

Midocean University

College of Management

Department of Management

**The Impact of Business Process Management on the Improvement of Performance Factors in
Saudi Arabia**

أثر إدارة إجراءات الأعمال على تحسين عوامل الأداء في المملكة العربية السعودية

Prepared by:

Jafar Ahmed. Alrashid and Reham Ali Alzawad

Supervised by:

Walid Soliman

Year:2024

Table of Content:

Abstract.....	5
:مختصر.....	5
Chapter One.....	6
Introduction:	7
Study Problem:	8
The Importance of the Research:	8
Research Objectives:.....	9
Research Hypothesis:.....	10
Study Questions	10
Theoretical Model.....	10
Chapter 2.....	12
Literature Review:	13
Chapter 3.....	16
Research Methodology	17
Research Tools and Data Collection	17
Study Population	17
Sample Characteristics.....	18
Data Collection:.....	18
Data Analysis Method:	19
Research Scope:	19

Chapter 4.....	20
Research Findings	21
Survey data and analysis.....	21
Interviews with key stakeholders Analysis	23
1. A Saudi IT and Telecom listed company. It is an ICT solutions service provider.	23
2. A family-owned closed shared company with business spanning several services and products.....	24
3. A family-owned IT solutions provider	25
4. A governmental entity responsible for the PMO strategy and execution of vision-2030.....	25
Case Studies Analysis.....	26
1. A Saudi IT and Telecom listed company. It is an ICT solutions service provider.	26
2. A family-owned closed shared company with business spanning several services and products.....	28
3. A family-owned IT solutions provider	29
4. A governmental entity responsible for the PMO strategy and execution of vision-2030.....	31
Conclusion:.....	31
Recommendations:.....	31
References:	32
Appendices	34

List of Tables and Charts:

Tables:

Table 1: The survey's collected responses and summary of the feedback	20
---	----

Figures:

Figure 1	14
Figure 2	22
Figure 3	23
Figure 4	23
Figure 5	27
Figure 6	28
Figure 7	30

Abstract:

This study aims to investigate the impact of business process management (BPM) on various performance improvement factors within organizations. BPM has gained significant attention in recent years as a strategic approach to streamline and optimize business processes to achieve better performance outcomes and operational excellence.

The research will analyze the existing literature on BPM and performance improvement factors such as cost reduction, operational efficiency, customer satisfaction, and organizational agility. The study will also explore the relationship between BPM practices and these performance metrics through a quantitative analysis of data collected from selected organizations in Saudi Arabia that have implemented BPM at different maturity level from ad-hoc to controlled BPM.

The findings of this research will provide valuable insights into the benefits of BPM in enhancing organizational performance and help businesses in identifying key areas for improvement. The results will contribute to the growing body of knowledge on BPM and its impact on performance improvement factors, ultimately guiding organizations in their strategic decision-making and implementation of BPM practices.

مختصر:

تهدف هذه الدراسة إلى معرفة تأثير إدارة إجراءات الأعمال (BPM) على عوامل تحسين الأداء المختلفة داخل المنظمات. لقد اكتسبت إدارة إجراءات الأعمال (BPM) اهتمامًا كبيرًا في السنوات الأخيرة باعتبارها نهجًا استراتيجيًا لتبسيط العمليات وتحسينها لتحقيق نتائج أداء أفضل وتميز تشغيلي.

سيقوم البحث بتحليل بحوث سابقة حول إدارة إجراءات الأعمال (BPM) وعوامل تحسين الأداء مثل خفض التكاليف، والكفاءة التشغيلية، ورضا العملاء، ومرونة المنظومة. سوف تستكشف الدراسة أيضًا العلاقة بين ممارسات BPM ومقاييس الأداء هذه من خلال التحليل الكمي للبيانات التي تم جمعها من مؤسسات مختارة في المملكة العربية السعودية التي طبقت BPM على مستويات نضج مختلفة من BPM من مستوى الخالي من التخطيط إلى التحكم في إدارة BPM.

ستوفر نتائج هذا البحث رؤى قيمة حول فوائد BPM في تعزيز الأداء التنظيمي ومساعدة الشركات في تحديد المجالات الرئيسية للتحسين. وسوف تساهم النتائج في تنامي المعرفة حول BPM وتأثيرها على عوامل تحسين الأداء، مما يؤدي في النهاية إلى توجيه المؤسسات في عملية صنع القرار الاستراتيجي وتنفيذ ممارسات إدارة إجراءات الأعمال BPM.

Chapter One

Introduction:

Business Process Management (BPM) has emerged as a strategic approach for organizations to optimize their processes and enhance overall performance. (2) In the context of Saudi Arabia, where businesses are increasingly focused on improving efficiency, cost-effectiveness, and customer satisfaction, the implementation of BPM holds significant potential to drive organizational success. (5) This research aims to explore the impact of BPM on the improvement of performance factors within selected organizations in Saudi Arabia that can primarily represent the organizations in Saudi Arabia in general. Hence, the selection included a listed company, family-owned group of companies and a governmental entity.

