اولین کنفرانس ملی رویکرد سیستمی

Designing A Knowledge- Based System For Marketing Strategy: A DEA Approach

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Abstract

The purpose of this paper is to better understand the selection of a distribution channels strategy for organization in multiple channels environments. Successful strategy implementation is based on effective evaluation tool. To effectively implement strategy process, this work proposes an integrated frame work for identify selecting distribution channels and knowledge-based system approach using Data envelopment analysis (DEA). This decision support system converts numerical data in to information that can be used to establish strategy in multiple channels environments. Accordingly, this study can usefully be implemented in identifying channel choice in financial service. This system offers a very fast way to establish the marketing strategy based on the consumer behavior in multiple channels environments.

Keywords: Data envelopment analysis, knowledge-based system, Performance evaluation, marketing strategy.

Introduction

Academicians and researchers involved in strategic management have devoted increasing attention in the recent decade to the influence of marketing strategy processes on process improvement, quality assurance, performance evaluation, and performance enhancement.

The process marketing strategy and improvement are a virtual necessity for business activities. Because of the complexity and importance of continuous improvement or establishing best marketing strategy, DEA technique, and knowledge-based system (KBS) are frequently used as the tools in support of decision-making. To effectively implement strategy, adequate tools, system, and IT support are needed. For example, knowledge-based systems (KBS) are computer-based tools that help managerial decision-making by presenting various effective alternatives. By the 1990s, intelligent knowledge-based systems had been playing an important role in new decision support tools. There have been few studies done about the combined the marketing

strategy, KBS and DEA technique. Thus, in this study, an intelligent knowledge-based system is developed to provide marketing strategy and improvement from the DEA technique. The KBS can be used as a establishing strategy tool to improve the operations and process based decision-making information. The objective of KBS is to offer conclusive references helping the decision maker to make correct decisions under complex situation and information. Consequently, the fundamental objective of intelligent knowledge-based system is to develop a system and process for implementing strategy process to support needs in this work.

This work has two related aims: (a) to propose an integrated framework for the marketing strategy tool and knowledge-based system using the data envelopment analysis (DEA) method; and (b) to develop an intellectual knowledge-based system for performance evaluation, establishing strategy process and continuous improvement. By using the DEA method as the analytical tool, this work attempted to answer the following related questions: (1) how can management improve efficiency and process with the marketing strategy tool? (2) How can IT technique support the marketing strategy processes and improve the organization performance? This work illustrates how knowledge-based system is implemented in banks for marketing strategy. Accordingly, this work presents the use of the DEA to evaluate all of the branches in DEA models in the banking industry. The rest of the work is organized as follows. Section 2 presents a brief review of the knowledge-based system (KBS) and related applications. Section 3 presents a brief review of the marketing strategy and related research. Section 4 describes the DEA theorem and related research. Sections 5 and 6 describe the architecture of marketing strategy knowledge-based system and the integration points of establishing strategy and KBS. Section 7 presents an illustrative example in the banking industry. Finally, some concluding remarks and a summary are given in Section 8.

1. The components of knowledge-based system and related applications

Knowledge-based system (KBS) is a computer application that analyzes business data and presents this data to help facilities user decision making. A KBS may present information graphically and may include either an expert system or artificial intelligence (AI). A KBS may be aimed at business executives or some other group of knowledge workers. KBS are a specific class of computerized information system that supports business and organizational decision-making. A properly designed KBS is an interactive software-based system designed to help decision makers compile useful information from raw data, documents, personal knowledge, and/or business models for problem solving and decision making. Knowledge-based systems are based on artificial intelligence (AI) methods and techniques. The core components of knowledge-based systems are knowledge base and inference/reasoning mechanisms. KBS are computer systems that represent knowledge in the form of heuristics for problem solving to assist humans in decision-making. In practice, KBS is a frequent abbreviation for knowledge-based systems. In the literature on KBS, Dhaliwal and Benbasat (1996) suggest that the four main components of KBS are generally as follows: knowledge base, inference engine, knowledge engineering tool, and specific user interface. Then, Chau and Albermani (2002) propose that KBS comprise three basic components: knowledge base, context and inference mechanism. The knowledge base thus is the heart or core component of the KBS and contains domain expert knowledge stored via a variety of representation techniques (for example semantic networks, frames and logic) (Curtis &

Cobham,2002); the most widely used technique or method is the ‘‘if (condition) then (action)’’ production rule. Since the 1990s academics and researchers have recognized the importance of KBS and its related concepts became one of the most popular topics related to decision support tools or management information systems (MIS). Since its development KBS has been widely applied to various studies and issues, including performance assessment (Wang, 2005; Wang et al.,2008; Wen et al,2008), e-procurement exception management (Liu et al.,2011), stock market investment (Cho, 2010), product pricing (Shakya et al.,2010). Consequently, the KBS has gained considerable acceptance recently in the current information management literature.

