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A Literature Review for Contributing Mining Approaches for Business Process Reengineering

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Abstract

Due to the changing dynamics of the business environment, organizations need to redesign or reengineer their business processes in order to provide services with the lowest cost and shortest response time while increasing quality. Thence, Business Process Re-engineering (BPR) provides a roadmap to achieve operational goals that leads to enhance flexibility and productivity, cost reduction, and quality of service/product. In this paper, we propose a literature review for the different proposed models for Business Process Reengineering. The models specify where the breakdowns occur in BPR implementation, justifies why such breakdowns occur, and propose techniques to prevent their occurrence again. The discussed models have been built based on different perspectives which are discussed, and consequently, different research gaps and issues have arisen which are also highlighted in this research

Keywords

Business Process Reengineering, Critical Success Factors, Data Mining

1. Introduction

Organizations are constantly seeking innovative ways to work to stay in a competitive business environment. Business Process Reengineering (BPR) is one of the most management approaches that are adopted by many organizations in order to achieve a dramatic increase in performance and cost reduction. Since the risks enfolded and failure rates related to BPR projects are very high, it is necessary to find ways to support success of BPR in a systematic approach [1] .

Nowadays, the efficiency of administrative processes has become a main concern for many organizations. Business Process Reengineering (BPR) helps organizations to change their old fashioned structures into innovative processes through reorganizing, removing some processes and detecting new ways of doing things. Successful implementation of BPR brings many benefits to the organization. The major benefits of successful BPR implementation are customer satisfaction, increased productivity, higher flexibility, increased employees and improved coordination and improved competitive advantage. Business Process

Reengineering (BPR) helps organizations to achieve new heights of success by dramatically changing existing business processes [2].

To implement BPR successfully, critical success factors should be identified and analyzed. In terms of BRP, CSFs are domains which organization must fulfill to achieve a successful implementation. Often the critical success factors are the same as failure factors if they are not applied optimally in the organization. To improve performance, it is necessary to understand everything related to each process in the organization, its function, the resources involved in its implementation, its own procedures and the expected result. Measuring the performance of business processes in terms of time, cost, and quality expresses the success of BPR implementation [3] .

2. Trends in Business Process Reengineering (BPR) Research

Through a survey of literature, it is identified that some terms are related to BPR as follows:

2.1 Business Process

Business Processes did not only exist from the times when work began in an orderly manner[4]; their existence and importance were recognized in the transition period in the nineteenth and twentieth centuries, if not earlier. The concept of business processes first appeared and was studied in more detail in the early twenties of the last century, with regard to methods of procedures and their analysis [5]. The term "Process" is a very broad word with various meanings used in many fields, for example software engineering, industrial engineering, etc. [6].

Business Process is simply all about how work is done in an organization. “Business Process is a set of logically related tasks performed to achieve a defined business. outcome”[7]. A Business Process is designed to add value for the customers and therefore should not include unnecessary activities. It has a goal, specific inputs and outputs, uses the resources, has a number of activities that are performed in some order, may affect more than one organizational unit and creates value for the customer. Business Process is defined as “a structured set of activities designed to produce a specific output”. Figure 2.1 illustrates the elements for evaluating the relationship between business activities as follows:

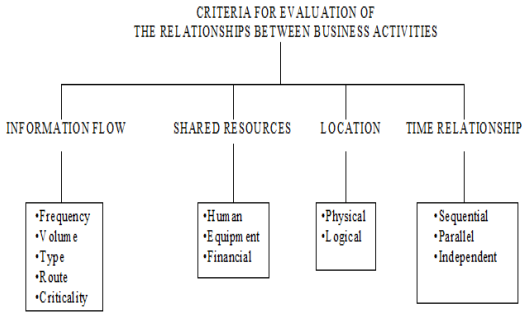

Figure 1: Structure of The First Model of Business Process adopted from [5].

Information flow: Information Flow between two activities is a key criterion in defining and quantifies the relationship between two activities. This is because, in an operational sense information (and material where applicable) flow is the only physical link between activities [8]. However, it was concluded that focusing only on frequency of flow alone would not be a realistic proposition as information flowing between activities could be classifies as more or less critical.

Shared Resources: considered a secondary importance and have been limited to human resources and equipment. As two activities can be carried out by the same person or team, it is advisable to share the equipment between two activities.

However, the impact of shared financial resources on determining the relationship between business activities is not considered significant [9].

Location: The physical and logical location of individual business activities will not be of great importance unless it is necessary for the activities to share the same resources. Shared resources being a separate area, site standards have also been dropped.

Time Relationship: The time relationship between individual activities is a factor in the information system. For example, an information flow that is critical in nature will indicate a chain relationship between the two activities, as there is no information flow between the activities indicating the independence of the two activities.

