Chapter 89

Mastering Intelligent Decision Support Systems in Enterprise Information Management

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ABSTRACT

This chapter explains the overview of Intelligent Decision Support Systems (IDSSs); the overview of Enterprise Information Management (EIM); the IDSS techniques for EIM in terms of Expert System (ES), Multi-Agent System (MAS), Fuzzy Logic (FL), Artificial Neural Network (ANN), Evolutionary Computation (EC), and Hybrid System (HS); and the multifaceted applications of IDSSs in EIM. IDSS techniques are rapidly emerging as the modern tools in information management systems and include various techniques, such as ES, MAS, FL, ANN, EC, and HS. IDSS techniques can increase the sensitiveness, flexibility, and accuracy of information management systems. IDSS techniques should be implemented in modern enterprise in order to gain the benefits of using the decision-making process concerning EIM. The chapter argues that utilizing IDSS techniques for EIM has the potential to increase organizational performance and reach strategic goals in global operations.

INTRODUCTION

The evolution of information technology (IT) applications makes the enterprise an absolute commitment on behalf of the decision makers to constantly make the best decisions in the shortest possible time (Jantan, Hamdan, & Othman, 2010). Decision support system (DSS) is a technology that assists managerial decision makers to utilize business data and models toward solving the semi-structured and unstructured problems (Qian, Huang, & Chan, 2004), used to support the complex decision-making and problem-solving processes in modern organizations (e.g., Arnott & Pervan, 2008; Shim et al., 2002; Turban, Aronson, & Liang, 2005). Problem solving ability develops over a long period of time and grows with experience in solving a wide variety of problems in many different ways (Kasemsap, 2017a). Although the development of DSS has been executed for over 40 years, DSS suffers from many limitations, such

as poor maintainability, poor adaptability, and less reusability (Janjua & Hussain, 2012). Information plays an important role in modern enterprise (Kahraman, Kaya, & Cevikcan, 2011).

Many IDSSs have been developed to support decision making for modern enterprises (Kahraman et al., 2011). Regarding global competition, enterprises are increasingly employing IT to electronically conduct business (Kahraman et al., 2011). The information sector in modern business is the most energetic segment (Rehman & Marouf, 2004). Those various transaction data can be transformed into information and knowledge by using business intelligence tools. Business intelligence involves creating any type of data visualization that provides insight into a business for the purpose of making a decision or taking an action (Kasemsap, 2016a). Enterprise-related decision makers make better business decisions using IDSSs (Wu, 2010).

Enterprise resource planning (ERP) is useful in providing the management team with the types of information necessary for making critical decisions (Kasemsap, 2015a). Decision making is the cognitive process resulting in the selection of a course of action among several scenarios (Kasemsap, 2016b) and is based on different data sources obtained from information systems, such as ERP, supply chain management, human resource management, financial management, and customer relationship management (CRM). The focus on the role of IS within business architecture and their impact on business performance by utilizing IT based on the practical application of IT, technical alignment, IS capabilities, and IS effectiveness is to connect people, processes, and technology for the purpose of maximizing corporate IT, technical alignment, and information systems capabilities to enhance business performance and reach organizational goals in the digital age (Kasemsap, 2015b).

The applications of IDSSs in EIM are discussed in this chapter in order to obtain a successful business strategy in enterprise. EIM systems in modern organizations have been developed following the requirements obtaining from administration, control, reporting, and transaction management in the global competitive environments. The focus of EIM must be shifted from general management to the development of business solutions to enable the operational integration of cross-functional teams, key business processes, performance management, information, and knowledge in order to increase the profitable market share in modern organizations.

Background

Computer applications can be used to provide proper and consistent decisions, thus increasing the effectiveness of decision-making process (Palma-dos-Reis & Zahedi, 1999). DSS is the key application in the field of software engineering (Vinodh & Kumar, 2012). The origin of DSS is in the early 1970s (Marakas, 2003). The continued forms are web-based DSS, group DSS, and executive support system (e.g., Laudon & Laudon, 2004; Power & Sharda, 2007). Swanepoel (2004) developed the DSS for the real-time control system of manufacturing processes. Laudon and Laudon (2004) created the DSS for supply chain management and CRM. CRM becomes one of the most important business strategies in the digital age, thus involving organizational capability of managing business interactions with customers in an effective manner (Kasemsap, 2015c).

A definition of intelligence, which is important in the fields of artificial intelligence (AI) and computational intelligence, has only rarely been provided (Kahraman et al., 2011). Many AI models (e.g., ANN, FL, and genetic algorithms) are the prominent research subjects, since they can deal with the complicated engineering problems which are difficult to solve by classical methods (Konar, 2005). These

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