BPR: Evaluation of Existing Methodologies and Limitations

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***Abstract*— Many of known organizations had their business processes changed and reengineered in order to achieve their objectives, meet their customer's expectations and attain competitive advantage. Thus, they were willing to adopt the concept of BPR at any cost no matter if they really need a radical change in their process. Unfortunately, it has been estimated that more than 70 % of BPR implementations have failed to achieve the expected result. Due to this risk, enterprises become more cautious to implement BPR projects in large scale. This paper discusses and the design of recent BPR methodologies identified in the literature, aiming to underline their limitations. It also presents the success and failure factors that affect BPR projects.**

Keywords*— *Business Process Reengineering (BPR), BPR evaluation & limitations, success and failure factors, Concept-Centric approach.

I. INTRODUCTION

Organizations have to consistently improve their business process to keep up with this elevation and stay in the game; improving process in sense of looking for better, cheaper and faster ways of doing things. Business Process Reengineering (BPR) concept has been introduced in 1990 by Michael Hammer, pointing that the main challenge for management is to adjust or remove process that will not add value to the organization instead of using information technology to automate existing processes. Process reengineering has been identified by Hammer and Champy (1993) as the essential reconsidering and reevaluation for current processes and organization situation and then redesign the business process radically, in order to obtain overall enhancements in organization performance, quality and benefits. They also defined the process as the controlled steps and activities needed to generate particular output for particular client [1].

They estimated about 70% of organizations did not attain the results they looked for and hence, they failed in implementation BPR projects. BPR has been frequently mentioned as one of the top management's issues in annual publications and questioners, and this indicates either top management's failure in implementing the BPR or results was under their expectations (Alter, 1994). [2]

In our literature review we focus on evaluation recent BPR implementation methodologies and present their limitations. Then, analyze each of these researches and elaborates more about the frameworks. Afterwards, and based on the analysis of these methodologies, outline the success and failure factors. Lastly, -as a future work- suggest a framework that can ensure successful implementation of the BPR.

II. LITERATURE REVIEW

Since it was introduced in 1990, BPR subject was -and still- attracting researchers around the world either to design a methodology that can be applied among most of the organizations, or to compare existing methodologies and select the best one that can fit particular organization goals and objectives.

Joshua Liem (2005) -for instance- applied NIMSAD framework to compare three different methodologies that was introduced in the nineties, then he combined all strength points of all methodologies in one new framework called (The true road to successful BPR) .

Chen Lei & Liu Bin (2007) came up with new framework called dynamic BPR instead of the consumed statics BPR concept.

On the other hand, some researches elected to measure the estimated success percentage before implementing the new BPR such as L. Maruster and Nick Beest (2009) they proposed a methodology that relays on process mining and emulation that allow organizations to predict the redesigned process performance before implementing it.

Others did evaluate the BPR failure factors and came up with new framework such as Eftekhari and Akhavan (2013) they developed an inclusive methodology that utilize Information Technology tools and maintain failure analysis along the implementation. It also supports Clean-slate and Dirty-slate approaches.

III. METHODOLOGIES OVERVIEW & ANALYSIS

A. Methodologies overview:

Joshua Liem (2005) applied the NIMSAD framework to evaluate BPR methodologies. However, only methodologies that conform to the "radical change" criteria will be considered; hence any incremental change will be excluded [3].

NIMSAD (Normative Information Model-based Systems Analysis and Design) is a methodology to evaluate methodologies related to systems development [10].

The study covered three BPR methodologies published in the following papers:

1. "Successful reengineering", (Petrozzo & Stepper) 1994.
2. "Redesigning business processes with IT", (Davenport & Short) 1999.

3. "A visible solution: successfully performing BPR", (Michael Covert) 1997.

Joshua outlined in his study the main steps for each methodology and their strengths and weaknesses. He came up with new methodologies called "The true road to successful BPR" and it combines all the strengths of the evaluated methodologies assuming that the problem solver will be sure that he will not miss any important step. However not all steps in this methodology are required in BPR implementation, also not all steps are applicable for all situation and aspects [3]. (Table 1) shows methodology steps.