Business process is "a set of business activities put together with a goal of creating added value for a specific customer or market" [10]. It can be also defined as:

- A closed set of activities taken as a response to a certain event, with the purpose of generating an output.
- Everything that is required to ensure that the person interested in a business process gets an expected outcome.
- Interaction between people, equipment, methods and regulation with the goal of achieving a certain business objective.

Basic elements of a business process are the following: the goal, available resources, activities, indicators, focus on the buyer, and the process holders [5].

The Business processes as shown in figure 2.2 can be seen as processes that have inputs from supplier and outputs which usually are the desired outputs for the customer and the feedback loop from customers.

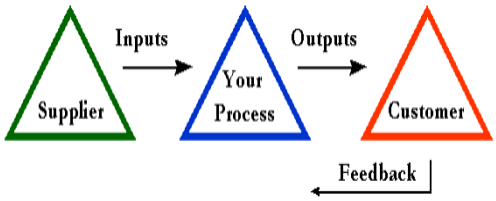

Figure 2: General Model of Business Processes adopted from [5].
[Six Sigma Software, BPR Online Learning Center]

Inputs: data such customer inquiries or materials.

Process: processing the data or materials which usually go through several steps.

Outputs: the delivery of the expected result.

There are four perspectives on business processes as follow [11]:

1- *Business processes as deterministic machines:* business process is considered as a fixed sequence of determined activities executed by human machines which convert inputs into outputs for accomplishing obvious targets.

2- *Complex dynamic systems:* It concentrates on the complex, dynamic and interactive features of business processes throughout open systems where a business process can have inputs, transformation, outputs and boundaries.

3- *Interacting feedback loops:* it focuses on the information feedback structure of business processes such as the complex, interactive and dynamic features of business processes.

4- *Social constructs:* it focuses on seeing business processes as produced by people with various expectations and values rather than viewing them as a predictable machine.

There are many approaches related to business process illustrated as below:

1- *Business Process Automation:* Business Processes Automation is a practice of analyzing, documentation, optimization and then to automate the business processes. It is based on eliminating redundant procedures, restructuring human capital and deploying software applications in the organization.

2- *Business Process Management:* Business Process Management (BPM) is "an approach that's designed to produce better processes through the combination of technology and expertise". BPM is "a collaborative effort between business units and the IT world, and this effort fosters a new paradigm of efficient and logical business processes" [12] [6] [13].

3- *Business Process Modeling:* Business Process Modeling is "the main research direction for process-aware system involving methods, techniques, and supporting tools towards process design, execution, and monitoring" [6][13]. A comprehensive process modeling framework needs to consider the following main issues: Process Modeling Requirements, Process Modeling Architecture with comprehensive Elements, Process Description Language, Formal Process Modeling Support, Legacy Process Integration and Graphic Process Modeling Suite.

4- *Business Process Improvement:* "Business Process Improvement is fundamental to business development, quality improvement and the management of change". Business process improvement method is a structured approach to the analysis and continual improvement of the fundamental activities of an organization by simplifying and streamlining its business processes.

5- *Business Process Reengineering:* BPR is defined as "the fundamental rethinking and radical redesign of business process to achieve dramatic improvements in critical, contemporary measures on performance, such as cost, quality, service and speed".

6- *Business Process Optimization:* Business Process Optimization is "a systematic approach that emphasizes repeatability and replaces heroic efforts and one-time improvements". Business Process Optimization shifts the focus to business innovation or what needs to be different in the process (business outcomes), rather than just compiling requirements or modeling processes [14].

The focus of the Business Process Optimization is on comprehensive change - not on gradually improving systems or processes, but re-engineering business to

gain from exploiting emerging technology. Business Process Optimization presents permanent structural changes in an organization that are necessary for innovation, business outcome, or both.

7- *Business Process Mapping:* The business process mapping provides an aggregated visual overview of all processes of an organization. It consists of building a model that demonstrates the relationships between activities, people, data, and objects involved in producing specific outputs [15]. One of the reasons why practical mapping methods are so popular today is that it is widely recognized that these models can provide useful, relatively inexpensive descriptions that can help improve and redesign business processes.

8- *Business Process Analysis:* Process analysis is the action of conducting a review and gaining an understanding of business processes. It involves reviewing the components of a process, including inputs, outputs, procedures, controls, actors, applications, data, technologies and their interactions to produce results [16].

9- *Business Process Integration:* Business Process Integration (BPI) is an important technique that focuses on integrating data from several sources in order to collaborate with each other by integrating business processes of organization. BPI supports the automation of business processes and systems integration into many organizations. One of the most commonly used methods of achieving BPI is the incorporation of organizational process models, but the integration of models is very complex. Therefore, process analysts require that they have extensive experience.

