to analyze the technical efficiency of 12 Luanda hotels by DEA. They found that the efficiency of these hotels may increase during the observation period, but at a decreasing rate. In addition, market share and joint members of a group may also positively affect the efficiency of these hotels. Hotel efficiency and innovation are vital for sustained hotel competitive advantage, profits, increase customer loyalty, enlarge flexibility, merchantability, decreased production costs, strengthening position and following competition (Morris, Langdon, 2013 and Vos,A.H.,2010). Innovation in hospitality industry is influenced by factors namely, market attractiveness, new service development process management, market responsiveness and empowerment, effective marketing communication, employee commitment, behaviour based evaluation, training of employees and marketing synergy (Lindgardt et al.,2009). Ros & Sintes (2005) opined that managers must lead the employees to improve service quality, to be client oriented and not to give too much importance to financial rewards and orient them to appreciate other rewards, such as diplomas (e.g. employee of the month/year, the most skilled employee) coupons, free holidays or free trainings. They could also organize team-buildings in order to consolidate the employee-employee and manager-employee relationships (Babaita et al.,2013). Monteiro & Sousa (2011) found that the more innovative managers showed a very distinct cognitive pattern, as they consider their co-workers as the most important people in the hotel, due to their direct contact with the client. They had an outstanding capacity to understand the members of their teams, putting themselves in their place, thinking as they would think, imagining their expectation and anticipating their reaction, in a process of role taking and role making. Nemeth et al. (2013) presented the characteristics of innovative activity of Hotel Bonvino Wine Apa, located in wine famous area in Hungary where service development revolves around the theme of wine culture. This included creating a wine bar, organize wine tasting, conversation about wine ,wine cellar exhibition, cellar and wine tours, common cooking, autumn –winter themed packages, trips by electric cars etc. Shaw et al. (2012) suggested that small hotels could innovate to varying degree such as recycling products, water and energy conservation either by using energy efficient bulb or installing solar panels, growth of spa hotels associated with health and fine dining ,responding to customer needs and providing more personalised services. Institutional support is also needed in designing of innovative clinics, and liberalise finance which at present acting as one of the major obstacles of hotels' innovation activities. Creating network within the marketplace to innovate the region as a whole for sharing innovative ideas (Sipe & Testa, 2009) is essential for long run sustainability of business. Use of IT elaborately designed software, along with good service including online concierge, mobile office, IPTV, VoIP telephone, interactive maps, etc. undoubtedly improved hotel guests' quality of experience, which in turn brought hotels more customer loyalty and revenue. When customers were enjoying convenience from the business network, they also enjoy another advantage that it is time-saving to search information by avoiding being submerged in commercial storms. It saved local businesses much expense compared with traditional advertising, made the advertisement well targeted and at the same time yielded customers pleasurable consuming experience. The improvement of product provided the company more chance to win against competitors in the field and attract customer loyalty through the process of using-feedback-improvement. The collaboration with hotels and local businesses not only brought IT system provider profits, but also rendered it a vantage point in the market in the long run (Hong Xing)**.** Suvi-Riikka Milord (2007) used participatory observations, customer interviews, brainstorming, process mapping and benchmarking to improve Executive Clubroom services attractive to customers and the suggestions centered around the importance of the staff as well as food and beverage service of the Executive Floor. Thus, an organization can achieve innovation and efficiency by placing the customer at the heart of all business activities.

4. ANALYTICAL FRAMEWORK FOR ASSESSING THE PERFORMANCE OF TOURIST DESTINATIONS

In order to estimate the efficiency and the productivity change, we assume that the hotel's production technology can be characterised by a production function, which provides the maximum possible output (i.e., output target), given the proper inputs (see also, Cracolici, 2004, 2005; and Cracolici and Nijkamp, 2006).

For our aim, the following 'visitor production function' for tourism is deployed:

Hotel output = f (Rooms available, cultural heritage, labour)................................(1)

As the functional form of the production function is not known, while we have to manage multiple inputs and outputs, a non-parametric method (i.e., DEA) is used. The main advantage of the DEA over a parametric approach is that it does not require any assumption concerning the production technology, while DEA can also easily accommodate multiple outputs. DEA being a non-parametric linear programming method of measuring efficiency to assess a production frontier, the efficiency of each tourist destination is evaluated against this frontier. In other words, the efficiency of an establishment is evaluated in comparison with the performance of other destinations.

