

Business Process Improvement Methodologies: An Overview

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Abstract — Due to the massive evolution induced by information and communication technology in all aspects of life, organizations are experiencing rapid changes in all technical, organization, and operational aspects. Organizations need to improve their business processes to achieve customer demands and satisfaction and maintain a competitive position in the market. A diversity of methodologies is available for process improvement. Some of these methodologies gained success and others face some difficulties in recent years but there still seems that there is a room for more improvement methodologies, because a lot of BPI efforts still fail. The large number of these methodologies can make any organization confuse when choosing the appropriate methodology because all the methodologies share many common features and are differed in their effectiveness. The situation is difficult due to the fact that business processes are different in different organizations, and methodologies should be designed based on processes need of each industry. This paper presents a sound literature review involving an overview of the common and important available business process improvement methodologies comprising their phases and their weaknesses and strengths through a clear comparison. The outcome of this paper is to increase the awareness and perceptions of organizations, and help them to take the right decision in selecting the right methodology based on their technical, operational, administrative and organizational aspects.

Keywords - business process improvement; business process methodology

1. INTRODUCTION

As a result of the massive development induced by information and communication technology in all life aspects, organizations are subject to fast changes in all aspects such as technical, organization, and operational aspects. These changes need systems, regulations, and procedures to increase the efficiency and performance of the business processes in order to ensure goals achievement, and thus ensure organization competitive position in the market. Business process improvement (BPI) is an approach to improve business process in a way that makes enhanced product and service available to the consumer. BPI is a wide term that involves many aspects from continuous improvement (CI) to the revolutionary re-engineering of the business, which is known as business process re-engineering (BPR). [21]. Business process improvement makes an incremental improvement in business process [27], through several methodologies, techniques, and tools [16] that were developed to increase the ability of businesses to improve their processes [2].

Many BPI methodologies have been proposed for business process improvement differed in their effectiveness. The situation is difficult due to the fact that business processes are different in different organizations, and methodologies should be designed based on processes need of each industry. The importance of relativity of subsidiary processes and its core process could be at variation accordance with the firm because of the disparity in specialization, targets, vision and mission [12]. However, none of the methodologies in process improvement satisfactorily assist the practitioner during all phases of improvements events [2].

This paper aims to explore the common methodologies phases and investigate their weaknesses and strengths to increase the awareness and perceptions of organizations when selecting the right methodology. The paper is organized as follows. Section 2 presents the methodology of this research. Section 3 reviews the literature describing several common methodologies and the related work in the same area. The analysis and results are in section 4, while conclusions are in section 5.

2. METHODOLOGY

The procedure of this paper is based on reviewing the literature carefully to achieve the following steps:

- Explaining the common methodologies for improving business process

- Demonstrating the phases of each methodology
- Investigating the possibility of merging more than one methodology
- weaknesses
- Exploring the related work

This procedure gives a clear vision on the common business process methodologies, which makes it easier for any party to review them and select the appropriate methodology according to its situation.

3. LITERATURE REVIEW

The methodology is a documented set of procedures, guidelines, and tools aimed to create better processes [17]. Methodologies are developed to make sure that the change does not bring the organization in danger of continuing their operations. Several methodologies have been more or less successful in recent years but there still seems to be room for improving methodologies, because a lot of BPI efforts still fail [11]. The large number of these methodologies can make any organization confuse when choosing the appropriate methodology because all the methodologies share many common features [8]. Some of the common important methodologies are shown in the following sections.

A. Model-Based Integrated Process Improvement Methodology (MIPI) (Generic Model)

Adesola and Baines (2005) developed a model-based integrated process improvement (MIPI) methodology to enhance the business process improvement implementation in organizations. They stated that their methodology can be used for process improvement and reengineering. MIPI methodology is a generic model of BPI includes seven phase: 1) business needs understanding, 2) process understanding, 3) process modeling and analyzing, 4) process redesigning, 5) new process implementation, 6) new process and methodology assessment, and 7) new process reviewing. This methodology describes what to do and how to make it happen. The methodology structure includes a hierarchical structure comprising: aim, actions, people involved, outcome/exit, checklists, hints and tips, and relevant tolls, and techniques [18]. This methodology helps organizations to select correctly the problem which is the main barrier for achieving company vision and mission, also aligns with their business needs [23].