10- *Business Process Simulation:* Business Process Simulation is a business process analysis tool. It is used to collect the dynamic behavior of processes over time, i.e. developing process and resource performance in response to changes or fluctuations in a specific environment or system parameters. The results provide insights that support decisions in the process design or provision of resources with the aim of improving factors such as process performance, product quality and customer satisfaction or resource use.

11- *Business Process Transformation:* Business Process Transformation (BPT) is a comprehensive term that describes the process of radically changing the chain of actions required to achieve a particular business goal. Transforming business process provides examining the steps required to achieve a specific goal in an attempt to remove redundant or unnecessary steps and automate the largest possible number of actions [16] [17].

12- *Business Process Monitoring:* Business process monitoring plays an important role in organizational development. It provides management information and thus allows for better decisions in the design and implementation of the process [6]. The main concept of business process monitoring is to group key events about the current state and results of business processes into quantitative measures, called key performance indicators (KPIs). The business monitoring process displays the most important information necessary to achieve one or more goals, unified and sorted on one screen so that the information can be monitored at a glimpse [18].

2.2 Business Process Reengineering (BPR)

In the face of intensive global competition in business world, BPR is considered one of the most managerial tools that help organizations with troubles to change its business processes to cope with customer demands and environmental changes.

BPR makes organizations more effective and competitive

over decreasing production costs, improving quality, optimal use of resources, cutting down product development cycles and providing products/ services with lowest speed and time to the customer.

Re-engineering was suggested when the current system doesn't work well to satisfy customer needs as it should do, the other reason when organization wants to improve their processes in order to compete with other organizations. BPR was defined as 'the fundamental rethinking and radical redesign of business process to achieve dramatic improvements in critical, contemporary measures on performance, such as cost, quality, service and speed' [19]. Many organizations applied BPR since 1990 but BPR success rate was 30%. The definition of BPR has four important words: fundamental, radical, processes and dramatic which take into details as following:

(1) Fundamental: It is necessary for organizations to determine their fundamental operations and why they need them? And why these operations work in this way? They may need to change the way of operation working for satisfying customer needs and profitable.

(2) Radical: It means the way of innovation a new business in the organization. Radical redesign is that the current situation in the organization is neglected for designing new product and restructuring the new processes.

(3) Business processes: from our point of view, we define Business Process (BP) as simply the way of doing activities in order to achieve business outcome [20]. Process is an important factor in BPR that adds value to customer not only achieves organization's objectives. Some characteristics of BP are gathered based on the most popular definitions of BPR are as follows:

Definability: BP must have input and output.

Order: BP consists of set of activities that must be executed in order.

Customer: the process result must be delivered to customers who desire this result.

Value – Adding: the change which occurred within the process must add value to customer.

Embeddeness: BP must be embedded in organizational structure not existed in itself.

Cross – functionality: process can span several functions.

(4) Dramatic: dramatic change is an essential part of BPR to achieve enhancement in performance. BPR implementation focuses on great effects and changes on business processes and not small changes during periods.

The three Cs: Customers, Competition and Change are motors for arising of implementing BPR. The most four types of changing within organization are structural changes, strategic changes, process changes and people-centered change. There is a relationship between these changes where one of them can oblige the organization to make the others as well.

There are several performance improvement techniques that are used to improve organizational performance such as Lean, Six Sigma, Business Process Improvement (BPI), Business Process Redesign, Business Process Management (BPM), Total Quality Management (TQM), and Business Process Re-engineering (BPR). Today, BPR is the most appropriate technique among the others that deals with rapid business and technological changes for a dramatic improvement. TQM alone is not sufficient, so it is replacing by BPR as a great effective technique to reach organization goals. TQM is intended to change and improvement at intervals while BPR is a radical change to achieve dramatic improvements in business performance.

Idiom business process innovation is promoted to BPR because it includes the

anticipation of new business strategies, designing the existent processes and implementing the change although it has technological, human and organizational complexities. Information Technology (IT) is not only used to automate and mechanize processes. IT can assist organizations to re-engineer and redesign their business processes to improve their operational efficiency through two ways that are raising the degree of cooperation and reducing the degree of mediation by implementing shared databases and communication technologies.

Business Process Reengineering has some features that are: radical change, operating across organizational units, cross-functionality, BPR is mostly geared towards process, BPR seeks to enhance the performance of BP in quality, time and cost at the same time using clean slate approach, BPR is totalitarian like technology, people, infrastructure and process, BPR begins with desiring of change or eliminating the current processes, BPR will modify power arrangements and disrupt social arrangements leading to resistance and conflict, BPR introduces substantial changes in work [21].

