Development Multi-Enterprise Collaborative Enterprise intelligent decision support system

Ming-Chang Lee¹, Jung-Fang Cheng²
¹ Department of Information Management, Fooyin University, Taiwan
² Department of Business Administration National Kaohsiung University of Applied Sciences
ming_li@mail2000.com.tw

Abstract

Enterprise Resource Planning (ERP) and related systems such as Supply Chain Management (SCM) and Customer Relationship Management (CRM) are incorporating decision support tools and technologies. In this paper, it presents an intelligent decision support, which includes business intelligence, customer intelligence, supply chain intelligence and business analysis. This literature reviews the IDSS and combines literature in ERP and IDSS. The proposed of a multi-enterprise collaborative conceptual ERP-IDSS framework is created which contains SCM and CRM. This framework being together the ERP, CRM and SCM integration solutions offered by a host of well-know venders in the marketplace. This integrates a decision support system with knowledge management, to provide guidance to decision-making during the planning process.

1. Introduction

Finlay (1994) defined DSS as a computer-based system that aids the process of decision-making. DSS are computer-based support for management decision makers who are dealing with semi-structured problems. According to Power (1997), the term decision support system remains a useful and inclusive term for many types of information systems that support decision making.

Traditionally, ERP system provided firms with limited analytical capabilities, such as strong data storage, access, scrubbing, and integration capabilities. For Sprague and Carlson (1982), DSS are interactive computer-based systems that help decision makers utilize data and models to solve unstructured problems. DSSs which perform selected cognitive decision-making functions and are based on Artificial Intelligence or Intelligent Agents technologies are called Intelligent Decision Support Systems (IDSS) (Gadomski et al.,2001). IDSS was applied to solve problems faced by rice framers desiring to achieve maximum yields in choosing the proper enterprise management strategies. IDSS is needed and is economically feasible for generic problems that require repetitive decisions. Dhar and Stein (1997) use term to characterize the degree of intelligence provided by a decision support tool. It describe intelligence density as representing the amount of useful decision support information that a decision maker gets from using the output from some analytic system for a certain amount of time (Dhar and Stein, 1997).

Over the past few years, the marketplace and the trade press has recognized the value derived via the integration of ERP, CRM and SCM. In this discussion to propose a multi-enterprise collaborative conceptual ERP-IDSS framework that considers SCM, Enterprise Management, and CRM as components.

2. Development an intelligent DSS for enterprise management

Traditionally, ERP systems have provide firms with limited analytical capabilities, but have made up this limitation via strong data storage, access, scrubbing, and integration capabilities. Conversely, DSS have provided firms with strong data transformation, discovery, and knowledge-gaining capabilities, but have not been able to provide this functionality at an enterprise-wide level. Dhar and Stein (1997) use term to characterize the degree of intelligence provided by a decision support tool. The integration of e-business and IDSS can play significant role in allowing firms to maximize the potential of their intelligence density, thereby taking care of their internal environments. In addition, by using integrated e-business and IDSS, such as CRM and SCM, firm can achieve multi-enterprise collaboration by reaching beyond the confines of their boundaries and forming valued relationships with all their partners. Therefore it proposed a multi-enterprise collaborative conceptual ERP-IDSS framework that considers SCM, Enterprise Management, and CRM as components.
2.1 Integration of ERP and IDSS

A firm can integrate an ERP (e-business) system with an IDSS in integrate existing DSS that currently sit on top of a firms’ ERP system across multiple firms. Dharand Stein (1997) describes six steps of processing to transform data into knowledge. Figure 1 is showed as a framework of e-business and IDSS. The integration of ERP and IDSS can extend to include the collaboration of multiple enterprises. Firms need to share information with their supplier-facing partners. Firm need to gather information from their customer-facing partners (i.e. retailers, customers). Firm need to increase intelligent density through the various IDSS tools and technologies integrated with their respective e-business system. In multi-enterprise collaboration, it develop relationship with its partners through systems such as CRM, SCM, Business-to-Business (B2B), data warehouse, firms are able to provide their decision makers with analytical capabilities (i.e. OLAP, Data Mining, MOLAP). From Figure 1, the integrated of e-business and IDSS included ERP system, Enterprise Application integration and ISS system.

2.2 The integration of ERP and IDSS with multi-enterprise collaboration

Multi-enterprise collaboration with respect to the integration of ERP and IDSS is showed in Figure 2. It consists of five main components: ERP component, KM component, SCM component, middleware, collaboration software and decision component. The SCM component is designed to integrate with ERP to support planning and execution across the total supply chain (Lee, et al., 1997). The middleware is interface software and consists of an integration manager, a message broker, data adaptors and a variety of application programming Interface. The collaboration component is the web- network / collaboration software. The functions of collaboration are Buying Collaboration, Design Collaboration, Marketing/selling Collaboration, and Marketing /Selling Collaboration.