3. Marketing strategy

3.1. The concept of the marketing strategy

Making and using a marketing strategy has a strong positive impact on profitability. This is because firms that employ a marketing strategy tend to focus on their customers and markets, integrate their marketing responses and work out in advance where their profits will come from. A marketing strategy defines objectives and describes the way you're going to satisfy customers in your chosen markets. It does not have to be written down but it is easier to communicate to outsiders, like your bank manager or other investors, when it is. A set of strategies found quite commonly in smaller businesses are growth strategies. One way to look at strategies to grow your business is through the way you will use products and markets or customers.

3.2. Marketing strategy and KBS

Marketing strategy is originally defined and designed as a best tool to facilitate the improvement of business operations and organizational performance. By the way IT can be used to develop a marketing strategy tool. Mcivor et al (1997) showed how knowledge-based systems technology can assist in the area of strategic purchasing. The authors discussed a knowledge-based system designed to help companies in the make or buy decision. The make or buy model described in that paper attempt to overcome some of problems by offering a structure for an organization to follow in the make or buy decision. Marti (2004) proposed strategic knowledge-based system (SKBS) to refine the classic strategic SWOT analysis. Wang (2005) proposed and evaluation frame work for real estate investment, including a data base, a model base and a knowledge base to create a tool that a management can use to deal with decision-making problems via the internet. Changchien and lin (2005) designed a CBR (Case Based Reasoning, which consists of retrieving, reusing, revising and retaining cases, that has been proved effective in retrieving information and knowledge from prior situations and being widely researched and applied in a great variety of problem territories) architecture and a method that facilitate the sharing and retrieving of cases of great concern to the marketing personnel. This system can support interaction and group decision making in the process of strategically formulating a new marketing plan. Wang et al (2008) described an intelligent decision support system for evaluating state-owned enterprises. This decision support system can provide optimum decision making for state-owned enterprises. Hunag (2009) describe that successful strategy implementation is based on effective strategic planning and proposed and integrated approach for the balanced scorecard tool and Knowledge-Based System using the analytic hierarchy process (AHP) method, and then developed and intellectual BSC knowledge based system for strategic planning.

3.3. Marketing strategy and consumer choice in a multi-channel environment

A distribution channel has been described as the exchange relationship between the organization and its customer that creates customer value in acquiring and consuming products and services. The use of a number of distribution channels by one organization is becoming widespread as increasingly organization add new channels and communication methods, providing an opportunity to extend market coverage cost effectively (Hughes, 2006). The past decade has seen some of the most rapid and substantive change is in channels of distribution for goods and services undeveloped economies. Consumers now face not only a choice between indirect and direct channels, but also a choice between deferent types of direct channel. Several factors underline the decision to focus on financial services. First, multi channeling has a long history in the financial services sector. Second, because of the widespread use of multiple channels, there is a well-established literature in financial services relating to the adoption of new channels and this may provide useful insides for the process of model development. Black et al, (2002) developed a model of product channel selection for financial services. The proposed model has identified four broad factors which will affect channel choice and there is some consistency between the factors which appear to influence consumer choice of channel and the factors that are thought to influence managerial decision making in relation to channel selection. The first group was formed by the characteristics of the consumer and included consumer confidence, socioeconomic characteristics, age and way of life, motivation, emotional answers and ethics, a second group was made up of the variables of the product itself such as complexity, price and perceived risk. The third group was composed of channel variables such as accessibility, channel cost risk. Finally, the forth group considered organizational factors such as company reputation, brand image, size, longevity and the ranking of available channels (Black et al., 2002). Albesa (2007) studied personal channel selection in a multichannel environment with an empirical study in Spanish. He categorized the variables that influence channel selection into desire for social relationships, privacy, skill, ability to use a channel and convenience that related to be comfortable with technological channels. His suggestions may be useful to segment customers and to establish marketing strategy. Coughlan et al.,(2010) illustrated the effects of including the customer as a resource in efficiency measurement and concluded the different impacts on efficiency between a transactional and a relational approach to bank branch marketing.