2.3 Critical Success Factors (CSFs) of BPR

Critical Success Factors (CSFs) are set of factors that should be identified and accomplished by managers in organization to increase the chances of successful implementation. The success of BPR implementation is dependent on identifying and analyzing CSFs of BPR. CSFs can be categorized as internal (endogenous) and external (exogenous). Internal CSFs are relevant to issues and conditions within the organization that managers can control, unlike external CSFs which linked to issues executed outside and the manager may not be able to control them. In this study, the most important CSFs of BPR are identified as follows:

1- *Less Bureaucratic (Flatter Structure):* To successfully implement BPR, a less bureaucratic and participatory structure should be available to motivate innovation in the organization in terms of depending on flexible organizational structure.

2- *Egalitarian Culture and Leadership:* An egalitarian culture gives positive effects in BPR project through involving employees, taking their views and innovations and treating them in friendly and equal manner. This is basis for creating an effective organizational culture. Further, strong organizational culture works to engage employees in making positive changes to accept them and avoid resistance to these changes. An egalitarian leadership involves some items such as opening communication, sharing vision and information by managers with their subordinates, managers put trust between supervisors and their subordinates and managers constructively use the idea of their subordinates.

3- *Customer Focus:* Customer Focus is one of the most successful factors of BPR associated with organization's performance. Many organizations have obstacles to fulfill their customer's requirements. In addition, BPR applies to add value to customer. By dint of products and services that are connected to customers' needs, organizations can achieve a competitive advantage [22]. Hence, BPR projects outcome from analyzing customers' needs on products and services. To implement BPR, training for employees is very important to determine the interaction with customers for creating long-term relations with them. So, employees should have the motivation to carry out an effective training for achieving the desired targets.

4- *Quality Management:* From our point of view, Organizations should adopt a Quality Management System (QMS) that is defined as a formalized system that documents processes, procedures, and responsibilities for achieving quality policies and objectives concept and application because it helps them achieve their goals and the need to work to create and provide the requirements for this concept [23]. The Business Process Quality Management is a set of various methods that are used by organization for align all the components of the business with the requirements of the customers in order to decrease waste and increase the quality of the products or services at the same time. Quality means "the degree to which a set of inherent characteristics fulfills requirements". This dividend definition reflects a fundamental problem related to all approaches to quality management: quality determination is based on comparison with the ideal goal or standard that defines the requirements of the object in question. If one wants to apply quality management to a class of artifacts (for example, business processes or business process input units), one has to determine the appropriate quality standard [13].

5- *Change Management:* Change Management plays a crucial role through the organization's practice of adapting changes in the organizational activities to keep up with the challenges for meeting customer requirements or expectations. The best practices that are used to overcome resistance to change like training of employees in the new process to be used, new reward system, employee's empowerment, regular communication with all staff, receptiveness of employees to change, reduce fear, desiring to dismantle the current structure and maintenance of job security.

6- *Use of Information Technology:* There is a need to build robust IT infrastructure to achieve the desired results of implementing BPR. IT is mostly accompanied by BPR and has a significant impact on BPR projects. IT has an important role to integrate and accelerate processes, errors reduction and improved productivity. IT is a major tool that supports the implementation of BPR. IT has a great advantage in automating manual processes to improve their performance and effectiveness. IT is used to make organizations more flexible by adopting the process re-engineer and innovation.

7- *Project Management:* Project Management is considered a CSF that is important to plan and manage BPR to be correctly implemented. Mostly, manufacturing industry companies are needed to effective project management through carrying out BPR in implementation stage particularly. In order to implement BPR successfully, BPR teams shares a clear vision, use various and trained expert team, use re-engineering team well-informed in BPR methods, opening communication channels during the redesign phase and implementation phase about the development of project with stakeholders [24].

8- *Adequate Financial Resources:* BPR implementation requires substantial resources to successfully implement changes and achieve the desired improvements. The capital allocated to carry out re-engineering is a long- term investment because BPR is expensive operation.

9- *Top Management Commitment:* Top Management Commitment is in charge of each activity in the organization and provides vision or strategic direction to achieve the desired results. Top management can make decisions based on the abundant knowledge about BPR implementation. Also, top management encourages employees and helps BPR team by friendly interacting with them. To make a change, employees need the full support of management. Under this factor, top management commitment develops strategic plans to achieve customer satisfaction and improve quality in BPR projects. Top management often plays the role of sponsor in BPR projects. Top management commitment is not resisted when agreeing to implement BPR project because it is considered an infringement.

10- *Collaborative Working Environment:* Collaborative Working Environment is an important factor within organization where staff of different types and grades work together in a friendly manner. This may lead to a reduction in resistance to change to successfully implement BPR.