---

**Figure 1: framework of e-business and IDSS**

- **Business Intelligence**
  - **Knowledge**
    - **SCM**
    - **ERP**
    - **CRM**
  - **Customer**
    - **Supplier**
  - **Data**
  - **Process**
  - **Integrate scrub**
  - **Transform Load**
  - **Data Warehouse**
  - **OLAP**
  - **Data Mining**

- **ERP system**
  - **Enterprise Application Integration**
  - **IDSS system**

**Support**
- **Learn**
- **Discover**
- **Decision**

**Enhance**
- **OLAP Data Mining**

---
A Supply chain intelligence system makes use of many of tools and technologies such as BI and analytic application (such as Data Mining, Multidimensional On line Analytic Process). Supply chain intelligence systems not only provide a snapshot view of the KPI’s selected by the decision makers, but also have the ability to examine the underlying detail from which this snapshot view originated. Supply chain intelligence systems have the ability to provide both breadth and depth of information for the decision maker.

Customer intelligence leverages the capabilities of the tools and technologies for CRM decision support applications. The goals of Customer intelligence are application with respect to maximizing the lifetime value of customer relationships (Liautaud and Hammond, 2001). Therefore, the process of building the value of customers is over time. The firm must work hard to build relationships with new customers and measure their achievement over time. The firm provides the best level of service to its customers, it builds customer retention levels. Customer intelligence leveraging ERP systems and the tools and technologies associated to BI and analytic applications, firm can build a infrastructure of information and butter understanding customer needs, thus providing them with the best care.

3. Implementation of the intelligent ERP-IDSS

3.1 Enterprise Management

According Anthony’s classic hierarchical taxonomy, Enterprise management included Strategic Enterprise Management (SEM), Management Control and Operation Control. SEM is defined as the process of deciding on the objectives of the organization, on changes in these in these objectives, and on the resources used to attain these objectives, and on the policies that are to govern the acquisition, use, and disposition of these resources. Long –term planning and IDSS, as well as analysis and information systems support the strategic planning level of the firm. Management control is defined as the process by which managers assure that resources are obtained and used effectively and efficiently in the accomplishment of the organization’s objectives. Reporting and controlling systems support the management control layer of the firm. Operational Control is the process of assuring that tasks are carried out effectively and efficiently. Value-oriented job accounting systems and quantity-oriented operative systems support the operational control layer of the firm.

3.2 Supply Chain Management

SCM is defined as a process of integrating organizational units along a supply chain and coordinating materials, information and financial flows in order to fulfill customer demands (Stadtler, 2000). Therefore, it define SCM as the collaboration and corporation of firms across the enter supply chain in order to improve operational effect icy and market competitiveness.
3.3 Customer Relationship Management

CRM is any application or initiative designed to help your company optimize interactions with customers, suppliers, or prospects via one or more touch points, such as a call centre, salesperson, distributor, store, bench office, Web, or e-mail— for the purpose of acquiring remaining or cross-selling customers.

3.4 Implementation of the intelligent ERP-IDSS

Enterprise develop relationship with their partners through system such as CRM, SCM, Business to Business (B2B) procurement, and Online Stores (Data Warehouse), firms are able to provide their decision makers with analytical capabilities. According to Power (2002), academics and practitioners have discussed building DSS in terms of four major components: (a) the User interface, (b) the Data base, (c) the model and analytical tools, and (d) the IDSS architecture and network. Marakas (1999) proposes a generalized architecture made of five distinct parts: (a) the data management system, (b) the model management system, (c) the knowledge engine, (d) the user interface, and (e) the user(s).

In Figure 3, during the planning process, data and models are manipulated through DBMS, knowledge management system (KMS) and model base management system (MBMS), respectively. Instructions for data modifications and model executions may come from the ES interface directly. The MBMS obtains the relevant input data for model executions from the MBMS and, in return, results generated from model executions are sent back to DBMS for storage. The data base also provides facts for ES as part of the Knowledge base. Using these facts together with the predefined rules, the interface ending on the ES performs model validations and planning evaluations, according to what a domain expert is support to do. In Data Warehouse, firms are able to provide their decision makers through with analytical capabilities and Data mining.

To collaborate at a multi-enterprise level, the firm connects with its partners through EAI technology, processes, and information with all their partners along their extended value chains. These partners in turn may also integrate their respective technologies, process, and information, thus creating a network like multi-enterprise collaborative structure. The implementation of multi-enterprise collaboration architecture is showed as Figure 3.

4. Conclusion

In this paper, we have proposed an IDSS, which integrates multi-enterprise collaborative conceptual ERP-IDSS framework that considers SCM, enterprise management, and CRM as components. The proposed IDSS is able to capture the domain knowledge and provide intelligent guidance during the planning process. While the data and model manipulation are done through the DSS, decision makers can focus on the planning issues. This framework being together the ERP, CRM and SCM integration solutions offered by a host of well-know vendors in the marketplace.
Figure 3: The implementation of multi-enterprise collaboration architecture
Source from: modified Cheung et al. (2005)
References


Ming-Chang Lee is Assistant Professor of Department of Information Management at Fooyin University. His research interests include knowledge management, parallel computing, and data analysis. His publications include articles in the journal of Computer & Mathematics with Applications, International Journal of Operation Research, American Journal of Applied Science and Computers, Industrial Engineering, International Journal innovation and Learning, Int. J. Services and Standards, Lecture Notes in computer Science (LNCS), and International Journal of Computer Science and Network Security