ACTA UNIVERSITATIS AGRICULTURAE ET SILVICULTURAE MENDELIANAE BRUNENSIS

Volume LX 58 Number 2, 2012

DECISION SUPPORT SYSTEM FOR PROMOTION OF FACULTY OF BUSINESS AND ECONOMICS MENDEL UNIVERSITY

J. Turčínek, A. Motyčka

Received: November 30, 2011

Abstract

TURČÍNEK, J., MOTYČKA, A.: *Decision support system for promotion of Faculty of Business and Economics Mendel University.* Acta univ. agric. et silvic. Mendel. Brun., 2012, LX, No. 2, pp. 443–448

Decreasing number of secondary school graduates means that, for college, it becomes more difficult to fulfill guide number of newly admitted students. In order to maintain an optimum number of registered students, the Faculty of Business and Economics decided to support activities which increase the interest of its accredited programs.

Potential students should be treated as customers to whom we want to offer a product – knowledge, skills and competencies. Promoting study programs PEF MENDELU is handled by PR department in collaboration with several students.

Availability of resources for promotion is limited. It is crucial to deciding how to deal with these sources. By creating a system for monitoring and decision support, we provide all interested collaborators tool to improve decision-making processes.

The system itself will be built on the tools of Business Intelligence (BI) that can observe consumer trends, identify customer segments and other important information. The BI emphasizes the use of OLAP technology for data processing. In the collected data about students is hidden a large amount of information that can be obtained using techniques such as knowledge discovery in databases.

This article aims to describe the methodology for solving problems and show the application, which result in support of decision-making processes in the propagation PEF MENDELU, which should also lead to the efficiency of spending on this activity.

marketing, marketing activities, study programs, student as a customer, ICT support, business intelligence, data mining, data analysis, decision support system

Research project ICT support for the implementation, monitoring and evaluation of marketing activities in customer-oriented processes, inter alia, focuses on analyzing the possibility of promotion, its optimization and support. For several years, a group of young scientists and students of the Faculty of Business and Economics at Mendel University in Brno have cooperated in the research on marketing activities related mainly to the relationship of students as customers and faculty of university as a service provider.

These marketing activities include propagation of individual study programs in various forms, which are described and assessed by Havránková (2011), Koubek (2011), Landa (2011), Pisarská (2011), Trenz (2011), Turčínek, J. (2011), Vernerova (2011).

Availability of resources for promotion is limited both in terms of finance and human resources. For this reason, it is necessary to systematize the processes of promotion so that all resources are optimally utilized.

During last years information and communication technologies are developing very dynamically and are penetrating into a lot of various business areas. Its perceiving is progressively changing from something rather sporadic and rate, bringing a competitive advantage on market, to absolute necessity determining existence or inexistence of certain enterprise among organizations able to compete (Chalupová, N., Motyčka, A., 2008).

The aim of this paper is to describe the methodology of dealing with the issue of support

of propagation and to introduce an application that will be used to support decision making processes in the promotion of FBE MENDELU, which will also lead to a better efficiency of allocated resources on this activity.

MATERIALS AND METHODS

Customer and provider relationship

The perception of values, which the company offers in the form of goods or services, must be managed. This requires significant efforts. The aim is to create customer relationships that are beneficial for the company and also for the customer.

Customer relationship management by Wessling (2003) begins by creating the image for potential customers. The initiative in making contact always comes from the company. This applies even if the customer turns to the company through the website. The website was created precisely for this purpose. If the contact is established, the next stage is its development and consolidation. If the relationship does not have increasing value for one or both partners, then becomes its decline and termination. Termination of the relationship may be initiated not only by the customer who does not have an interest in further exchanges of values with the company, but by a company as well, when the customer is not prospective, does not bring profit for the company and his or her loss does not harm others. The whole process is illustrated in Figure 1.

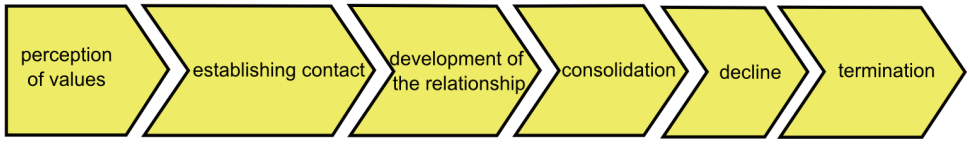
Decision support systems

Decision support systems include the main area of problems of information systems (IS), they are one of several significant upgrades that have occurred in the field of information systems. Area of decision support systems (DDS), as a subject of research and practice, continues to grow toward the endless horizons, this area is often associated with other extensions of IS (Burstein, Holsapple, 2008).