11- *Organizational Structure:* Organizational Structure is important CSF which should be flexible by establishing organizational team and structure styles, managing and integrating human resources.

2.4 BPR Life Cycle

BPR life cycle consists of four steps where each step is considered different aspects of re-engineering and it's serious to follow them in order [21] [25].

Step 1: Identify processes: The processes that need most attention and prioritize them according to the redesign urgency are identified. Hammer and Champ [25] suggested that a redesign should be made, ignoring the existing processes fully, so as not to impede the creative process. This is one way to do this. Although analyzing the process to reveal what went wrong, can assist you for avoiding making the same mistakes in redesign [16].

Step 2: Analyze As-Is: Many organizations need to plan first, analyze and improve the existing processes. The re-engineering team must understand the current process, before they can redesign it. The main objective of this phase is to identify disconnections (anything that stops the process from achieving desired results, in particular the transfer of information between organizations or persons) and adding value to the processes. This begins with the first creation and documentation of activity and the use of various modeling methods which are available by process models. After that, the amount of time taking for each activity and the cost which each activity requires in terms of resources is calculated through simulation, the processes that need redesign are identified after the completion of all the groundwork [16].

Step 3: Design To-Be: The goal of this phase is to create one or more alternatives to the current situation, which meets the strategic objectives of the organizations. Benchmarking may be also used to obtain ideas for improvement from best practices in peer organizations. To-Be models are developed using the various modeling methods available, taking into account the rules of process design. Then, like As-Is model, we execute simulation to analyze factors such as time and cost involved. Obviously, this activity is an iterative process and is not easy to do quickly. Several To-Be models which are eventually reached are validated. The best possible To-Be scenarios are identified for implementation through performing the differentiations analysis [25] [16].

Step 4: Implement: Organizations are keen to put all their efforts into the final implementation phase to ensure that all aspects of the re-engineering process will be carefully covered during implementation. A successful implementation of BPR can lead to expected improvements in both quality and productivity.

There are some parameters that are used to measure BPR success like reducing process cost, reducing process time, quality output, respond to customer requirements and adapt employees to the new process [16].

3. Data Mining

Data mining is a process of extracting tacit information and knowledge that can be useful and not known in advance by people, and this extraction is from the mass, incomplete, noisy, fuzzy and random data [26]. The main difference between data mining and traditional data analysis (such as querying and reporting and applying online application of analysis) is that data mining aims to extract information and discover knowledge based on the lack of a clear assumption. Application of data mining involves: Data Mining in Agriculture, Surveillance / Mass surveillance, National Security Agency, Quantitative structure-activity relationship, Customer analytics, Police-enforced ANPR in the UK, Stellar wind (code name) and Educational Data Mining [27]. Data Mining has several challenges such as scalability, dimensionality, complex and heterogeneous data, data quality, data ownership and distribution, privacy preservation and streaming data [28]. There are various advantages of data mining are as follows:

- Marketing / Retail: Data mining support marketing companies to build models based on historical data to foretell who will respond to new marketing campaign such as direct mail, online marketing campaign and etc. Through this foretelling, marketers can have suitable approach to sell profitable products to targeted customers with high satisfaction [29].

- Finance / Banking: Data mining gives financial organizations information about loan information and credit reports. By establishing a model from previous data of customer with joint characteristics, the bank and money can assess what are bad loans and level of risk. Additionally, data mining can support banks to discover a fraudulent credit card transaction to assist the credit card's owners and prohibit their losses [30].
- Manufacturing: data mining is applied in operational engineering data in which manufacturers can discover defective equipment and define optimum control standards [31].
- Governments: data mining supports government agencies through dig and analyzes financial transaction records to establish patterns that can uncover money laundering or criminal activity.

Disadvantages of data mining consist of three issues namely, privacy issues, security issues and misuse of information/inaccurate information. Firstly, concerns about personal privacy have increased dramatically recently, especially when the Internet thrives on social networks, e-commerce, forums and blogs. Due to privacy issues, people who fear their personal information are collected that used in an unethical way that can cause them a lot of trouble. Secondly, security is a big problem. Companies have information about their employees and customers, including Social Security number, Christmas, payroll, etc [32] [33]. The major goal of data mining is to predict and extract patterns of full information. Based on the kinds of investigated patterns, tasks in data mining can be categorized into: description, estimation, prediction, classification, clustering, and association [34]. One of the most important components of data mining is association mining.

Association mining is the most important model that has been invented and widely studied by the data mining community.