5. THE STUDY AREA AND SUMMARY CHARACTERISTICS OF VARIABLES

Each establishment of JKTDC is taken as a separate Decision Making Unit (DMU).Primary data is collected from all the 12 establishments of JKTDC in Jammu region for the year 2014-2015. The input variables considered are cultural heritage(number of state owned museums, monuments and archaeological sites), the accommodation capacity (rooms and dormitories) , people working in the establishments, where as the output variables are rooms rented out and total revenue from the hotel establishment. Thereafter, we apply DEA to each establishment considering them as a generic DMU (e.g., hotels and restaurant), which use proper inputs to reach multiple outputs. For this purpose, we adopt an output-oriented DEA model, because we want to explore how well these establishments of JKTDC deploy their input resources for tourism development. In other words, given a stock of tourist resources, the aim of a tourist area is to maximize tourist flows. Table 1 depicts the descriptive statistics of the input and output variables.

Table 1: Descriptive statistics of the input and output variables

Inputs and Outputs	Mean	Standard Deviation	Maximum	Minimum
Cultural Heritage	7.09	6.39	22	1
Rooms Available	12901.91	14395.31	53492	730
Labour	17.73	18.28	70	7
Rooms Rented Out	5670.73	8048.30	29095	84
Total Revenue	92.09	159.67	563.5	3.98

6. MODEL DEVELOPMENT

CCR and BCC models in DEA methodology, we evaluated 'n' productive units, DMUs, where each DMU takes m different inputs to produce s different outputs. The essence of DEA models in measuring the efficiency of productive unit DMU q lies in maximising its efficiency rate. However, subject to the condition that the efficiency rate of any other units in the population must not be greater than 1.

The DEA methodology, originally proposed in (Charnes et al., 1978), is used to assess the relative efficiency of a number of entities using a common set of incommensurate inputs to generate a common set of incommensurate outputs. The original motivation for DEA was to compare the productive efficiency of similar organizations, referred to as DMUs. The problem of assessing efficiency is formulated as a task of fractional programming, but the application procedure for DEA consists of solving linear programming (LP) tasks for each of the units under evaluation. Let xij - denote the observed magnitude of i - type input for entity j (xij > 0, i = 1, 2, ..., m, j = 1, 2, ..., n) and yrj - the observed magnitude of r-type output for entity j (yrj > 0, r = 1, 2, ..., s, j = 1, 2, ..., n). Then, the Charnes-Cooper-Rhodes (CCR) model is formulated in the following form for the selected entity k:

MODEL (M1)

Maximize
$$h_k = \frac{\sum_{r=1}^{s} u_r y_{rk}}{\sum_{i=1}^{m} v_i x_{ik}} \qquad (1)$$

Subject to

$$\frac{\sum_{r=1}^{s} u_r y_r}{\sum_{i=1}^{m} v_i x_i} \le 1, \quad j = 1, 2, \ldots, j_k, \ldots, n \qquad (2)$$

$$u_r \ge \varepsilon, \quad r = 1, 2, \ldots, s \qquad (3)$$

$$v_i \ge \varepsilon, \quad i = 1, 2, \ldots, m \qquad (4)$$

Where: n v_i is the weights to be determined for input i; n m is the number of inputs; n ur is the weights to be determined for output r; n s is the number of outputs; n h k is the relative efficiency of DMU_k; n n is the number of entities; n is a small positive value. The relative efficiency h_k, of one decision-making unit k, is defined as a ratio of the weighted sums of their outputs (virtual output) and the weighted sums of their inputs (virtual input). As for the decision-making unit k, for which a maximum in objective function (1) is sought, the condition (2) is true, meaning that it is obviously $0 < h_k$ 1, for each DMU_k. The weights vi and ur show the importance of each input and output and are determined in the model so that each DMU is efficient as much as possible. Given that the condition (2) is true for every DMU, it means that each of them lies on the efficiency frontier or beyond it. If Max hk = hk* = 1, it means that efficiency is being achieved, so we can tell that DMU_k is efficient. Efficiency is not achieved for $h_k^* < 1$ and DMUk is not efficient in that case. DMU_k is to be considered relatively inefficient, if it is possible to expand any of its outputs without reducing any of its inputs, and without reducing any other output (output orientation), or if it is possible to reduce any of its inputs without reducing any output and without expanding some other inputs (input orientation). Problem (1) - (4) is nonlinear, non convex, with a linear and fractional objective function and linear and fractional constraints. Using a simple transformation developed by Charnes and Cooper (1962), the above CCR ratio model can be reduced to the LP form (the Primal CCR model) so that the LP methods can be applied. In this model, the denominator has been set equal to 1 and the numerator is being maximized. The input oriented CCR primal model is:

MODEL (M2)

$$Max \quad h_k = \sum_{r=1}^{s} u_r y_{rk} \tag{5}$$

subject to

$$\sum_{i=1}^{m} v_i x_{ik} = 1 \tag{6}$$

$$\sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{m} v_i x_{ij} \leq 0, \quad (j = 1, \dots, n) \tag{7}$$

$$u_r \geq \varepsilon, \quad (r = 1, .., s) \tag{8}$$

$$v_i \geq \varepsilon, \quad (i = 1, .., m) \tag{9}$$

The mathematical model given above is linear and can be solved using any of the familiar programs packages for LP. However, in practice, it is often solved dual task for problem (5) -

(9), which is:

MODEL (M3)

$$Min \quad Z_k - \varepsilon \left(\sum_{r=1}^{s} s_r^+ + \sum_{i=1}^{m} s_i^- \right) \tag{10}$$

subject to

$$\sum_{j=1}^{n} \lambda_j \cdot y_{rj} - s_r^+ = y_{rk}, \quad (r = 1, 2, \dots, s) \tag{11}$$

$$Z_k \cdot x_{ik} - \sum_{j=1}^{n} \lambda_j x_{ij} - s_i^- = 0, \quad (i = 1, 2, \dots, m) \tag{12}$$

$$\lambda_j, s_r^+, s_i^- \geq 0; \quad Z_k - \text{sign unbound.} \tag{13}$$

The basic idea behind DEA is best conveyed in the dual CCR model (M3), which is easy to solve because of its calculating size. The dual model for a given unit using input and output values of other units tries to construct a hypothetical composite unit out of the existing units. If it is possible, the given unit is inefficient, otherwise it is efficient and lies at the efficiency frontier. The efficiency frontier is a set of segments interconnecting all the efficient DMUs and it acts as an envelope for inefficient units. An inefficient unit can be enveloped below input-oriented model) or above (output-oriented model). Because the problems described by models (M2) and (M3) are associated and because of the duality theorem in linear programming, DMUk is efficient if and only if conditions for optimal solution (*, s+*, s-*, Z_k*) are accomplished for the problem (10)-(13):

$$Z_k^* = 1 \qquad (14)$$

$$s^{+*} = s^{-*} = 0 \text{ in all alternate optima} \qquad (15)$$

Using the optimal solution (λ^*, s^{+*}, s^{-*}, Z_k^*) of the problem (10) - (13), it can be determined:

$$X''_k = Z_k^* X_k - s^{-*} \qquad (16)$$

$$Y''_k = Y_k + s^{+*} \qquad (17)$$

It can be shown that after CCR projection (16), (17), DMU_k with altered inputs X''_k and out- puts Y''_k becomes efficient. The difference $\Delta X_k = X_k - X''_k$ and $\Delta Y_k = Y''_k - Y_k$ respectively shows the estimated amount of input and output inefficiency. Thus it can be seen for inefficient DMU_k, how to change its inputs and outputs, so it would become efficient. We should emphasize that, for each DMU_j (j = 1, 2, ..., n) taken as DMU_k, an appropriate linear programming problem is solved (10) - (13). Hence, we should solve n linear programming tasks with the form (10) - (13), with (s+m+1) variables and (s+m) constraints per task. The CCR models (dual and primal) with input orientation are still the most widely known and used DEA models despite the numerous modified models that have appeared. The CCR models as- sum constant returns to scale. DMU operates under constant returns to scale if an increase in the inputs results in a proportionate increase in the output levels. These models calculate an overall efficiency in which both its pure technical efficiency and its scale efficiency are aggregated into a single value. The envelopment surface obtained from the CCR model has the shape of a convex cone. The efficient DMUs would lie on top of the structure, while the inefficient ones would be covered under the cone. In a single input and output case, the efficiency frontier is reduced to a straight line. The CCR model yields the same efficiencies regardless of whether it is input or output-oriented. The most important extension of the original CCR models is given in Banker et al. (1984) where an additional constraint was introduced in model (M3):

