A Business Process Redesign for e-Book Store Using Computer Simulation

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Abstract

This research studies the concepts of enterprise engineering theory. The objectives of this research are to design a work system of an online book store at Sripatum University as a case study and test the proposed model through Computer Simulation. The researcher used international standard tools such as iGrafx Process 2000

The novel technique proved to be helpful in analyzing the improvement of work processes and internal communication. These processes include both front office and back office mmanagement. By developing computer simulation to test various types of working processes as required, the study can be measured and evaluated on a quantitative basis. The design of a new process can help reducing time and errors of core processes such as the distribution process (2.37 hours into 1.87 hours), the procurement process (25.58 days into 8.91 days) and the ordering process (8.60 minutes into 6.58 minutes). This would help maximizing the utilization of resources and improve its efficiency.

1. Introduction

At the present, business transactions conducted in electronic forms, or e-business, have been growing very rapidly [3]. As e-business can help introducing products and services to the global market easier and faster, plus it helps create a new distribution channel, business transactions can be made without any limitation of location and time.

Sripatum University's book center has a policy to create a new distribution channel in the form of e-Commerce, as a means to improve its services to better satisfy customers' needs. However, there are a number of risks associated with developing an e-Commerce channel, such as technological risk, operational risk, and business risk. Therefore, the book center needs to have good planning and reorganizing processes, together with a gradual change in organizational culture, to suit the new channel.

Good planning is the key success factor in developing electronic business, as it will help guide the business to the right direction. Since the entire processes need to be reorganized, which will involve an investment in equipments, personnel and other resources, technology can be used to

support the design of work processes, from purchase of raw materials, production, and distribution of product to end customers.

According to the study, the researcher applies computer simulation technique in order to conduct and develop a model that can be used to test various types of working processes. The model can help reduce time and expenses incurred, thus increase more cost efficiency.

2. Research Objectives

The researcher has the main objectives as the followings:

1. To re-design a work system of an online book store.
2. To design a system of supply chain Management in order to sell books via the website.
3. To test the proposed model through a computer simulation.

3. Expected Derivable Results

In this research, we expect to have the derivable results such as:

1. To understand more about the system of online business and electronic supply chain management (e-CRM).
2. To develop work processes for a prototype online book store that is efficient and satisfy customers' needs.
3. To apply the computer stimulation technique in testing, analyzing, and planning work processes in order to increase efficiency, while minimizing time and costs.
4. To use the model for analyzing systems and managing suitable job distribution so that it can eliminate unexpected opportunities cost or expenses.

4. Research Conceptual Frameworks

The study in redesign e-supply chain management for online book store has a scope or limitations as the followings:

1. Analyze and design work processes of an online book store, including front office management such as processing orders and payments, and back office management such as ordering goods from suppliers, storing and distributing goods to customers.
2. Analyze and design e-supply chain management for Sripatum University's book Center, from ordering goods from suppliers, storing, processing orders and distributing goods to customers.
3. Develop and test the proposed model for an on-line book store, by using a computer simulation technique, to analyze and improve work processes.
4. Analyze the results that derived from the computer simulation model, and make a summarized report which can help business executives in making decisions with regards to the development of an on-line distribution system for Sripatum University's book center.

Based on research objectives and limitation, the researcher can explain conceptual framework as in Figure 1.

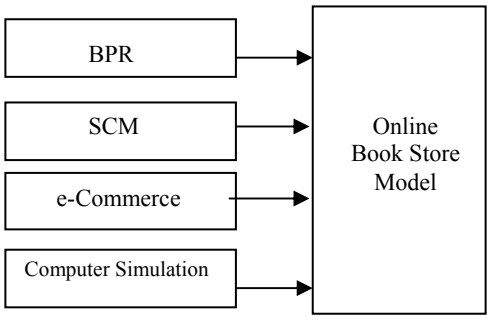

Figure 1. Conceptual Frameworks

5. Literature Review

Enterprise Engineering (EE) is a concept of improving the work processes within an organization to achieve better efficiency and effectiveness [3]. It involves various methods, including modeling, cost analysis, simulation, workflow analysis and process improvement.

A tool that is recognized as an international standard in designing and improving work processes is called "Integration Definition for Functioning Modeling" or IDEF [2]. It was developed by the US Air Force in 1970, under the Integrated Computer Aided Manufacturing Program (ICAM) Project, and was certified by the National Institute of Standards and Technology. The standard, which is called the Federal Information Processing Standards Publication (FIPS), was, in turn, certified by the US Secretary of Commerce [7]. The technique proved to be helpful in analyzing the improvement of work processes and internal communication. It can also be used to measure and evaluate work processes on a quantitative basis.