Saudi Arabia's economy has undergone rapid transformation in recent years since the introduction of Vision-2030 with a growing emphasis on diversification and innovation. As organizations strive to stay competitive in a dynamic business environment, the need for efficient and effective processes becomes paramount. BPM offers a framework for organizations to analyze, redesign, and automate their business processes to achieve strategic goals and deliver value to customers. (5)

This research will investigate how the adoption of BPM practices influences various performance factors, such as cost reduction, operational efficiency, customer satisfaction, and organizational agility, in Saudi Arabian organizations. By engaging in a comprehensive literature review on BPM and performance improvement factors, this study will provide a theoretical foundation for understanding the relationship between BPM and organizational performance.

Furthermore, through a quantitative analysis of data collected from surveys conducted with organizations in Saudi Arabia that have implemented BPM, this research will assess the tangible impact of BPM on performance improvement. By identifying key success factors and challenges faced by organizations in implementing BPM, this study aims to provide practical insights for businesses seeking to enhance their performance through BPM practices. (3)

Overall, this research will contribute to the existing knowledge on BPM and its potential benefits for organizations in Saudi Arabia. By shedding light on the impact of BPM on performance improvement factors, this study will offer valuable insights for organizational leaders, managers, and practitioners looking to leverage BPM as a strategic tool for success in the Saudi Arabian business landscape. (6)

Study Problem:

While the concept of Business Process Management (BPM) has gained recognition as a strategic approach to drive performance improvement in organizations, there is a gap in understanding its specific impact on performance factors within the context of business in Saudi Arabia. Despite the increasing focus on efficiency, cost-effectiveness, and customer satisfaction in Saudi Arabia, there is limited factual research on how BPM best practices or the lack of such contribute to these performance metrics in organizations operating in the region. (8)

The unique socio-cultural and economic context of Saudi Arabia presents distinct challenges and opportunities for organizations aiming to implement BPM initiatives. The lack of research on the impact of BPM on performance improvement factors in Saudi Arabian organizations hinders the ability of businesses in the region to leverage BPM effectively to achieve competitive advantage and drive sustainable growth. (3)

Moreover, while the potential benefits of BPM are well-documented in global studies, the applicability and effectiveness of BPM practices in the specific business landscape of Saudi Arabia remain less explored. Understanding how BPM and its maturity can address the performance challenges faced by organizations in Saudi Arabia is crucial for driving strategic decision-making and enhancing operational excellence in a rapidly evolving market. (10)

Therefore, the research problem at hand is to investigate the impact of Business Process Management on the improvement of performance factors in organizations in Saudi Arabia and to identify the key success factors, challenges, and implications of implementing BPM practices in this unique business environment. By addressing this research gap, this study aims to provide valuable insights that can inform organizational strategists and practitioners for optimizing performance and achieving sustainable business success in Saudi Arabia.

The Importance of the Research:

The importance of this study can be seen through the following points and objectives:

- To understand how BPM practices influence performance factors in Saudi Arabian organizations can inform strategic decision-making processes. By identifying the key success factors and challenges associated with BPM implementation, organizational leaders can make informed decisions to drive performance improvement and achieve business objectives.

- How BPM can help organizations in Saudi Arabia gain Competitive Advantage in a rapidly changing business landscape, by continuously enhancing efficiency, cost-effectiveness, and customer satisfaction. Research on the impact of BPM on performance factors can help businesses leverage BPM as a strategic tool to gain a competitive advantage in the market.
- To find out how BPM can offer a systematic approach to analyze, redesign, and automate business processes, leading to improved operational efficiency and effectiveness. Research on the impact of BPM in Saudi Arabian organizations can provide valuable insights for enhancing **operational excellence** and optimizing business processes.
- To identify how BPM can help meeting customer expectations and delivering high-quality products and services which are key priorities for organizations in Saudi Arabia. By understanding how BPM practices can enhance customer satisfaction, businesses can improve their customer retention rates and build strong relationships with clients.
- Identify how BPM can achieve Economic Growth. As Saudi Arabia focuses on economic diversification and innovation; the adoption of BPM can contribute to sustainable growth and development. Research on the impact of BPM on performance factors can help organizations in the region drive productivity, innovation, and profitability, leading to overall economic advancement.

Overall, this research is crucial for enhancing the understanding of how BPM can drive performance improvement in organizations in Saudi Arabia. By exploring the impact of BPM on key performance factors and providing practical insights for implementation, this study can empower organizations to unlock their full potential, achieve strategic goals, and thrive in the competitive business environment of Saudi Arabia.