$$\sum_{j=1}^{n} \lambda_j = 1 \qquad (18)$$

This constraint enables variable returns to scale and provides that the reference set is formed as a convex combination of DMUs, which are in the set (those that have positive value for in the optimal solution). The DMU operates under variable returns to scale if it is suspected that an increase in inputs does not result in a proportional change in the outputs. The convexity constraint ensures that the composite unit is of similar scale size as the unit being measured. The BCC model yields a measure of pure technical efficiency that ignores the impact of the scale size by only comparing a DMU to a unit of similar scale. Often, small units are qualitatively different from large units and a comparison between the two may distort measurements of comparative efficiency. The measured efficiency is always at least equal to the one given by the CCR model. The envelopment surface obtained from the BCC model results in a convex hull.

7. RESULTS AND DISCUSSION

The DEA index can be calculated in several ways. An output-oriented, technically efficient DEA index is estimated in this study. The output-oriented technical efficiency defines a production frontier and the measurement addresses the question: 'By how much can output quantities be proportionally increased without changing the input quantities used?'. The variable return-to-scale (VRS) was chosen because scale size is controllable by the JKTDC. The CRS scores measure pure technical efficiency only. However, for comparative purposes, this measurement index is also presented. The VRS index is composed of a non-additive combination of pure technical and scales efficiencies. A ratio of the overall efficiency scores to pure technical efficiency scores provides a scale measurement. The reason for including this ratio to measure scale efficiencies stems from the fact that VRS is due to scale effects, while CRS is due to the absence of the latter. Therefore, a ratio between the two captures the scale effect, when this is present in the data.

According to CCR model of DEA, TRC Jammu, TRC Katra, Sanasar, Ramban and establishments are efficient where as Mansar, TB Katra, YN Katra, Kud, Patnitop , Batote and Chichimata are inefficient units of JKTDC. The mean efficiency score of the JKTDC establishments is 76 % i.e. the waste 24% of their total resources. Whereas the results of output-oriented BCC DEA models in Table 2, indicates that TRC Jammu, Mansar , TRC Katra, Sanasar, Batote , Ramban and Chichimata establishments are efficient where as TB Katra, YN Katra, Kud, Patnitop are inefficient units of JKTDC. The efficiency score is 86% and the JKTDC establishment waste 13.1% of their resources.

It is verified that the DEA index is equal to 1 for the majority of the hotels when the overall level of efficiency is assumed (CRS scores), while a large number of DMU, including all the CRS-efficient DMU, are only efficient when VRS is assumed, signifying that the dominant source of inefficiency is due to scale economies. The average efficiency score under CRS is equal to 0.76. Including all sources of inefficiency, DMU could operate, on average, at76% of their current output level and maintain the input value. However, the efficiency score assuming VRS is equal to .869.

A hotel is output-oriented efficient if it is not possible to raise any of its output levels without lowering at least one of its other output levels and/or without increasing at least one of its input levels. The technical output efficiency of a hotel is the inverse of the maximum factor by which its output levels could be jointly expanded while its input levels do not rise.

Table 2: Technical Efficiency Of Hotel Through CCR Model And BCC

DMU	Technically Efficient Constant Return-to-Scale Index (CCR Model)	Technically Efficient Variable Return-to-scale Index (BCC model)
TRC Jammu	1	1
Mansar	.71	1
TBKatra	.61	.69
TRC Katra	1	1
YN Katra	.83	.84
Kud	.38	.51
Sanasar	1	1
Patnitop	.53	.53
Batote	.80	1
Ramban	1	1
Chichimata	.49	1
Mean	.76	.87