The University of Toronto has a research study entitled "Designing Tools to Support Business Process Re-engineering" [5] with an objective to re-organize knowledge discovered within an organization. The examples of such knowledge include cost management, quality and speed of work, and processes to increase competitiveness. Knowledge discovered would be put together in a software tool, which will then be used as a model for organizational structure and behavior. The model would be designed first, then analyzed, improved and re-designed to help the decision making processes, using the BPR concepts.

The University of Minnesota, Washington, is one of many organizations to invest in enterprise transactional systems via business engineering and process redesign. The research entitled "Business Engineering and Process Redesign in Higher Education: Art or Science?"[8], published in 1998, stresses an important role of information technology in gaining basic infrastructure and tools to support an organizational change. The reengineering process, in particular, involves the use of automated tools, the use of an expert system in the decision making process, training and an accessibility to information.

The study titled, "Business Process Design and Organizational Structure: Technological, Operational and Economic Issue" [1] by University of Rochester are : Process redesign is more desirable when there are a large number of tasks, these tasks are non-uniform, job specification variability is high, and there are information asymmetries among workers and between workers and management. It is less desirable when tasks are uniform, knowledge intensive and there are low returns from information sharing.

Simulation is a desirable method in solving problems, especially, business problems which need fast and accurate decision making. The main reasons why a real test of work process is undesirable are: it involves an interruption to the current system, it can incur high costs associated with hiring new personnel or purchasing new tools and it takes a long time to complete. Simulation can help deriving an answer to the problems at lower cost and less time, and its results can be applied immediately [4].

Computer simulation is an important tool in Production/Operation Management because it can be used to model and analyze an extremely wide variety of practical situations [6]. Simulation models have proven useful at all levels of decision making, including strategic business planning. There are many of successful simulation applications within various manufacturing and service industries. For example, the U.S. Air Force Material

Command's Sacramento Air Logistics Center (SM-ALC) was built to identify process and facility bottlenecks for improvement by throughput analysis for aircraft maintenance and dental clinic in healthcare services industry. The objective of the simulation study was to determine an effective and efficient way to schedule patients, rooms, and dentist/oral surgeons while maximizing the throughput of the clinic.

The research entitled "The Role of Simulation Modeling in Re-engineering the Retail Business Process" describes the role of simulation modeling in re-engineering the retail business processes. Contemporary management is characterized by great dynamism which is especially notable in retail sales. In order to survive in the highly competitive conditions of the marketplace, enterprises have to constantly change and redesign their business processes. Successful strategic decision making, effective investment of limited resources and efficient use of time are essential for business survival. This goal is achievable only by assuming control of information with the help of a retail information system. One of the success factors in business processes re-engineering (BPR) and development of an information system is the use of simulation modeling methods and tools. [9]

6. Research Methodology

The research methodology on redesign e-supply chain management for online book store is as follows:

1. Set research objectives and plan its process

   Set clear objectives, together with the scope of study, process and time, that ensure the study meet its objectives

2. Data collection and analysis

   This means collect data of related concepts and theories with regards to business process redesign, supply chain management, the development of electronic commerce, computer simulation, online book store and the work process of Sripatum University's book center.

3. State research problems

   State the research problems that cover the scope of the study, by analysing the problems in the current work processes and the needs for new alternatives.

4. Analyse and re-design of work processes

   Analyze and design various work processes including the processes of an on-line book store.

5. Develop and test computer simulation model

   Develop a computer simulation model that tests various work processes and explains their behavior. Use the designed process to develop a model that tests the work process according to the stated problems.

6. Analyse and summarize the results

   Analyze the results derived from the computer simulation model, and make a summarized report which can help business executives in making decisions with regard to the development of an on-line distribution system for Sripatum University's Book center.

7. Produce a research paper

   Produce a paper that explains the research methodology, literature review, the analysis of findings and a conclusion.

Moreover, the researcher uses additional tools such as hardware: computer with CPU 2.6 GHz, 256 MB main storage, second storage with 20 GB. The main software that uses in this research is iGrafx Process 2000.

7. Research Results

By analysing the design of a work process for Sripatum University's online book store as a case study, the scope of various processes can be understood clearly.