3.4. Marketing strategy and efficiency of distribution channels

A distribution channel has been described as the exchange relationship between the organization and its customers that creates customer value in acquiring and consuming products and services. The use of new distribution channels, such as the telephone and the internet, is becoming widespread. Distribution channels provide the means for an organization to interact with its customers and the discourse on relationship marketing can be seen to be relevant in discussing this (Hughes, 2006). Relationship marketing is also a marketing philosophy that focuses on building long- term relationships with customers to satisfy mutual needs. While transaction marketing focuses on how best to use resources to produce more sales and transactions (Coughlan et al., 2010). In this study is suggested; if position of both new and old distribution channels are good, the best marketing strategy for firm is a hybrid relational- transactional approach; if just only new distribution channels situation are suitable, the marketing strategy will be transactional marketing; if only old distribution channels are good, the marketing strategy will

be relationship marketing and finally both distribution channels are weak, decline and deleting strategy is suggested.

Both new and old distribution channels have high efficiency: hybrid relational-transactional approach	Just old distribution channels has high efficiency: relationship marketing strategy
Just new distribution channels has high efficiency: transactional marketing strategy	Both new and old distribution channels have low efficiency: decline or deleting strategy

Table1. Matrix of determining marketing strategy

4. Data envelopment analysis

4.1. Data envelopment analysis (DEA) method

DEA model was first introduced by Charnes, Cooper and Rhodes in 1978 and became popular as CCR (come from the first letter of the name of above person) model. DEA analysis DMUs (Decision Making Units) and evaluates their relative efficiencies scores based on linear programing. DMUs often have multiple inputs and outputs as performance measures. The efficiency score is defined as a ratio of weighted sum of outputs to weighted sum of inputs. The weights are calculated in a way that highest possible relative efficiency score to a DMU is assigned. So far many different types of DEA models with different aims have been developed (Cook & Seiford, 2009).

4.2. DEA and marketing strategy

DEA is suggested to aid traditional strategy activities and to provide guidance to management. The DEA has proven to be a powerful tool for performance evaluation and strategy so that organization or companies, operations can be improved. Consequently, The DEA has been successfully employed in strategy studies. In formulating competition strategies, one must first measure the comparative performance of the entire industry, before one may understand one's advantages and disadvantages.

Hwang and Chang (2003) used DEA to measure the managerial performance of hotels in Taiwan. They showed that the entire industry can be partitioned into six clusters based on relative managerial efficiency and efficiency change. They developed effective management strategies specifically for each of the six clusters of hotels they provided useful information for establish marketing strategy.

Guan et al., (2006) found a systematic quantitative methodology to explore the relationship between technological innovation capability and competiveness at industrial innovative firms in china they employed the traditional DEA model to analyze the data collected.

They developed a multi-objective DEA project model for benchmarking auditing competiveness. They showed strategies for enterprises to improve competiveness in situations of confining score ranges of technological innovation capability and competiveness.

Chen (2008) employed DEA to determine the comparative efficient units of life insurance companies in Taiwan. He further analyzed dual Weights and the key leather and examined local economies of scale to indicate ways to remedy inefficient insurance companies. These results will enable inefficient companies to identify their main competitive opponent to each inefficient company and clarify marketing strategies for the future.

4.3. DEA and KBS

The DEA can assist an organization or firm in evaluating among alternative objectives or decision marking units, ranking among alternative efficiency scores, and allocating resources to implement the organizational strategies and objectives. But few studies about the DEA technique and KBS or DSS have been done. For example, Wang et al., (2008) propose a framework (namely, DSSPE) for evaluating state-owned enterprises (SOEs) using DEA models, including a database management subsystem, a model base subsystem, a knowledge acquisition subsystem, and a dialogue subsystem. Linton et al,. (2007) describe an extension to the data envelopment analysis (DEA) support system that has been used for the assessment, rating, and ranking of diverse portfolios of research and development (R&D) projects at Lucent Technologies. Wang (2005) describes a knowledge-based decision support system for measuring the performance of government real estate investment using DEA models (namely, KDSSGREI). Narasimhan et al., (2007) propose DSS framework for service channel management using DEA models, and the decision support system incorporated a number of factors such as branch office efficiencies based on multiple measures, budget restrictions, capacity limitations for processing transactions, and demand requirements in designing an efficient service system. As reflected in the existing literature, the issue of the integration of the DEA and KBS has received decidedly less attention. Consequently, the goal in this paper is to make some progress in filling the research gap by combining the DEA with KBS for implementing the marketing strategy processes.