B. Super Methodology

Lee and Chuah et al (2001) stated that business process improvement (BPI) comprises continuous process improvement (CPI), business process reengineering (BPR), and benchmarking (BPB). They indicated that these approaches may not be useful for all organizations and combining two or three may be more useable based on the process and environment of organization. Thus, they proposed the methodology super based on combination of the approaches mentioned above, and they stated that this methodology can make significant improvements for small to medium sized companies. This methodology can be used to handle the organization improvement problems, where it serves as a road map to shift a process from its current state to a better performance. The methodology includes five phases: 1) process selection, 2) process understand, 3) continue the process of measurement, 4) process improvement executing, and 5) Improved process reviewing.

C. Benchmarking Methodology

The benchmarking is a continuously comparing of organization strategy, products, processes with successful organizations and then adapt their practices and ideas [8]. This will reduce costs and cycle time and finally promote the competitive position in the marketplace [1]. The method had developed in Japan in the early 1950s based on the American Dr. Deming's advice who taught the Japanese the quality control. The Japanese success in implementing this method led to its prevalence in USA during 1980s when many companies such as Xerox, Ford and Motorola adapted benchmarking in USA. Benchmarking can be performed within organization (internal benchmarking), or with other organizations (external benchmarking). This methodology includes five phases: 1) planning, 2) analysis, 3) integration, 4) actions, and 5)

maturity[8]. Benchmarking becomes a common adopted procedure and is used to gain competitive advantage. It can save cost in performing operations and supports the budgeting, strategic planning, and capital planning of organizations[10].

D. PDCA Methodology

In a given process, the difference between the actual result and a certain target is corrected if the variance is significant. The continuous improvement follows this usual process of control is represented by the PDCA[22]. Plan-Do-Check-Act (PDCA) is a continuous improvement cycle developed by Walter Shewhart at Western Electric and popularized by Dr. W. Edwards Deming. It consists of four phases; 1) Plan, 2) Do, 3) Check and 4) Act. These phases combine accurate planning with small portions doing, and measure the most effective method by using feedback [18]. The PDCA cycle is an essential notion of continuous improvement processes established in the culture of organizations. It is easy to understand and should be used by a large number of people in the company. PDCA cycle is used widely in the quality policies development and deployment[22].

E. Six-Sigma Methodology

This methodology is a business strategy that aims to determine and remove errors, defects, failure causes in business processes through concentrating on outputs, which are imperative to customers. It is also a quality measure that seeks to eliminate defects using the statistical methods application [3]. It is a rigorous methodology introduced by senior engineering Motorola Bill Smith in 1986. Currently, Six Sigma Model -DMAIC phases are: 1) Define, 2) Measure, 3) Analyze, 4) Improve and 5) Control. Six-sigma constructs an approach to measure and analyze operational processes to define the modality and cause of defects occurrence, and then seeks to improve those root causes. Six-Sigma is still one of the successful quality improvement methods especially in financial and healthcare services[5].

Six-Sigma often combine with Lean Manufacturing to produce a methodology called Lean Six Sigma [30]. Lean manufacturing focuses on flow of process and waste while Six Sigma focuses on design and variation [20]. [7] stated that combining the approaches helps to enhance savings since Lean Six Sigma is able to be used in all sectors. Lean can decrease waste and enhance the efficiency of process, whereas variation can be reduced and performance improved by using Six Sigma. Using Lean and Six Sigma in a consistent way can double saving.

F. Lean Thinking

Lean Thinking had originated in the Toyota Company, and has been developed with time. Lean is regarded as an evolutionary substitution to the conventional mass production methods and batching basis for high efficiency and quality, in addition to speed and cost. This methodology seeks to reduce waste to enhance business performance by improving workflow. It considered all activities that do not produce value are a waste and should be removed, thus, the core of Lean is the elimination of non-added value or waste, variability and inflexibility. Lean is regarded as a substitution to the conventional way of mass production and batching principles for high efficacy, quality, speed and cost. The five phases of Lean are: 1) Sort, 2) Straighten, 3) Scrub, 4) Systematize, and 5) Sustain [20][25]. Lean ensures that all activities are performed without interruption, which increases their performance effectively. Currently, Lean becomes one of the significant improvement methods that expanded to manufacturing and service industries[5].

