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Overcoming business process reengineering obstacles using ontology-based knowledge map methodology

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Abstract

Business process reengineering (BPR) is identified as one of the most important solutions for organizational improvements in all performance measures of business processes. However, high failure rates 70% is reported about using it the most important reason that caused the failure is the focus on the process itself; regardless of the surrounding environment, and the knowledge of the organization. The other reasons are due to the lack of tools to determine the causes of the inconsistencies and inefficiencies.

This paper proposes Process Reengineering Ontology-based knowledge Map Methodology (PROM) to reduce the failure ratio, solve BPR problems, and overcome their difficulties. Using an organizational ontology to show the structure and environment surrounding to organization's processes, using knowledge maps as an inference that succeeds to identify and find out the causes that lead to contradictions and inefficiencies, and using Analytical hierarchy processing to identify and prioritize processes of the business to be re-designed. Through the proposed methodology, all organizational processes are completely analyzed. Moreover, Analytical Hierarchy Processing technique is used to show the most important processes with high priority to be reengineered first then it is easy to discover any errors occurred during reengineering process through knowledge map so BPR is done successfully. Finally, Apply the proposed methodology to inventory management shows how processes reengineering are done successfully and helping the organization to achieve its objectives.

Keywords: Business process reengineering; Knowledge map; Ontology; Analytic hierarchical processing

1. Introduction

Today, the structure and behavior of the organizations have to be considered to help adaptation and evolution in a dynamic and more rapidly changing in the environment.

Currently, the organizational changes are unexpected although they were expected in the past. New technology appeared the globalization of business processes and the changing of customer requirements are the most factors that affect the organization position among the market. The aims of most organizations are to grow with high performance, achieve excellent work, minimizing the cost of services and products, and add value to the customer through good understanding about their requirements. Consequently, they need to be efficiently and continually redesigned in a world of new technology, changes, and strong competitors and redesigned to actualize strategic and operational success. The causes of strategic failures of the organizations are the inefficiency of the business processes, the lack of innovation, entailing serious consequence for companies and its competitiveness [51].

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BPR is defined as "a fundamental rethinking and radical redesign of business processes to achieve substantial improvements in all performance metrics such as cost, speed, quality, and service." Each of private and public organizations are either subject to use BPR or looking for an alternative methods which achieve the same results. Although a lot of organizations embraced the concept of BPR programs, only a few of them success, while the other fail with a high failure rate (e.g. 70%) [43,51].

Many factors affect the success of the BPR that will be explained in details below and these factors including the understanding of the environment in which the business process exists. As a result, organizations need techniques and integration of knowledge management models to understand the environment which includes processes, people, workers, customer, and tools.

The ontology contains a range of concepts and classifications, so it is developed to improve the comprehending structure of the organization and relationship between the organization goals it also used in the knowledge domain.

Knowledge map "is a representation of knowledge which reveals relationships of the sources of knowledge by using the metaphor of maps to display a certain place." It is a knowledge management technique that is used for different purposes, such as finding sources of knowledge or opportunities for knowledge creation, increases their participation and how they interact within the organization; identify the experiences and the ability to determine the terms of references [36].

Analytic Hierarchical Processing (AHP) "is a structured technique for organizing and analyzing complex decisions, based on mathematics and psychology".

In this paper, ontology is used to improve, build data and information structure. Also, knowledge map is used to identify and find out the causes that lead to contradictions and inefficiencies in the business processes reengineering depending on the ontology structure. Moreover, AHP is used in this paper to identify and prioritize processes of the business to be redesigned use the ontology to collect all information related to the business procedures that demand to be reengineered. The organization may don't have the resources to handle all processes at once so AHP is very important in this case.

This paper aims to propose a methodology to BPR to be successfully done through using ontology, AHP, and knowledge map. Therefore, all organizational processes will be analyzed and the most important process will be reengineered first. Then if any errors occurred the map will find why this error occurred, who are caused it, and where these errors are founded to make everything clear during BPR and tackle any obstacles.

The paper is organized into the following sections; the BPR, organizational ontology, and knowledge map are described in Section 2. Section 3 describes the BPR's success and failure factors then BPR models and methodology are described and evaluated. After this, the PROM methodology is proposed finally the conclusion and the future suggestions are presented.

2. Theoretical background

This section presents the BPR theoretical concepts. It starts with the definition, analysis of the nature of BPR and the role of BPR in modern organization, followed by discussion of the business process reengineering environment linked to the significant of all support concepts such as knowledge map, organizational ontology and AHP. Then the environment structure is presented through BPR, selecting appropriate modeling tools both BPR and its environment and choosing the most successful methodology for BPR using ontology and knowledge map. Finally, criticism and contradictions are presented that are related to BPR.

2.1. Business process Re-engineering

BPR Used since 1990 works on a large scale and had achieved many benefits, such as lower costs and increases production, improves products and increases customer satisfaction. There are many definitions for re-engineering processes and these definitions vary in focus.

BPR is defined as "A radical redesign of processes to gain significant improvements in cost, quality, and service" [15]. That means neglect all existing structures around the procedures, inventing new ways to end, accomplish work and get the job done in record time. Re-engineering is the re-renewal of the business process starts with assumptions and does not take anything for granted.

BPR is "an approach used to create a computer-based system for the management of the supply chain traceability information flows" [25]. It has emerged from key management traditional like systems thinking and scientific management. "The development of the Information system can be regarded as business process reengineering practice, either because it automates some human-based processes or because it replaces an existing legacy system" [57]. Also, BPR is defined as "Methodologies to change the internal business of the organization in response to environmental and requirements changes" [14]. Business process "is a group of logically related tasks using the firm's resources to provide customer-oriented results to support the organization's objectives" [60].

Another definition is "the radical redesign fundamentally of a business process to gain dramatic improvements in performance measures such as quality, cost, speed, and service" [3]. This definition contains keywords: fundamental, radical, dramatic and process, which implied that before reengineering it is necessary to understand the process and the fundamental business operation, while it ignores the underlying rules and assumptions of the traditional/old business processes and to radically redesign the business process for dramatic performance can be measured in terms of time, speed, cost, and quality.

Reengineering is achieving significant improvements in the performance of the organization and not just the work of amendments, for example, there are three companies used reengineering. The first one found itself in big problems and there is no an alternative solution. The second company found

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