5. The architecture of marketing strategy knowledge-based system

5.1. The architecture of MSKBS

In order to marketing strategy effectively, an organization needs a strong system in achieving management's goals. Inspired by prior studies, the main purpose of this work is to fill in the research gap and to combine the marketing strategy tool, KBS and DEA technique to provide best strategy, improvement and decision-making. Consequently, this study applies a prototype KBS, which links the database management subsystem, model base subsystem, knowledge acquisition subsystem, and dialogue subsystem to develop the Marketing strategy knowledge-based system (MSKBS) for marketing strategy and improvement. The database management subsystem primarily comprises a relational database managed by a software program known as the database management system, and which provides rapid data retrieval, updating, and appending. The MSKBS database includes company's lists and financial or non-financial information, measurements, and indicators from a number of applications or units. The model base subsystem includes many DEA models, such as CCR and BCC that provide the system with analytical or rating capability to determine the relative efficiency of partners. DEA models are employed because the MSKBS intends to evaluate the relative efficiency of the partners Modeling languages for building adequate models are also included and together are known as the model base management system. Consequently, this work focuses on using DEA models to evaluate the relative efficiency. Regarding the knowledge-based acquisition subsystem, it can support any of the other subsystems or act independently. It suggests alternatives or actions to decision makers. Additionally, the knowledge- based acquisition subsystem can be linked to the firm knowledge base. Finally, the dialogue subsystem supports a friendly environment for communicating with and commanding the KBS through this subsystem. The next section will

examine in detail each component of the marketing strategy knowledge-based system (MSKBS) and illustrate practical operations.

5.2. Database

A database can be defined as a structured collection of records or data that is stored in a computer so that a program can consult it to answer queries. Next, a database is a shared, integrated computer structure that houses a collection of end user data that comprises raw facts of interest to the end user. The records retrieved in answer to queries become information that can be used to make decisions. The computer program used to manage and query a database is known as a database management system (DBMS). A DBMS is required to manage data, answer ad hoc queries, improve access, and markedly reduce data inconsistency. DBMS is a collection of programs that manages a database structure and controls access to the data stored in the database. The DBMS described here uses Microsoft Access to create a database and an ODBC driver to connect the data in the database. The central concept of a database is that of a collection of records, or pieces of knowledge. A database is typically made up of many linked tables of rows and columns.

5.3. Model-base

Mathematical models are good for application to well-structured decision problems that led to optimal solutions, while rule based knowledge systems are good at dealing with unstructured and semi-structured problems where heuristic algorithms are used to obtain feasible solutions (Lai et al., 2011). Using a model based on the decision support system, this work develops the DEA model for establishing strategy knowledge-based system. The DEA model is described as below.

5.3.1. Russell model

In DEA models the efficiency was determined based on the distance between any DMU and efficiency frontier and type of projection on the efficiency frontier. There are two general methods for picture to efficient frontier; radial and non-radial. Radial models ignore non- radial inputs and outputs such as BCC and CCR while non-radial models simultaneously reduce input and increase output such as RAM, PK, SBM and Russell models (Cook and Seiford, 2009). In this research was applied multiple Russell for evaluate efficiency of non-radial model for evaluate efficiency of distribution channels. Specifically, the model is (Davoodi, 2005) in general from and output-oriented:

$$Min \sum_{i=1}^{m} v_i x_{i0} + u_0 - \sum_{r=1}^{s} \mu_r$$

$$\sum_{i=1}^{m} v_i x_{ij} - \sum_{r=1}^{s} u_r y_{rj} + u_0 \geq 0 \quad j = 1, \dots, n$$