G. Kaizen Methodology

Kaizen implemented first in Japanese industries during the country's recovery after the Second World War. It focuses on performing small improvements in large numbers with involvement of all employee on a continuous basis, which leads to improve the relationship between managers and employee [24]. Kaizen is a Japanese term that means continuous improvement [20]. It is a philosophy of gradual, incremental and continuous improvement and generating more value and less waste. It asserts on process improvement and process control. Kaizen used the same PDCA Cycle; Plan, Do, Check,

and Act[25]. Recently, Kaizen is known as the best methodology for improving performance within companies due to minimal costs of implementation [24].

H. Total Quality Management (TQM)

TQM is a system of practices, tools and training methods for managing organizations to increase customer satisfaction in a quickly changing environment[4]. [6] described TQM as a collaborate culture attributed by enhanced customer satisfaction by continuous improvements in active participation of employees. Thus TQM supports and encourages improvement ownership, team working and obligation based on the basis of continuous improvement of customer and process orientation. TQM is way of working that focuses on quality, long term success through customer satisfaction. It focuses on customer, process and defect reduction [20]. This methodology contains the following phases: 1) process selection, 2) preparation for improvement, 3) process analysis and redesign, 4) implementation and improvement. Generally, TQM improves its success in terms of financial results, operating performance, quality, and customer dimensions[5].

Radnor (2008) reviewed the literature to identify the possibility of applying the business process methodologies in public sector. The literature indicates that Lean, Six Sigma and BPR together with Kaizen, TQM and Systems Thinking are applied in public sector. [20] also reviewed the literature to identify shortcomings of applying business process improvement methodologies within a public and to determine which business process improvement approaches are suitable in a given environment. The researcher discussed Lean, Six Sigma, BPR and TQM but he focused on Lean and Six Sigma and their integration. [15] reviewed and compared the methodologies six-sigma, lean thinking, theory of constraints, and customer-inspired quality to help healthcare organizations to take the right decision in selecting the proper methodology.

4. ANALYSIS AND RESULTS

Understanding the actual situation and defining the process weak points is the significant thing before achieving the improvement of the process, and it is substantial to gain a detailed and precise picture of how it is actually working, involving the strengths and weaknesses of the process [9]. [14] investigated many business process reengineering methodologies to define their effectiveness and whether they are sufficient enough in their structuring. He concluded that it seems to be that no one of the methodologies addressed all the BPR problems yet. Thus, it seems to be better to merge the strengths of every methodology together based on other methodologies experiences of the methodologies [14]. [17] stated that there are many evidences that indicate that no of these approaches (BPI, BPR) are guarantee of success [21]. [2] stated that no one of the above approaches sufficiently support the practitioner in all improvement stages of business process (BPI) activity.

Therefore, many researchers suggested that the integration of more than one methodology can achieve the success in the improvement of business processes. [5] suggest that Lean and Six Sigma can be integrated together in order to complement implementations. [7] supports the use of Lean Six Sigma in order to achieve positive financial impacts. [4] suggested using TQM, Six Sigma and Lean together as a combination to process improvement. They suggest that a combined approach allows the issues or criticisms of each to be addressed. [13] presented the methodology super based on combining BPI, CPI, BPR, and benchmarking because the stated that one methodology may not be suitable for organizations. Comparison between several methodologies based on their phases, and on their focuses, weaknesses and strengths are shown in table 1 and table 2 respectively [21] [20] [14] [26] [13].