Step 1:	Preparing for BPR
Step 2:	Evaluating current situation
Step 3:	Mapping the current situation
Step 4:	Mapping the desired situation
Step 5:	Define the problems
Step 6:	Establishing solutions for the problems
Step 7:	Performing physical design
Step 8:	Implementing the design solution
Step 9:	Evaluating

Table 1. Joshua Liem's methodology "The true road to successful BPR"

Another study presented by Chen Lei & Liu Bin (2007) they adopt the concept of dynamic BPR methodologies rather than the traditional static implementation. Static BPR doesn't have the ability to adjust any process at any level of the execution based on the demand and the objective, in addition to the fact that it doesn't feedback the result to other process – (table 2) outlines the main steps in the dynamic BPR-. Therefore, they have introduced an adaptive workflow model which maintains flexible and dynamic BPR implementation with enabling the possibility of changing the process at any stage in order to adapt any unexpected change and also feedback the result to other process [4]. (Table 2.) Outlines the basic dynamic BPR.

Dynamic BPR	Step 1: Process analysis Step 2: Modeling Step 3: Model emulation Step 4: Evaluation optimization If satisfies → Step 5: Workflow model Step 6: Model verifying Step 7: Process execution Step 8: Process monitoring and adaptive adjustment If changes required → Step 9: Dynamic adjustment Step 10: Dynamic optimization Step 11: Model evaluation Step 12: Adjust model All mentioned dynamic steps happen in cooperation with project management processes: • Project layout and project definition • Project execution and monitoring • Project adjustment

Table 2. Dynamic BPR

L. Maruster and Nick Beest proposed (2009) a methodology that relays on process mining and simulation. It allows organizations to predict the redesigned process performance before implementing it using the simulation. The methodology follows a bottom-up (which means BPR is based on process data) approach.

Their methodology begins with determining performance issues of the process (redesign base). The chosen process is mined and simulated to represent the 'As-Is' process model, then the redesigned process should be ready and simulated to represent the 'To-Be' process model. Lastly, the performance criteria of the 'As-Is' and the 'To-Be' business process models are compared to find out whether the redesign efforts does improve the performance.

They tested the methodology on three unique case studies (Gas company, government institute and web based DSS). In the 'To-Be' process model they focused on replacing manusteal activities with automatic activities. The result of the comparison showed an efficient performance gain in the first two cases but for the DSS the gain evaluation was beyond their scoop [8]. (Table 3.) highlights the steps of the methodology.

Step 1:	Identify relevant performance criteria of a process
Step 2:	Mine current process
Step 3:	Emulate current and planned models
Step 4:	Compare both simulations
Step 5:	Identify the predicted performance gains

Table 3. Marsuster and Besst methodology "process mining and simulation-based"

Eftekhari and Akhavan developed (2013) a comprehensive IT tools based methodology (CITM) that support two BPR known methods:

1. Clean-slate approach
2. Dirty slate approach (current processes analysis)

They considered IT's role in BPR as an enabler, as a supportive, and as facilitator. Thus, in every stage of the CITM, IT tools and applications should be proposed and utilized. Furthermore, critical failure factors of implementing BPR was identified (by studying literature and conducting a survey filled by experts in this field) to be considered/tested (failure analysis) in every stage of the methodology in order to decrease the risk of BPR project.

They validated the CITM by interviewing 50 BPR experts then improving the methodology with the received feedback. Also, they tested it in an IT firm [9]. CITM steps can be seen in (table 4.).

Step 1:	Assessing the organization (performance, IT structure and vision)
Step 2:	Implementation: using clean-slate approach
	a. Determine key processes, IT tools and project team.
	b. Executing the change plans (Reengineering, testing and initiating new process)
Step 2:	OR: Implementation: using dirty-slate approach
	a. Analyzing current process (determine IT tools and project team)
	b. Amending and reengineering the processes (testing and initiating modified process)
Step 3:	Post implementation Support (measuring improvement, competitor gap analysis, customer satisfaction).

Table4. Eftekhari & Akhavan methodology "CITM"

B. Success and failure factors

In order to evaluate mentioned methodologies, success and failure factors of BPR implementation must be identified. On the reviewed literature, researchers agreed on the common five dimensions; change management, project management, management's support & leadership, organization structure and IT aspects. These dimensions (and their related factors) are adequate with the private and public sector.

Al-Meshari and Zairi classified the factors that could affect BPR implementation into following dimensions [2]:

1. Change management.
2. Management support.
3. Organizational structure.
4. Project management.
5. IT infrastructure.

Eftekhari and Akhavan identify the most significant BPR's failure factors to be considered in each step of their methodology. Hence, reduce the high probability of failure in such projects.