$$u_r y_{r0} - \mu_r = \frac{1}{s}$$

$$v_i \geq 0 \quad u_r \geq 0 \quad \mu_r \geq 0$$

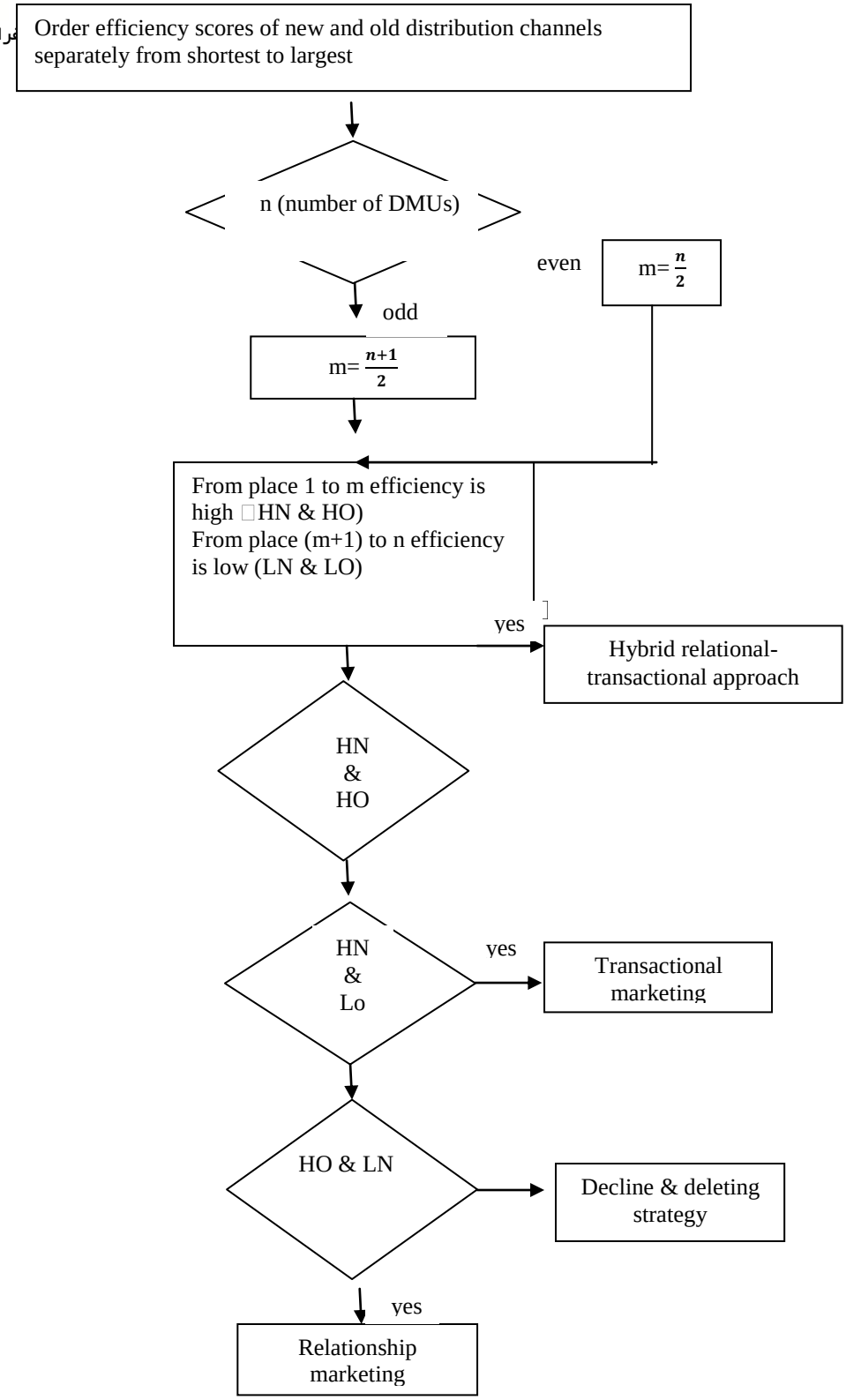
x_{ij} is input i (i=1,..,m) from DMU j (j=1,..,n) and y_{rj} is output r (r=1,..,s). The possible answer for above model is:

$$v_i = 0, u_r \in U, u_0 = \max_{1 \leq j \leq n} \left\{ \sum_{r=1}^{s} u_r y_{rj} \right\}, \mu_r = u_r y_{ro} - \frac{1}{s}$$

This model will be solve separately for any DMUs. If in optimal solution the amount of target function is equal 1, DMU assumes efficient else is inefficient.

5.4. Rule-based reasoning

To effectively develop a knowledge-based system (KBS); rule based reasoning was generally used in the practice. Because knowledge presentation plays an important role in knowledge reasoning, a well-designed knowledge presentation will influence information system performance. Accordingly, rule-based reasoning (RBR) requires a well-constructed domain principle as its knowledge basis, and RBR contains much of the problem solving knowledge. The simplest form of artificial intelligence which is traditionally used in organization is the rule-based system (RBS), also known as the rule-based reasoning (RBR). There are two broad kinds of rule system: forward chaining systems, and backward chaining systems. Rule-based systems (RBS) use a procedural representation schema based on if-then rules to describe domain knowledge(Lai et al., 2011). In rule-based systems, knowledge is represented as facts about the world and rules to manipulate the facts. RBR stores the knowledge of experts directly into the rule base and uses inference and rules to solve the problem. Rules take the form ‘‘if (condition) then (action)’’. Although Rule-based systems (RBS) always comprise rules with the form ‘‘if antecedent then consequent’’, they differ markedly (both syntactically and semantically) depending on the theory considered (such as multiple criteria decision making logic). In this work, the MSKBS focuses on multiple criteria decision making logic; that is, the DEA rule based on the use of four different types of rule-based systems: (1) the efficiency scores evaluation rule; (2) efficiency scores ordering rule; (3) efficiency scores category rule; and (4) establishing marketing strategy rule. First, the efficiency scores evaluation rules are used for efficiency evaluation of DMU’ s distribution channels. Then, the efficiency scores ordering rules are used for ordering and ranking separately efficiency scores of DMU's distribution channels that can be done by bubble or merger algorithms. In this case production rules are order efficiency score of old distribution channels from shortest to largest and order efficiency scores of new distribution channels from shortest to largest. The efficiency scores category rules are used to category efficiency scores on two batches. For efficiency scores of old distribution channels, from place 1 to m (middle place) are categorized on high old distribution channels and so are new distribution channels. As shown in flowchart 1, establish marketing strategy rules are created accordingly the situation efficiency scores related to both new and old distribution channels. To solve the problem using RBR, all the production rules are searched to find the proper production rules to match the problem, and when it is found, the action explained after the found production rule is executed. Managers or users can use friendly interface to setup their favorite standard values for each production rule.