TABLE 1: Various Methodologies Phases[21] [20] [14] [26] [13]

<i>METHODOLOGIES</i>	Super Methodology	Model-Based and Integrated Process Improvement (MIPI) (generic model of PBI)	Lean	Total Quality Management TQM	Six Sigma DMAIC	Benchmarking	PDCA Methodology
<i>PHASES</i>	Process Selection	Business Need Understanding	Specify value	Process Selection	Define Process	Plan	Plan
	Process Understanding	Process Understanding	Identify the value stream	Preparation for Improvement	Measure Process	Collect	Do
	Process Measuring	Process Modeling and Analyzing	Flow	Process Analysis and Redesign	Analyze Process	Analyze	Check
	Improved Process Executing	Process Redesign	pull	Implementation and Improvement	Improve	Adapt	Act
	Improved Process Reviewing	New Process Implementation	Perfection		Control		
		Assess New Process and Methodology					
		Review New Process					

TABLE 2: Methodologies Weaknesses and Strengths [21] [20] [14] [26] [13]

<i>Methodology</i>	Super Methodology	Generic Model of PBI	Lean	TQM	Six Sigma DMAIC	Benchmarking	PDCA
<i>Focus</i>	1. Organization process 2. Performance	Process	1. Process 2. Customer 3. Defect reduction 4. Waste Reduction 5. Flow focused	1. Process 2. Customer 3. Defect reduction	1. Quality improvement 2. Error reduction 3. Statistical process control 4. Customer	1. whole process or part of a process 2. Customer 3. Defect and waste reduction	Main and important processes
<i>Strength</i>	1. Continuous improvement 2. Improves the operation efficiency	1. Use for improvement process and engineering process 2. Practical and procedural methodology 3. Well-defined structured steps	1. High potential cash savings 2. Moderate potential for soft savings 3. Improvement in service delivery	1. Improve service delivery 2. Moderate potential cash savings 3. High potential for soft savings	1. Improve service delivery 2. Moderate potential cash savings 3. High potential for soft savings	1. Accelerated rate of change 2. A better understanding of competitors and industry dynamics 3. Exchange of ideas and views 4. Provision of shared management Information 5. Establishing best practice 6. Better understanding of processes 7. Accelerating	1. Team working 2. Continuous improvement Processes 3. Simple to understand

						organizational learning	
<i>Weakness</i>	Suitable for small and medium sized companies	1. Need more validity and generalization. 2. need to embed process users' skills into the methodology	1. Long time from initiation to results 2. External support require	1. lack of structured approach to improve the process 2. No prescriptive methodology for implementation 3. difficulties in measuring TQM outcomes	1. Processes improved independently 2. System interaction not considered 3. Long time from initiation to results 4. External support required	1. Requiring considerable effort and investment. 2. Adapt and adopt of another organization process	1. Ignorance of the 'people' element 2. Confusion in acronym 3. It assumes that everything starts with planning where it is not correct sometimes

5. CONCLUSIONS

The relative importance of main process and its sub-processes may be at variance according to the company because of differences in strategic factors such as mission, vision and strategic targets [9]. No process improvement methodology until now can support adequately all requirements through all phases in the BPI activity [2]. Different methodologies are available for process improvement, and each one has its strengths and weaknesses. The large number of these methodologies can make any organization confuse when choosing the appropriate methodology because all the methodologies share many common features. One methodology is not necessarily suitable for use by all projects because any company has its implementation criteria and can measure each methodology's capability in satisfying these criteria. The selection of the right methodology should depend on various technical, organizational, project and team considerations. This may include combining more than one methodology [17][8]. Understanding and improvement of organization processes form the core of the organization's continuity and success. There is no completely failing methodology or perfect one, but each one has strengths and weaknesses. Generally, there is no common methodology for all organizations. Any organization must examine all its organizational, technical and operational aspects in order to choose the appropriate methodology. The selected methodology may need to be modified or merged with other methodology in order to achieve the objectives of organizations. Understanding and improvement of organization processes form the core of the organization's continuity and success [7][11]. This paper provides a clear vision on the available common methodologies; their phases, their focuses, and their pros and cons, which helps organizations to make the right decision in choosing the appropriate methodology. Also, the paper shows that these methodologies are not an imposed reality that cannot be changed due to the lack of a general

methodology. Moreover, it is possible to develop new methodologies through the modification of any methodology or through the integration of several methodologies to ensure the development of the business process of any organization.

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