One of the data mining tasks is association rules mining which are an important category of methods for discovering patterns in data. Association mining has been applied in many fields. The business field is considered one of the best areas in which association mining has been applied where finding purchasing patterns or connects between products is very useful for making decisions and efficient marketing. Examples of applications of association mining such as discovering patterns in biological databases, extraction of knowledge from software engineering metrics, web personalization, text mining, telecommunication networks, market and risk management, inventory control etc. The goal of association rule mining is to extract interesting correlations, frequent patterns and associations or casual structures among sets of items in the transaction databases or other data repositories. Association rule (If-Then rule) is defined "it includes picking out the unknown interdependence of the data and finding out the rules between those items". There are two measures with association rules which quantify the support and confidence of the rule for a given data set [35] [37] [38]..

4. Literature Review and Related Work

Phiphopsuthipaiboon and Bonsoir [25], established a framework for supporting redesign decision making which was used to determine the necessary and unnecessary steps for the service processes in computer center that would be re-engineered through four phases of BPR life cycle. It focused on reducing the cycle time and steps in new process as a success of BPR. Another research in [38] applied the inductive approach and research philosophy of the functional model by analyzing the results for BPR before and after in IBM used as a case to reach the research goal of building a link

between BPR theory and practice. However, it concluded that BPR does not only re-engineer processes but rather basic functions or competencies and must be driven by customer perception to achieve the best results as well as affect the content of the business strategy while the business strategy must support the BPR initiative.

Abubakar [39], sought to find the relationship between BPR and organizational performance by using deductive approach aiming to test the hypothesis and the hypothesis analyzed by using Partial Least Square (PLS) which aimed to explain the causal relationship among the variables and test the hypothesis. The result shows that business process reengineering has a positive effect on organizational performance.

Omidi and Khoshtinat [40], suggested a model that describes the effect of technical factors like (process management, change management) and organizational culture like (involvement, integration, capability) moderating the human factors on the implementation of BPR. The model reached a conclusion that there is needed for employees to recognize the company's proven problems, the need to change, support the implementation of re-engineering and not be afraid of losing their jobs. Time and cost should be allocated for the re-engineering process and a training program for employees on new processes. Managers should encourage employees to participate in the design of new processes and motivate them so as not to resist the process change. The use of IT support is also essential in the implementation of reengineering in order to support decision-making and solve the challenges in the organization. Nzewi, Nzewi, and Moneme [41], examined the effects of critical success factors of BPR on organizational performance where there is a statistical significant to prove a positive relationship among less bureaucratic structure, management commitment and IT infrastructure except change management that has a negative sign. So, employees should adapt to change. Everyone has the right to participate in change and get good training to deal with the new situation without resisting it to improve the performance.

Iqbal, Nadeem, and Zaheer [42], presented a model that studies the relationship between CSFs of BPR and Business Process Efficiency (BPE) that is defined as the levels of performance for business processes by reducing cost, cycle time, delays and duplications and Process Conflict (PC) that is defined as disputes and disagreements about resource delegation and job responsibilities, then examines the impacts of PBE and PC on organizational performance (financial and non-financial performances) [20]. Model is tested using structural equation modeling Analysis of Moment Structures (AMOS). The findings clarify that CSFs has a positive effect on PBE. Thus, PBE will increase the performance. On the other hand, there is no relationship between CSFs and PC, so Process conflict will reduce the performance.

Abdel-Fattah [43] in building her model, as shown in figure (3.4), considered four dimensions which are integrated together for evaluating the advantages of applying BPR: "achieving organization strategy" in which there are many obstacles to implementing an organization's strategy, which are vision, people, management, and resources. Consequently, it should be borne in mind that the problem is not only measuring the achievement of strategic goals, but translating the strategic goals into operational goals, and then measuring them, "stakeholders" is an important dimension of assessing the benefits of implementing a business process reengineering is to meet the needs or expectations of stakeholders, and many organizations and governments face difficulties in meeting stakeholders' requirements.

Various stakeholder classifications are provided by the authors. The stakeholders are identified as shareholders, employees, government organizers, clients, external auditors, or labor unions.

A set of measurements must be developed for each type of stakeholder to determine their satisfaction with business operations. In addition, a pilot test of new operations must be conducted before implementation to measure how these processes can meet stakeholder expectations, "measuring the performance of business processes" is defined as "a process by which an organization monitors important aspects of its programs, systems, and processes" collected data is used to promote organizational decisions over time, providing information about how the organization's current programs work and how their resources could be allocated to improve program efficiency and effectiveness.

New processes (To-Be) should be measured for time, costs, productivity, and quality, and then compared to the processes that have replaced them (As-Is)], given that cost reduction and cycle time are important factors for measuring BPR success, and "organization restructure" The organization's restructuring around new business operations must be checked to ensure that the organization's structure is appropriate for new operations, which means that if changes are made to processes, make sure to make the corresponding changes, if necessary, to the organizational structure. However, there may be a need to test the proposed model by BPR techniques.