Flowchart1. Procedure of selecting marketing strategy based on efficiency of distribution channels

6. Integration points of marketing strategy and KBS

This work combines the marketing strategy tool, KBS and DEA technique to develop and construct the marketing strategy knowledge based system (MSKBS) for improvement and decision making. The MSKBS associates database management subsystem, model base subsystem, knowledge acquisition subsystem, and the dialogue subsystem. The prototype system operated in the Windows environment, and the main platform is web-based. This system is designed using HTML and ASP, and managed using Access. The above four subsystems form the KBS application system, which is connected to the Internet. The integration of the marketing strategy and the BKBS system can occur at several points of intersection and is illustrated in Fig. 1.

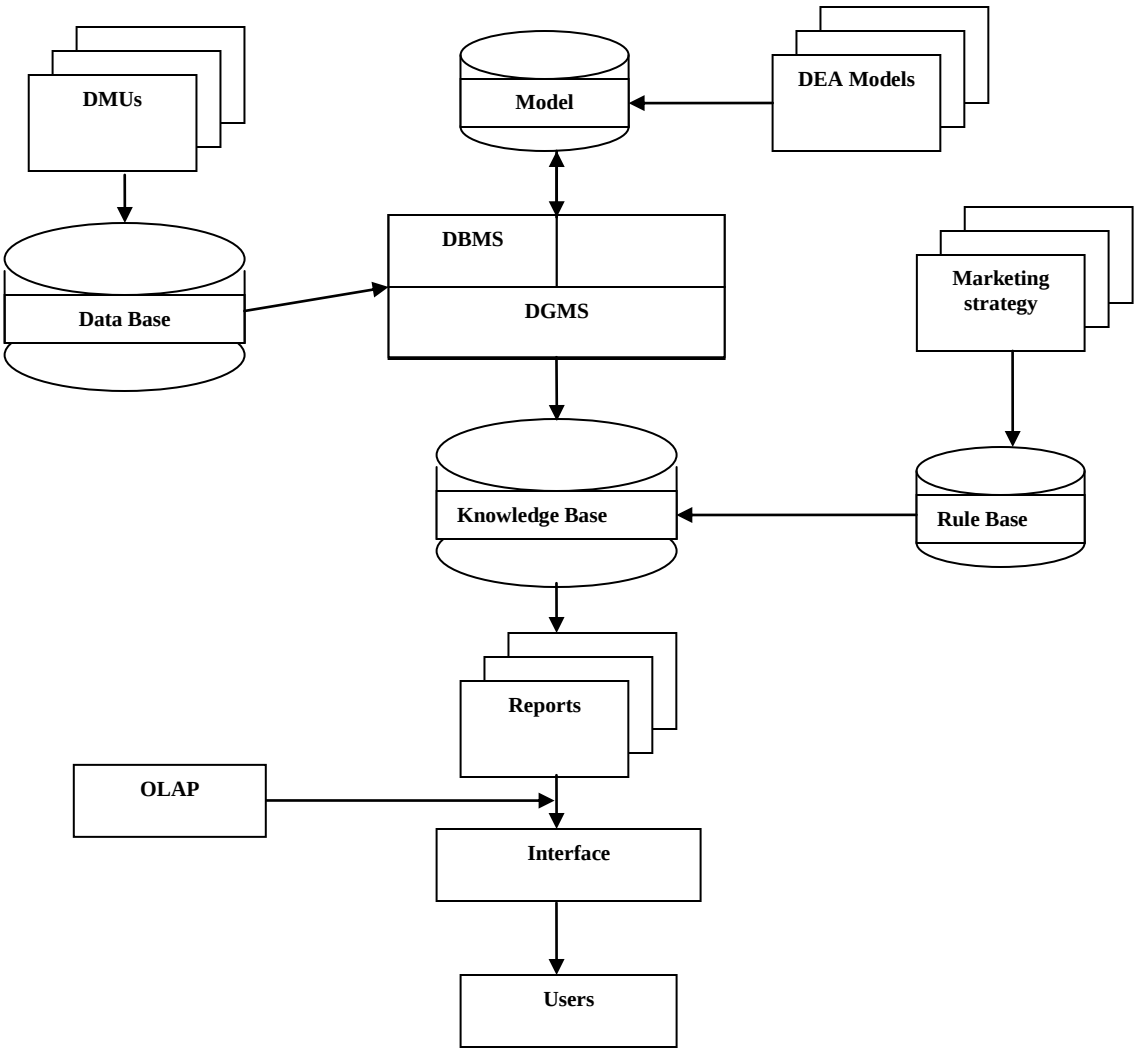


Fig.1. Selecting Marketing Strategy with DEA and KBS

7. Illustrative example in the banking industry

Efficiency analysis for financial services and branch banking in particular is well developed, with review articles of best practice appearing in the literature. As bank branches are relatively homogenous they have been popular subject they have been popular subject for DEA models. Researchers determined for key assumptions with respect to the input/output set. They assumed that it must cover the full range of resources used; that it captures all activity levels and performance measures; that the set of factors in common to all units and that environmental variation has been assessed and captured if necessary for homogeneity (Coughlan et al., 2010).

A total 40 branches were taken from a larger network of a Iran bank. The branches are concentrated into one geographical area of the Este Iran in Mashhad city. Data was collected at branch level for a period of twelve month from March 2008 to February 2009 using data base at head office in Mashhad city. In this period had not taken place any major changes in bank unstructured. Key issue such as size of sample, number of inputs and outputs and correlation between them are flectional factors on the ability of DEA models for measuring efficiency (Alirezaee et al., 1998) considered in this study. Selection and definition of variables were done through interviewing experts and pay attention to last researches)Alirezaee et al, 1998; Chiu & Chen, 2009; Portela & Thanassoulis, 2007; Staub et al, 2009).

7.1. Measuring the performance of old distribution channels

Old distribution channels are related to all types of distribution channels that go on directly in a bank branch by staff.

It accounts especially for value-added operations (sales related) and more time branch staff will have to perform value-added activities.