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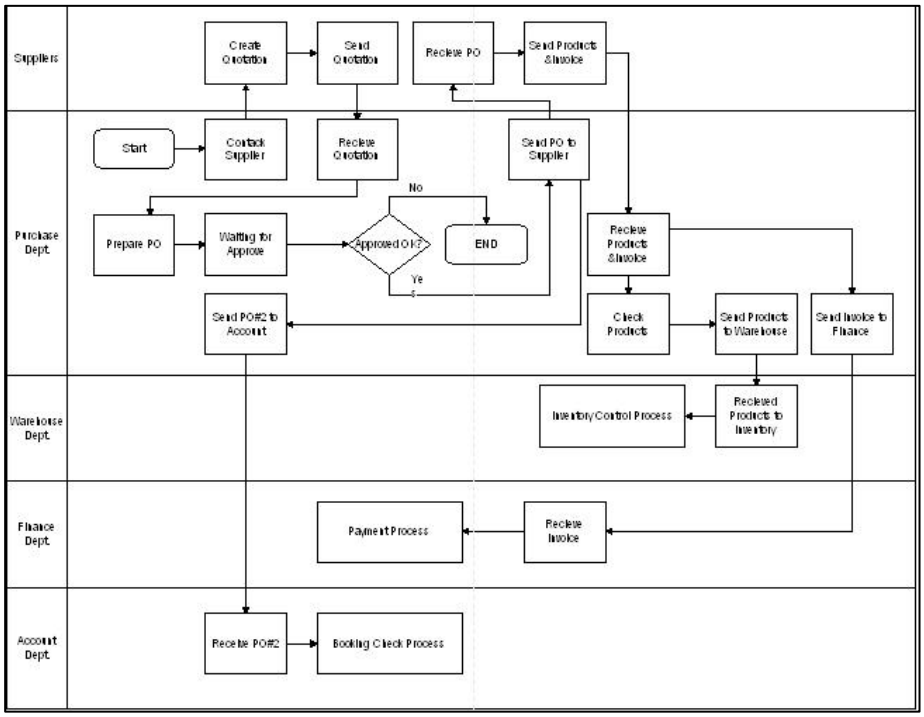

Figure 2. Procurement Process (AS IS model)

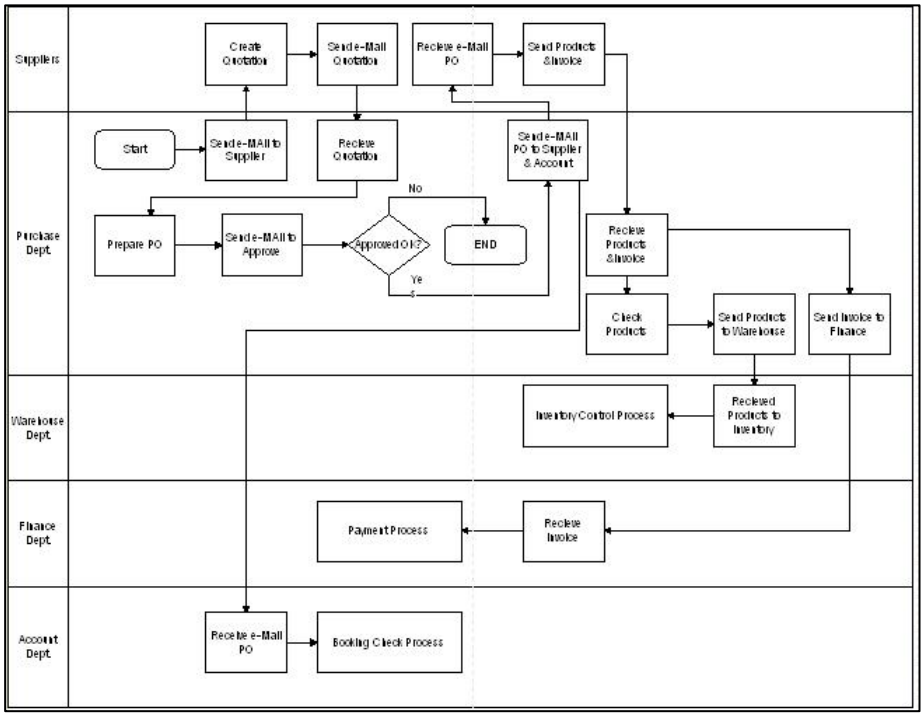

Figure 3. Procurement Process (TO BE model)

These processes include front office management, from customers accessing to the store's website on the Internet, browsing, shopping products into carts or baskets, filling payment forms and confirming orders. Back office management includes ordering goods from suppliers, storing and distributing to end customers. The Procurement Process (AS IS model) is shown in Figure 2 and Figure 3 demonstrated Procurement Process (TO BE model).

The re-design of a new process can help reducing time and errors of core processes such as the distribution process (2.37 hours into 1.87 hours), the procurement process (25.58 days into 8.91 days) and the ordering process (8.60 minutes into 6.58 minutes). This would help maximizing the utilization of resources and improve its efficiency as in Table 1.

Table 1 Research Result

Process Name	**AS-IS model**	**TO-BE model**
Distribution Process	2.37 hours	1.87 hours
Procurement Process	25.58 days	8.91 days
Ordering Process	8.60 minutes	6.58 minutes

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