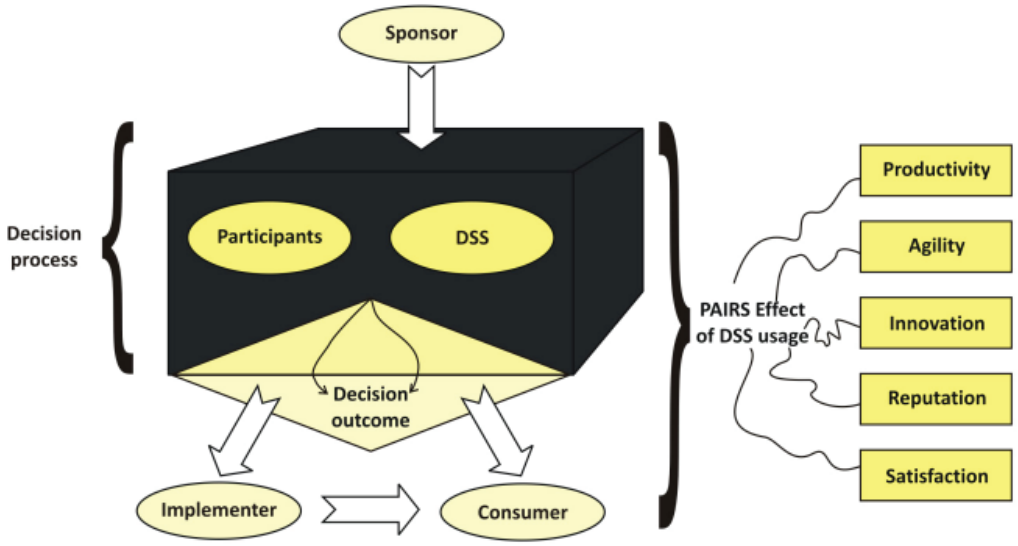
Online Dictionary businessdictionary.com (2011) defines decision support system as a computer system designed to provide assistance in determining and evaluating alternative courses of action. A DSS (1) acquires data from the mass of routine transactions of a firm, (2) analyzes it with advanced statistical techniques to extract meaningful information, and (3) narrows down the range of choices by applying rules based on decision theory. Its objective is facilitation of 'what if' analysis and not replacement of a manager's judgment.

Decision support systems are defined in terms of the roles they play in decision processes. They provide knowledge and/or knowledge-processing capability that is instrumental in making decisions or making sense of decision situation. They enhance the processes and/or outcomes of decision making. The support furnished by the system allows a decision episode to unfold

- in more-productive ways (e. g., faster, less expensively, with less effort)
- with greater agility (e. g., alertness to the unexpected, higher ability to respond),



1: *Individual stages of relationship (Wessling, 2003)*



2: *The role of a decision support system in decision making (Holsapple, 2008)*

- innovatively (e. g. with greater insight, creativity, novelty, surprise),
- reputably (e. g. with higher accuracy, ethics, quality, trust),
- with higher satisfaction by decisional stakeholders (e. g., decision participants, decision sponsors, decision, consumer, decision implementers.

These concepts are illustrated in Figure 2.

The black box, which is represents a decision process, can be thought of as: being sliced into three stages of intelligence, design, and choice; containing a particular decision mechanism such as optimization, elimination-by-aspect, and so forth. As the two windows into the decision process indicate, the process can involve the actions of a DSS as well as other participants. When a DSS is involved in a decision process, it affects the process and outcome in at least one of the indicated PAIRS (productivity, agility, innovation, reputation, satisfaction) direction (Holsapple, 2008).

RESULTS

Marketing activities developed by a team of collaborators participating in the above mentioned project fall within the first two phases shown in Figure 1. The remaining phases involve already enrolled students. These phases are not less important than the first two, but in this article, we will no longer deal with them.

Students interested in studying at university can be divided into active, those who actively look for information about colleges such as websites, journals with that theme, or fairs, and passive, which wait until some study program is offered to them. Both of these groups similarly perceive offered value, high level education, which universities provide, however establishing the contact is different in both groups. While for the first is a clear need to prepare a web site full of accurate information, to present in the journals for secondary students, etc., for the second group is best to address directly in their environment in their own secondary schools.

Based on these facts it is necessary to decide how to optimally deal with the available resources so that contact would be established with the greatest number of potential candidates. By creating a disposable system for monitoring and subsequent evaluation of marketing activities is possible to create a tool that will provide the necessary information to support decision-making processes.

The task of the proposed decision support system will not only be to prepare common background for good decisions. The system will also serve as support for all processes that lead to both common (operational) and fundamental (strategic) decisions.