Figure 0.1: Proposed Model of Benefits of Applying BPR adopted from [43].

Hussein et al. [44], aimed to use best practices for BPR, also best practices are known as BPR techniques that execute tasks with recurrence nature and many persons. Best practices apply for re-engineering marketing processes to be effective based on Sharp and MCDERMOTT methodology. The impacts of best practices are examined by process time, cost and quality expressed as Key Performance Indicator (KPI) after modeling to-be processes. Several best practices are applied to improve business processes. APQC model is used to identify processes in the organization. Business Process Modelling Notation (BPMN) is availed to dissect and model AS-IS process. SWOT analysis is used to determine strength and weaknesses of the processes.

Awolusi and Onigbinde [45], suggested a model as shown in figure 3.5 that studies the relationship between CSFs of BPR and operational and organizational performances. Thus, examines the impacts of operational performance on organizational performance. By measuring operational performance that indicates to improve quality of products, cost reduction and high flexibility will give a positive effect on the organizational performance which relates to financial and non-financial measures to express the successful implementation of BPR. The effect of change of management system and culture, organizational structure, project planning and management and information technology infrastructure on the success of BPR (improving business performance) of all Nigerian oil and gas companies has been confirmed empirically excluding management support and competence.

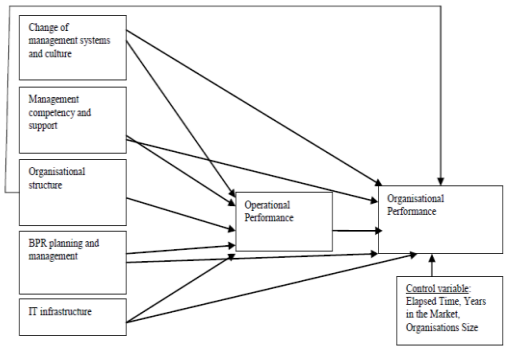

Figure 0.2: Proposed Model for Effects of BPR on Performance adopted from [45].

Sungau, Ndunguru, and Kimeme [46], presented a model as shown in figure 3.6 that examines the effect of BPR activities (business processes renovation, automation and networking) on delivering speed. Business process renovation is the redesign of business processes to improve business processes. The renovation process includes streamlining of major business processes, succession or continuity of work activities and sometimes a combination of other business processes. Business process automation is the automation of business processes to improve process efficiency using information and communication technology.

Information technology plays a key role in BPR as it provides process automation. It allows businesses to be run in different locations, allows for faster delivery to customers, and support for fast service and paperless transactions. Business process networking is to link activities / clients inside / outside the department / organization to improve coordination using information technology. Delivering speed is an element in time. Speed is a competitive dimension which supports one to make the desired product or provide service very quickly. Organizational performance is enhanced when the time it takes for a customer to receive a product / service since the order was reduced.

Organizational service could be judged as good or bad depending on the time spent consuming the service in the organization by customers. In this matter, organizations must ensure that their business operations are efficient enough to provide services that delight their clients. The study found that BPR improves the speed of service delivery in organizations. The results are consistent with the idea that BPR improves speed delivery in service organizations as determined in the focused literature review. Consequently, it has been found that BPR is an important technology adopted by service organizations to enhance business processes in order to improve delivery speed, which in turn decreases the time spent on customer service.

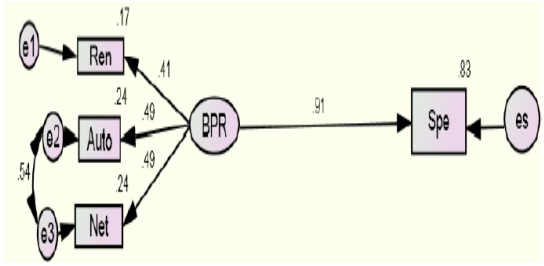

Figure 0.3: Relationship between BPR and Delivering Speed adopted from [46].

Amrita and Sheriff [47], gave insight to understand BPR effort empirically in manufacturing industries that are categorized into Small Scale Industries (SSI), Medium Scale Industries (MSI), Large Scale Industries (LSI), Very Large Scale Industries (VLSI), and Multi National Companies (MNC's). it concluded that the institutions of large or medium size and others that have a global presence prefer radical change because they seek to gain a competitive advantage in the world unlike institutions with a small size.