The inputs have been used reflect the main operational resources of bank branches (x_1;number of staff, x_2; number of tills, and x_3;supply costs) and its environmental conditions (x_4; rent). They are reduced set of variables because of data limitations. The outputs are intended to reflect the main operational objectives of bank branches to increase the customer base, to serve client (reflected in number of current accounts(y)).

In basic DEA model discussed so far, the weights were allowed to vary freely and this flexibility made the unit appear at its best; however, based on management opinion the model could be more realistic considering the relative importance of weights. Such concept was expressed as percentages by management. They were converted to constraints as ratios and then added to the basic model to get a refined measure of efficiency. The mathematical from of these constraints are shown below:

V_4 (rent) $\geq$ (1/3) v_1(number of staff)

V_4 (rent) $\geq$ (1/3) v_2 (number of tills)

These constraints were added to the Russell model, showed in model base and the model remains solvability.

The multiple Russell non-radial model for old distribution channels then becomes:

$$\min \sum_{i=1}^{4} v_i x_{i0} + u_0 - \mu$$
$$\sum_{i=1}^{4} v_i x_{ij} - u y_{rj} + u_0 \geq 0 \qquad j = 1,\ldots 40$$
$$u_r y_0 - \mu = 1$$
$$v_4 \geq (1/3) v_1$$
$$v_4 \geq (1/3) v_2$$
$$v_i \geq 0 \qquad i = 1,\ldots,4 \qquad u_0, u \geq 0 \qquad \mu \geq 0$$

7.2. Measuring the performance of new distribution channels

New distribution channels efficiency is defined as the extent to which a bank branch moves general services away from the branch to new technology tool of distribution. Main purpose is on the role of bank branches-our unit of analysis-in motivating their customer to use new distribution channels. Chosen variables differ from those were considered ideal, since the bank couldn't supply some data (like transactions on each new distribution channel made by a branch's own clients the affect their propensity to use new channels) and the bank in this study hadn't internet banking services on that period. On the input side of the new distribution channels assessment, are tried to account for the resources that allow a bank branch to foster the use of alternative new distribution channels. x_1; is the sum of automatic teller machines (ATM) pin pad and pos. x_2; rent is a surrogate for the location and size of the bank branch (this variable is used internally by the bank and doesn't depend on the bank owning the branch or not). The outputs used in the new distribution channels efficiency assessment are intended to capture the degree of usage of new distribution channels.