For each marketing activity is within the system required to ensure the process shown in Figure 3.

There are different types of activities, but all must be recorded in the system, then that could be analyzed. Activity must be in the system created and subsequently assigned responsibility to a specific person, including all dates and tasks related to this activity. At a given activity may involve more people with different responsibilities. The actual realization of activity is then recorded in the system, by inserting the results corresponding to a given type of activity. Recorded results then serve as the underlying data for subsequent analysis.

As shown the system serves also as a communication tool through which there are assigned tasks. By using it is possible to monitor activity and success of involved people in marketing activities developed.

In the first years, the system will serve primarily as a tool to support the organization of marketing activities. During these initial years it is necessary to get a sufficient data base to perform the data analysis.

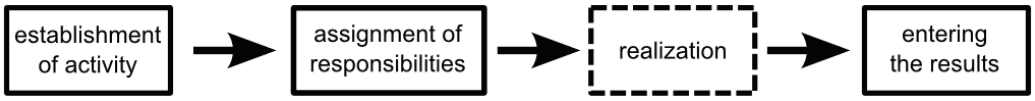
For these analysis can be used traditional statistical approaches represented by models and methods of multi-criteria decision making (Fiala, 2006). Furthermore, as the Ngai *et al.* (2009) stated, in the customer-provider issue would be a mistake to forget technologies of knowledge discovery from databases, which include mainly the classification, creation of association rules, clustering, prediction, detection of sequences and others. It is also suitable to use neural network algorithms that are described by Weinlichová and Fejfar (2010).

The cardinal question is whether to use a desktop application based on robust clients or select the web application. As Darius *et al.* (2006) mentioned, a web application is easy and inexpensive to provide to users, you can easily update, it has a flexible user requirements and allows easier centralized data management.

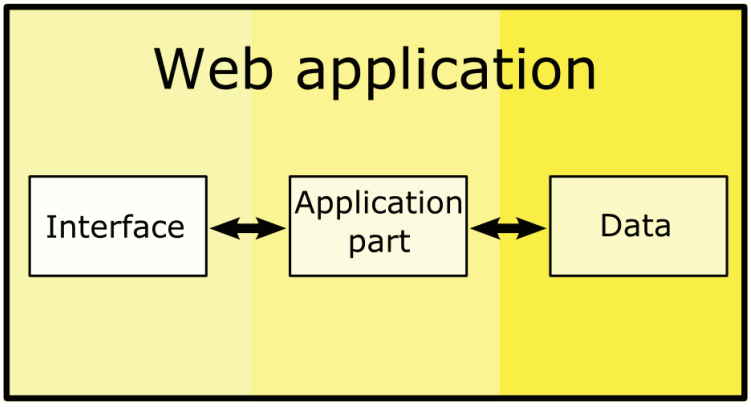
Also because of the availability of the Internet, which has a large proportion of the population even in their mobile phone, the system was designed for web platform abd built on the traditional three-layer architecture as shown in Figure 4.

Each application must have its user interface. Since this is an application designed for the web platform it will be accessed through thin clients (web browsers). Users will interact with the system through forms generated into HTML. Possible customization can be done by using CSS. In this article, however, the interface will not pay more attention.

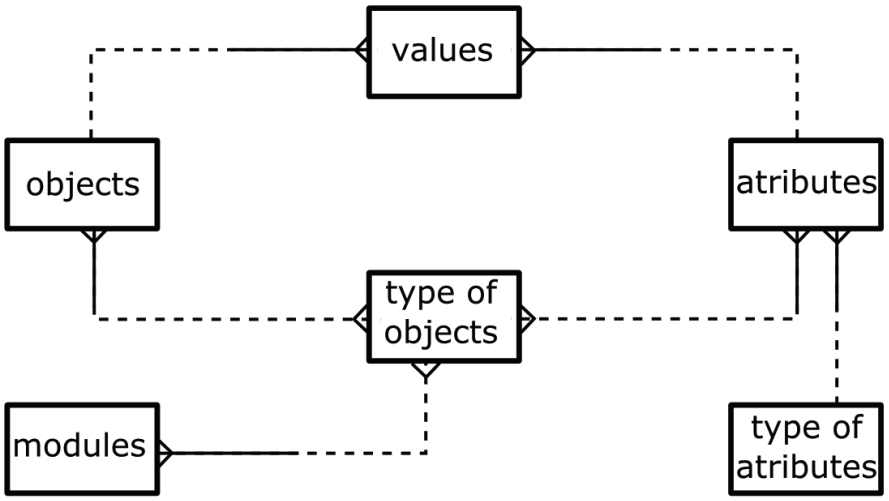
Application layer can be divided into two parts. Part of supporting processes of marketing activities



3: *The process of recording marketing activities in the system*



4: *Three-layer architecture of web application*



5: *Conceptual database model*

and analytical part, which is intended to support decision making.