5. Highlighting the Research Future Research Directions

According to the presented previous research, many issues have been highlighted for future research, a brief discussion about these directions are as follows:

1- the scope to link CSFs and performance of business processes (intended success of BPR) by process time, cycle time, quality and cost before and after reengineering processes for competitive advantage
2- evaluating the effects of CSFs on "As-Is" model as (primary measures) to determine where the breakdowns occur in BPR implementation, clarifies why such breakdowns happen and evaluating the effects of CSFs on "To-Be" model as (secondary measures).
3- One of the shortcomings of the existing researches is to identify variations in the performance of business processes that is important to success BPR. The following table 1 was built to illustrate a comparison of the previous examples between BPR models and the proposed model.
4- The impact of human and organization factors, including organizational resistance to change on BPR. Human factors involved user competence in adoption of an IT project, the respondent's cautiousness before adopting any new initiative, the respondent's cautiousness before adopting any new IT project, possible staff layoffs/reduction as a result of an IT project, the respondent's input becoming no longer needed with a new IT project, and the old business process being considered satisfactory. Organization factors involved redefining organizational mission prior to BPR, intention to serve clients better, users' awareness of plans to reengineer processes, full collection of user requirements prior the new project, involvement of the users during the BPR development, training the users, provision of adequate management support for the project, and high implementation speed.

2- Possible causes of BPR failures which included technical incompetence of the implementers, underestimation of the challenge at hand, failure to define organizational objectives, poor communication between the implementers and the management, thus inability to inform the management of arising challenges, project management failure to respond to delays adequately, organizational resistance to change, lack of organizational ownership of the project, significant cost overruns, significant time schedule overruns, project management failure to create awareness of the project, poor users' requirements collection and analysis, failure to train the users, and project failure to meet organizational goals.
3- The level of completion of BPR projects in selected organizations in Uganda which was 30.4% of BPR projects in Uganda delivered the intended usable systems.
4 Emotional response of users towards using and implementing BPR that was 48% of the respondents had accepted the projects, 33% were testing and may probably accept it, 12% were indifferent or not sure of whether they like or dislike the system while only 7% were still angry. To achieve this goal, researchers used the following methods: cluster sampling technique to identify organizations; pre-coded questionnaires and self-surveying to collect data from respondents (quantitative); sampling technique aimed at selecting respondents within organizations; note for data collection; descriptive analysis of data collected using SPSS statistical packages 17.0, EViews 3.0 and Microsoft Excel 2007; analysis of secondary data on current (qualitative) BPR models and practices.

According to the current conditions, all organizations need a basic and scientific model in order to help them achieve the desired results for a competitive advantage. As numerous studies popped up proposing models to find out the relationship between CSFs of BPR and the operational performance/ the organizational performance, various others suggest methodologies and models to redesign business processes, each methodology had different phases and there was no assessment of the success of BPR.

However, the scope to integrate CSFs and performance of business processes as a measure of BPR success during success factors are an essential step in the process redesign stages, they must be studied to avoid the failure of BPR. So, the main question that may be asked now: How can we integrate CSFs and the performance of business processes during reengineering processes? And what will be the results of its implementation?

On the other hand, most studies agreed on the reengineering processes for a competitive advantage slightly disregarded by most of the researchers. Because critical study tools, as they were mostly the questionnaire, and sometimes they were based on personal interviews and the analysis of the questionnaire through using regression analysis and exploratory factor analysis to understand the causal relationship, with the exception of few of them mentioned above where data mining techniques were used.

Table 1: Comparison of BPR Models.

Reference	Items			
	1-Integrating CSFs and Performance of Business Process.	2-Measuring Performance of Business Process before Reengineering	3-Measuring Performance of Business Process after Reengineering.	4- Using Data Mining Techniques
Phiphopsuthipaiboon and Boonsir [25]	×	×	×	×
Sorunke and Nasir [48]	×	×	×	×
Amrita and Sheriff [47]	×	×	×	×
Abubakar [39]	×	×	×	×
Omidi and Khoshtinat [40]	×	×	×	×
Nzewi, Nzewi, and Moneme [41]	×	×	×	×
Iqbal, Nadeem, and Zaheer [42]	×	×	×	×
Abdel-Fattah [43]	×			×
Awolusi and Onigbinde [45]	×	×	×	×
Hussein et al. [44]	×	×	×	×
Cunha and Agard [38]	×	×	×	
Ayzatullova, Lyadova, and Shalyaeva [49]	×	×	×	

6. Conclusion

This paper presents a discussion of the previous research in the business process reengineering. The research determines the breakdowns that are highlighted in different previous BPR models, why they happen and how they can be prevented. The research has attempted to discuss the proposed models for BPR in many industries which highlighted that it lacks some development and updating. According to the presented discussion, this research paves the way for the opportunity of embedding data mining techniques to raise the performance of business processes in order to enhance processes and support successful implementation of BPR. According to the presented discussion, there are seven identified factors impacting on BPR success (as expressed by measuring performance of business processes) by using data mining techniques includes organizational structure, use of information technology, adequate financial resources, egalitarian culture and leadership, change management, customer focus and top management commitment.

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