Chapter 27
Suggested Model for Business Intelligence in Higher Education

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ABSTRACT

BI is playing a major role in achieving competitive advantage in almost every sector of the market, and the higher education sector is no exception. Universities, in general, maintain huge databases comprising data of students, human resources, researches, facilities, and others. Data in these databases may contain decisive information for decision making. In this chapter we will describe a data mining approach as one of the business intelligence methodologies for possible use in higher education. The importance of the model arises from the reality that it starts from a system approach to university management, looking at the university as input, processing, output, and feedback, and then applies different business intelligence tools and methods to every part of the system in order to enhance the business decision making process. The chapter also shows an application of the suggested model on a real case study at the Arab International University.

INTRODUCTION

Business intelligence (BI) is composed of several technologies, methods, and tools that may support the middle and top management in the decision making process. Almost all industries have already started to utilize BI tools, methods, and technologies to achieve competitive advantage through the utilization of data piles it has cumulated throughout its history. These huge amounts of data required special manipulation in order to enhance the decision making process. The BI approach helps in building up multiple views of the overall system of the organization comprising customers' suppliers, competitors, and human resources data (Hart, 2007).

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Data mining is considered an advanced tool in the theme of business intelligence (Folorunso, Ogunde, vincent, & Salako, 2010). Data mining helps mainly in the strategic applications of institutions. Data mining could be a very powerful tool for building, implementing higher education strategies.

The need for BI to achieve competitive advantage in higher education has gained momentum in the last decade (Dell'aquila et. al (Carlo DELL'AQUILA, 2008) (Javed et. al, 2008). The attractiveness of BI implementation in universities is due to many reasons. First, universities are facing huge competition and they need better understanding of the business forces in order to respond effectively to the already dynamic industry (Javed et. al, 2008). Second, universities always require tools to predict student performance, employment paths, course selection etc. and all these could be greatly supported by business intelligence applications (Kohavi, 2000). Third, like any other business, universities require to do cost-benefit analysis, trend analysis, value chain analysis, and so forth, which could be supported by BI applications.

In this paper we will describe a general model of university management, based on system theory, where the university is seen as input, processing, output, and feedback. Then, we will see how business intelligence in general and data mining in specific could be utilized in every part of the system, with a practical case from Arab International University.

The rest of the paper is organized as follows. First, we will start with a literature review focusing on the utilization of BI in enhancing university management, with literature focusing on every part of the university process, and then we will have a case study from Arab International University, where every part of the system is investigated with a separate case.

LITERATURE REVIEW

Data mining is a set of systems that are really embedded in a larger BI system (Apte, et. al, 2002). Data mining itself is made up of several analytical, mathematical, and statistical techniques. Before applying these methods to data, the data has to be typically organized into history repositories, known as data warehouses (Luan, 2004).

Data mining has been used in several industries such as financial, telecommunication, and education (Delavari and Beikzadeh, 2008). Education organizations have shown interest in data mining due to the potential data mining can provide in this domain. For example, (Erdoğan and Timor, 2005) used data mining in studying the effect of admission test results on students performance in higher education. (Shaeela, et al 2010). (Luan, 2002) studied the potential data mining can provide to the decision makers in higher education.

Applications of data mining in higher education can be roughly categorized into three main categories: input, output, and processing. That is, studying the use of data mining in analyzing input, processing, and output data.

In higher education input data mining we can see several studies. For example, (Superby et al, 2006) studied freshmen students to identify characteristics of students who are more likely to have successful study record. (Kovačić, 2010) tried to identify early predictors of students performance in universities, focusing on socio-demographic variables (age, gender, ethnicity, education, work status, and disability) and study environment (course program and course block), that may influence persistence or dropout of students at the Open Polytechnic of New Zealand. Using CHAID tree and CART trees he found that the most important factors that help separate successful from unsuccessful students are ethnicity, course program and course block. (Yu et al., 2007) used a data mining approach to identify predictors of retention among first year students enrolled at Arizona State University. Using the classification