8. MANAGERIAL IMPLICATIONS

A number of points emerge from the present study. First, the best practice calculations indicate that all the establishments of JKTDC were working at high efficiency rate. However, almost half of the DMU were technically inefficient, with different slacks in different inputs and outputs. Secondly, all technically efficient constant return-to-scale DMU are also technically efficient at variable return-to-scale, signifying the dominant source of efficiency is scale. Thirdly, the location appears to be an explanatory factor of efficiency, with DMU in, or near, the cities more efficient than those in more remote locations. A rationale for this result is that demand plays a role in organizational efficiency, with the hotels near more populated zones attracting more tourists. This higher demand enables greater efficiency. Hence, assuming that there are two hotels with the same managerial expertise, the one with more demand tends to be more efficient. Fourth, although DEA identifies the inefficient hotels in the sample, it does not reveal the cause of the inefficiency. DEA suggests the slacks for the inefficient hotels and gives to each a reference set (peer group) which allows for specific recommendations to improve efficiency.

REFERENCES

- Barros, C. P. (2005). Measuring efficiency in the hotel sector. *Annals of Tourism Research, Tourism Management, 30(6),* 857-866.
- C.P. Barros, & Dieke, P.U.C (2008). Technical efficiency of African hotels. *International Journal of Hospitality Management,* 27(3), 438-447, 2008.
- Carmen Babaita, Gabriela Sipos, Andreia Ispas, Andrea Nagy (2013). Leadership style and culture for innovation in hotel industry, Proceedings of the 5th WSEAS International Conference on Economy and Management Transformation (Volume II), University of Craiova and Fraunhofer Institute for Integrated Systems and Device Technology - Fraunhofer IISB." Developing Innovations: What Factors Impact the Performance of Chain Affiliated versus Independent Hotels complex system of direct and indirect (Goods) service value proposition. In Naples Forum efficiency of hotel units, J*ournal of Multidisciplinary Engineering Science and Technology (JMEST), 2(8),* 2140-2146.
- G.M. Sanjeev (2005). Measuring efficiency of the hotel and restaurant sector: The case of India, *International Journal of Contemporary Hospitality Management, 19(5),* 378-387, 2007
- Gareth, Shaw, Williams, Allan M., Bailey, Adrian (2012). Uncovering innovation processes in hotel industry. A report by The Advance Institute of Management Research, UK hospitality business performance. Emerald Insight: *International Journal of Contemporary Hospitality Management, 10(5),* 184-188.
- Kozak, M., & Rimmington, M. (2006). Benchmarking: Destination attractiveness and small hotels in Malaysia, *SEGi Review, 4(1),* 25-36.
- Langdon Morris (2013).Three dimensions of innovation, *International Management Review, 9, 5*-10.
- Lori J. Sipe & Mark Testa (2009). What is innovation in the hospitality and tourism marketplace? A suggested research framework and outputs typology'. International CHRIE Conference, University of Massachusetts – Amherst Scholar Works.
- Martić, M., Novaković, M., Baggia, A., Barros, C. P., Kozak, M., Rimmington, M., Othman, M. (2009). Data Envelopment Analysis : An application to

measure technical efficiency of hotel units In. *Journal of Multidisciplinary Engineering Science and Technology (JMEST), 4(2),* 2140- 2146. ttp://doi.org/10.1016/j.annals.2004.07.011

- Nemeth, Petra Gyuracz, Friedrich, Nora, Clarke, Alan (2013) .Innovation in special hotels-As A Key to Success, *Knowledge Management and Innovation, p* 643-653.
- Pike, S. (2009). Destination brand positions of a competitive set of near-home destinations, *Tourism Management, 30(6)*, 857-866. http://doi.org/10.1016/j.tourman.2008.12.007
- Ramaj, T. (n.d.). Data Envelopment Analysis : An application to measure technical efficiency of hotel units In. *Journal of Multidisciplinary Engineering Science and Technology (JMEST),* 2(8), 2140-2146.
- Suvi-Riikka Milord (2007). Service concept development case: in Hilton's Executive Floor Clubroom, Service Innovation and Design, Laurea University of Applied Sciences /Laurea Communications, Finland, 24-26.
- Yen, F. L., & Othman, M. (2011). Data Envelopment Analysis to measure efficiency of hotels in Malaysia, *SEGi Review, 4(1),* 25-36.
- MartÍnez-Ros, E., & Orfila-Sintes, F. (2009). Innovation activity in the hotel industry. *Technovation, 29(9),* 632-641.