The first part has to ensure the process of storing information of individual marketing activities, as shown in Figure 3. There are fixed types of activities which are performed. Each type has its own specifics and specific data (eg, budget, duration, number of persons required for realization, …) must be assigned to it. In the system is necessary to distinguish the rights of individual users so that each can execute only the applications given to him or her (eg, team leader adds a new activity, while a regular user can only fill out a report on the realization). In this section will also be included mutual communication tools, a calendar to see who can participate in the activity, etc.

In the analytical part there will be tools designed to analyze data from support of marketing activities of processes. It is appropriate to extend this data by the data from the university information system, where is stored information about the applications submitted, accepted students, their subsequent study results, etc. Over these data it is possible to carry a wealth of analysis, visualize trends or even predict the future development. By combining data into one system, space for analyzing the effectiveness of marketing activities preformed in specific places and by specific people. It will be possible to find out what plays a major role in establishing contact with potential students, and to analyze which secondary schools produce the best students for university study programs.

The important question is how to store data to the subsequent analysis. Given that we are working on the web platform is the easiest to use for storing data a relational database. The structure of stored data can be in someway variable and over time can grow additional attributes that need to be monitored. In order for any such change did not alter the data model. It is designed for system conceptual model, which is shown in Figure 5.

To each object must be assigned at least one type (marketing activity, the user system, secondary school, …), but one object can have more types (for example, a user can simultaneously be an administrator).

Each object is then characterized by its attributes. Attribute values for objects are stored in an entity values. That, which attributes belong to what type of object, is captured in the link between these entities.

Attributes can be of different types (text, selection of options, numeric, etc.). The entity modules then represents the individual modules of the system and the link between entities modules and type of objects represents the right of the object of given type to access or modify the module. General principle of this module is presented in Turčínek, P. (2011), where the model is applied to the storage of data within the CRM system.

This model represents part of the transaction database. There will be continuously stored data relating to marketing activities. By extending this model to make it possible to store aggregate data from different perspectives, we create space for the use of OLAP technology such as described by Novotný *et al.* (2005).

DISCUSSION

The proposed system to support decision-making processes must be well structured and arranged for users so it will not become useless burden. The actual decision support will be relevant after getting a sufficient data base. This system serves to support the propagation of study programs PEF MENDELU, mainly in order to make expended resources more efficient. Assessment whether the system meets expectations will be possible to evaluate after a certain period of time of its operation.

CONCLUSIONS

The article outlines the issues of provider-customer service in terms of the relationship between the faculty and graduates of secondary schools that are potential students. It also introduced the area of decision support systems. Article from these starting points, proposes a system that uses the technology of IS/ICT, to supports the decision-making processes in realization of marketing activities aimed to promote the study programs of the Faculty of Business and Economics at Mendel University in Brno.

SUMMARY

Decreasing number of secondary school graduates means that, for college, it becomes more difficult to fulfill guide number of newly admitted students.In order to maintain the optimum number of students with the appropriate quality registered Faculty of the Business and Economics has decided to support activities which increase the interest of its accredited programs.

Potential students should be treated as customers to whom we want to offer a product – education. Promoting study programs PEF MENDELU is handled by PR department in collaboration with several students.

The article deals with issue how to use the tools of IS/IT to optimize use of available resources which are very limited. There is also an analysis of the system for decision support in the realization of marketing activities related to the propagation of study programs.

The system itself is built on the tools of Business Intelligence (BI) that can observe consumer trends, identify customer segments and other important information. The BI emphasizes the use of OLAP technology for data processing. In the collected data about students is hidden a large amount of information that can be obtained using techniques such as knowledge discovery in databases.

The article describes a methodology of solving problems and shows the application, resulting in support of decision-making processes in the propagation of PEF MENDELU. The purpose of the described system is to ensure better efficiency allocated resources on this activity.

Acknowledgements

This article was created in cooperative research projects IGA 6/2011 and IGA 21/2011.

REFERENCES

BURSTEIN, F., HOLSAPPLE, C. W., 2008: *Handbook on Decision Support Systems 1*. 1st edition. Berlin: Springer, 2008. 854 p. ISBN 978-3-540-48712-8.