Although they quite agree with Al-Meshari and Zairi classifications and factors, they did highlight few more points. In Management competency and support dimension they included; Lack of strategic insight. In Project planning & management they argued that an organization might apply improper strategies and methodologies with their situation. Also, difficulties in validating the effects of redesigned process before implementation (due to lack of proper assessment tools). They divided the organizational issues into structural and cultural. One of the organizational structure issues are high hierarchical levels. While, cultural issues include:

- Insufficient authority given to BPR team
- Lack of innovation in the redesigned process[9]

On the other hand, Marlen C. Jurisch, Christian Ikas, Wolfgang Palka, Petra Wolf and Helmut Krcmar they discovered that majority of available BPR literatures focus on BPR implementations on private sectors more than public sectors and this is due to the restrictions exist in public sectors such as rules, policies, political & legal conditions and financial issues; compared to semi-total freedom in the private sectors [5][6][7]. Therefore, they decided to study the success and failure factors in BPR implementations. They have identified similar dimensions. When they analyzed these dimensions independently, they observed that the success factors are significantly similar in private and public sectors, although it is certainly difficult to apply methodologies designed for private sectors on public sector as the properties affecting the restructuring process in both environments are significantly vary; resulting in a lower success rate in public sector [5]. They also identify private and public sectors' dissimilarities in terms of their: Functions & Intention, Processes, Organizational Structure, Economic Feasibility, Political Feasibility and Expectations from BPR. Finally, they came up with five suggestions for successful BPR implementation in public organizations:

1. Public sectors are less likely to lunch BPR projects.
2. Benefits and goals for BPR implantations are very in public and private sectors.
3. In public sectors, it is highly recommended to implement BPR projects starting from top managements, in order to ensure the financial and political support.
4. The engagement of minimal stakeholders in BPR projects will facilitate the implementation and increase success percentage in public organizations.
5. Ensure well communication channels to transfer the knowledge among all employee levels would lead to successful BPR implementation in public organizations.

C. Analysis

We have used the Concept-Centric matrix approach [11] to evaluate BPR methodologies in terms of the five dimensions of success & failure factors: change management, project management, management's support & leadership, organization structure, IT aspects.

Joshua Liem's methodology "The true road to successful BPR" mainly focuses on identifying current and desired situation, maintaining project plan and evaluating the results to make corrections. Chen Lei & Liu Bin methodology "Dynamic BPR" also emphasizes on the project management part of the BPR in addition to the process workflow. On the other hand, Marsuster and Besst methodology "process mining and simulation-based" underlines the performance measures and criteria that will help in predicting performance gains. However, this methodology addresses less structured processes (e.g. legacy systems). Last but not least, Eftekhari & Akhavan methodology "CITM" covers all the five dimensions as it focus on overcome BPR failure factors. (Table 5.) shows the Concept-Centric matrix for these methodologies and dimensions.

Methodology / *Dimensions*	(Joshua Liem) The true road to successful BPR	(Chen Lei & Liu Bin) Dynamic BPR	(Marsuster and Besst) process mining and simulation-based	(Eftekhari & Akhavan) CITM
Change Management	-	-	-	✓
Project Management	✓	✓	✓	✓
Management's Support & Leadership	-	-	-	✓
Organization Structure	-	✓	-	✓
IT Aspects	✓	✓	✓	✓
Limitations	Ignores organization structure and human aspect	Ignores human aspect	Ignores human aspect	No criteria on which approach to select

Table 5. Concept-Centric matrix to analyze BPR success and failure factors

IV. CONCLUSIONS:

There is no perfect methodology that can be applied to all situation or organization. Although we do believe that having all success factors incorporated in a methodology steps will boost the prospect of BPR project success. Methodologies often concerned about project plan and processes. However, Organizations should prepare a comprehensive plan that include intensive change management efforts especially when radical change being embraced as BPR will not affect the business process only but one of the most important resources which is people. Therefore, more efforts must be placed into preparing employees and the organization for the change.

V. FUTURE WORK:

A combination between SDLC (System Development Life Cycle) and Agile methodologies can enhance the BPR implementation. As most of BPR projects lack to project management and the sense of dynamicity during the implementations, SDLC will take care of the project management part while Agile methodology will ensure smooth and dynamic BPR implementation, as the core values of Agile methodology are: communication, simplicity, feedback and courage.

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