Y_1; the number of printed cards for using new distribution channels on this period and y_2; all transactions in ATM, pin pad and pose showed the size of the client base of the branch. Within corporation management opinions and judgments:

v_2 (rent) $\geq$ (1/3) v_1(number (ATM + pose + pin pad))

u_2 (transactions on new distribution channels) $\geq u_1$ (printed cards)

The linear programming of new distribution channels efficiency evaluate after adding constraint are:

$$\min \sum_{i=1}^{2} v_i x_{i0} + u_0 - \sum_{r=1}^{2} \mu_r$$
$$\sum_{i=1}^{2} v_i x_{ij} - \sum_{r=1}^{2} u_r y_{rj} + u_0 \geq 0 \qquad j = 1,\ldots..,40$$
$$u_r y_{r0} - \mu_r = \frac{1}{2}$$
$$v_2 \geq (1/3) v_1$$
$$u_2 \geq u_1 \qquad v_i \geq 0 \qquad u_0, u_r \geq 0 \qquad \mu_r \geq 0 \qquad i, r = 1,2$$

No problems were identified based on adding the constraints. And the model will be solved. These two models were solved using GAMS software. The efficiency results were produced for each performance dimension for a total of 40 bank branches. This type of information is too detailed to be presented in this paper, where aim is to show general results on each performance

dimension. The efficiency scores of both old and new distribution channels were calculated, ordered and ranking according to rule-based reasoning.

In this study branches 5,8,12,19,20,29,30,33,36,37 are efficiencies are both old and new distribution channels and suitable strategy for them is hybrid relational-transactional approach that means; manager should pay attention to develop both relational and transactional marketing strategy. Branches considered efficiency only new distribution channels are 4, 6, 9, 15, 21, 23, 25, 35, and 38. The best strategy for them is transactional strategy. 3,7,13,17,18,22,24,28,31 and 39 are branches calculated efficiencies just on old distribution channels and relationship marketing is best strategy for them. Branches 1,2,10,11,14,26,27,23,34 and 40 are on both new and old distribution channels. The best strategies for them inefficiencies are decline, backward and deleting strategy.

8. Conclusions and future work

This work examines two main research questions: (1) how can management improve efficiency and process with the marketing strategy? (2) How can IT technique support the marketing strategy processes? This work applies a KBS to examine the above questions, namely the marketing strategy knowledge-based system (MSKBS). Consequently, this work describes the design of a MSKBS for marketing strategy and improvement. The potential contribution of this work can be summarized as follows. First, this work provides a logical and reliable means for banking industry to describe and implement their process marketing strategy in multiple environments. Second, this system evaluates the relative efficiency for banks and proposes best strategy for improvement. The intelligent MSKBS can help banking industry to more effectively execute marketing strategy for improved quality or operational results.

Several practical implications can be drawn from this investigation. Establish one good marketing strategy has demonstrated to be a powerful tool for improvement and total quality management. Management thus should make an effort to learn how to practically apply the integrated MSKBS to achieve organizational competitive advantages and effective marketing strategy. This work concludes that administrators of banking industry can use this analysis to help them identify and manage marketing strategy processes when adopting the MSKBS.

Several recommendations for future work and research could help to explore the MSKBS, not only the concept of the architecture of MSKBS, but also its usefulness in the practice.

First, in recent years, fuzzy rule-based systems (FRBS), case based reasoning (CBR) and model-based reasoning (MBR) have emerged as important and complementary reasoning methodologies for application to decision support systems. For complex problem solving, it is useful to integrate FRBS, CBR and MBR in decision-making. In the future, MSKBS should integrate RBR, CBR and MBR for marketing strategy implementation, performance assessment, and process improvement. Second, during the past decade academicians and researchers have devoted increasing attention to the impact of management tools on strategic performance improvement, such balanced scorecard (BSC), Activity-based Costing/Management (ABC/M), Target Costing, Six Sigma, etc. In the future, the MSKBS should integrate those management tools for process marketing strategy finally; it is recommended that the approach outlined in this work be replicated in other industries and companies. Future research works will focus on validating the MSKBS and associated strategic objectives and performance measures, as well as on implementing the MSKBS to the other companies or organization to test the effectiveness of this

MSKBS for process marketing strategy. Also this system is isomorphism with system that segments market based on adoption of distribution channels.

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