BUSINESSDICTIONARY.COM., 2011: *Decision Support System (DSS).* [online]. HTML document. [cit. 2011-10-10] <http://www.businessdictionary.com/definition/decision-support-system-DSS.html>.

DARIE, C., BRINZAREA, B., CHERECHEŞ-TOŞA, F., BUCIA, M., 2006: *AJAX a PHP – tvoříme interaktivní webové aplikace PROFESIONÁLNĚ*. Brno: Toner Press, 320 p. ISBN 80-86815-47-1.

FIALA, P., 2006: *Modely a metody rozhodování*. 1st reprint 1st edition, Praha: Oeconomica, 298 p. ISBN 80-245-0622-X.

HAVRÁNKOVÁ, M., 2011: Propagácia PEF na Slovensku. In: MOTYČKA, A. (ed.) *ICT podpora sledování a hodnocení marketingových aktivit v zákaznicky orientovaných procesech*. pp. 49–56. ISBN 978-80-7375-546-1.

HOLSAPPLE, C. W., 2008: *DSS Architecture and Types*. Chapter in Handbook on Decision Support Systems 1. 1st edition. Berlin: Springer, pp. 163–190. ISBN 978-3-540-48712-8.

CHALUPOVÁ, N., MOTYČKA, A., 2008: Situace a trendy v informačních technologiích pro podporu obchodování. In: *Acta Universitatis agriculture et silviculture Mendelianae Brunensis*. LVI, 6, 25–36. ISSN 1211-8516.

KOUBEK, T., 2011: Propagace studijních programů oborů PEF. In: MOTYČKA, A. (ed.): *ICT podpora sledování a hodnocení marketingových aktivit v zákaznicky orientovaných procesech*. pp. 13–16. ISBN 978-80-7375-546-1.

LANDA, J., 2011: Proces tvorby roll-up banneru pro potřeby prezentace studijních programů In: MOTYČKA, A. (ed.): *ICT podpora sledování a hodnocení marketingových aktivit v zákaznicky orientovaných procesech*. pp. 57–62. ISBN 978-80-7375-546-1.

NGAI, E. W. T., XIU,L., CHAU, D. C. K., 2009: Application of data mining techniques in customer relationship management: A literature review and classification. In: *Expert Systems with Applications*. 36. pp. 2592–2602. ISSN 0957-4174.

NOVOTNÝ, O., POUR, J., SLÁNSKÝ, D., 2005: *Business Intelligence*. 1st edition. Praha: Grada Publishing, 256 p. ISBN 80-247-1094-3.

PISARSKÁ, M., 2011: Rozšíření marketingové komunikace při akvizice potencionálních studentů PEF MENDELU. In: MOTYČKA, A. (ed.): *ICT podpora sledování a hodnocení marketingových aktivit v zákaznicky orientovaných procesech*. pp. 69–74. ISBN 978-80-7375-546-1.

TRENZ, O., 2011: Propagace fakulty na středních školách. In: MOTYČKA, A. (ed.): *ICT podpora sledování a hodnocení marketingových aktivit v zákaznicky orientovaných procesech*. pp. 35–36. ISBN 978-80-7375-546-1.

TURČÍNEK, J., 2011: Postřehy z Roadshow uplynulých let. In: MOTYČKA, A. (ed.): *ICT podpora sledování a hodnocení marketingových aktivit v zákaznicky orientovaných procesech*. pp. 37–38. ISBN 978-80-7375-546-1.

TURČÍNEK, P., 2011: Aproach to storing customer in CRM systems. In: *Mezinárodní Baťova konference pro doktorandy a mladé vědecké pracovníky*. ISBN 978-80-7454-013-4.

VERNEROVÁ, E., 2011: Možnosti propagačního působení na studenty středních škol. In: MOTYČKA, A. (ed.): *ICT podpora sledování a hodnocení marketingových aktivit v zákaznicky orientovaných procesech*. pp. 107–111. ISBN 978-80-7375-546-1.

WEINLICHOVÁ, J., FEJFAR, J., 2010: Využití samoorganizující se neuronové sítě pro hodnocení chování spotřebitele. In: *Acta universitatis agriculturae et silviculturae Mendelianae Brunensis*. LVIII, 6, 625–632. ISSN 1211-8516.

WESLING, H., 2003: *Aktivní vztah k zákazníkům pomoci CRM*. 1. vyd. Praha: Grada, 196 s. ISBN 80-247-0569-9.

Address

Ing. Pavel Turčínek, doc. Ing. Arnošt Motyčka, CSc., Ústav informatiky, Mendelova univerzita v Brně, Zemědělská 1, 613 00 Brno, Česká republika, e-mail: pavel.turcinek@pef.mendelu.cz