Research Objectives:

1. To investigate the current state of Business Process Management (BPM) practices in the selected organizations in Saudi Arabia for this research.
2. To examine the impact of BPM on performance factors
3. To identify the key success factors and challenges associated with the implementation of BPM practices in the Saudi Arabian business context.
4. To explore the implications of BPM adoption for organizational agility, innovation, and competitiveness in Saudi Arabia.

5. To provide practical recommendations for organizations in Saudi Arabia on leveraging BPM to drive performance improvement and achieve sustainable growth.
6. To contribute to the existing body of knowledge on BPM by conducting empirical research in the specific context of Saudi Arabian businesses, filling a significant research gap in the literature.
7. To create awareness among organizational leaders and decision-makers in Saudi Arabia about the potential benefits of BPM and the importance of adopting BPM as a strategic approach to enhance performance and achieve strategic objectives.

Research Hypothesis:

The hypothesis that is going to be explored in this research is that there is a positive relationship between the adoption and maturity of Business Process Management (BPM) practices and organizational performance in various performance factors in Saudi Arabian organizations such as:

- ☐ Operational efficiency
- ☐ Cost savings and improved cost-effectiveness
- ☐ Customer satisfaction levels
- ☐ Higher levels of innovation and agility

Study Questions

The following list of questions are going to be explored in this study:

1. What are the current BPM practices?
2. How organizations in Saudi Arabia measure performance factors?
3. What is the perceived impact of BPM on performance factors?
4. What are the challenges in implementing BPM in Saudi Arabia?
5. How businesses in Saudi Arabia align BPM initiatives with their strategic goals?
6. What are the recommendations for organizations in Saudi Arabia looking to improve their performance through BPM?

Theoretical Model

This research study will use a combination of relational and explanatory theory due to the nature of the subject, topic maturity in Saudi Arabia, the relatively small study population size, and the availability of data that can be collected systematically.

Chapter 2

Literature Review:

This literature review aims to explore the impact of business process management (BPM) on the improvement of performance factors in Saudi Arabia. The review will analyze several relevant papers that investigate the relationship between BPM and performance factors in the Saudi Arabian context.

Al-Mashari, M., & Zairi, M. (2000). BPR implementation process: an analysis of key success and failure factors. *Business Process Management Journal*.

This study provides insights into the implementation process of Business Process Reengineering (BPR) and identifies key success and failure factors. It highlights the importance of aligning BPM initiatives with organizational objectives and engaging employees in the change process. It explores the alignment role of BPR and BPM with IT infrastructure requirements, the effective use of consultants, and in how this helps organization achieve Total Quality Management (TQM). (6)

Villari, Bobby Chaitanya, and Sanjay Jharkharia. "Critical success factors for ERP implementation: A classification." *Twelfth AIMS International Conference on Management*. 2014.

This study links to a great extent that ERP implementations are more successful the design and implementation are fit to the business processes. This actually translates to the fact that the firm is deploying a more mature business process management. (7)

"Greater the fitness the easier for the organization and people to adopt to the system as there would be lesser requirement for any further business process reengineering."(7)

Al-Mashari, M., & Zairi, M. "Business process reengineering: a survey of international experience". *Business Process Management Journal*, 9(5), 604-622.

This survey-based study explores international experiences with Business Process Reengineering (BPR) implementation. It is about the need for conducting change on the business process in a way to achieve better performance and quality of operations. One of the most interesting findings of this study shows that incremental improvements and process redesign can bring big benefits with less need for radical reengineering or major innovative exercises. (8)

Mohamed Zairi "Business process management: a boundaryless approach to modern competitive." *Business Process Management Journal* ISSN: 1463-7154, 1 April 1997

This study begins by introducing what is a process and defines, in very simple terms as an approach for converting inputs into outputs. However, it sheds a light on the need for a good BPM practice to be based on accredited quality system to make sure that documentation of the processes and procedures are governed and controlled with the right accessibility to various take holders such as the ISO-9000 quality system. The study also mentions that BPM must align with the corporate strategy. This paper points out to the fact that not only you need to have documentation and control for BPM, but also organizations need to create a business process management culture because it not a goal to reach, but rather a continuous, systematic, and consistent approach that will take years to becoming a fully process-oriented organization. (1)

Remco Dijkman & Sander Vincent Lammers, and Ad Jong. "Properties that influence business process management maturity and its effect on organizational performance," *Information Systems Frontiers*, Springer, vol. 18(4), pages 717-734, August. 2016

This case study shows how maturity models initiated in business literature by Crosby (1979) and Nolan (1973) found their way into the business process management. It concluded that the more mature your BPM system is, the more benefit and positive impact it will have on the organization's performance. (4) see figure 1

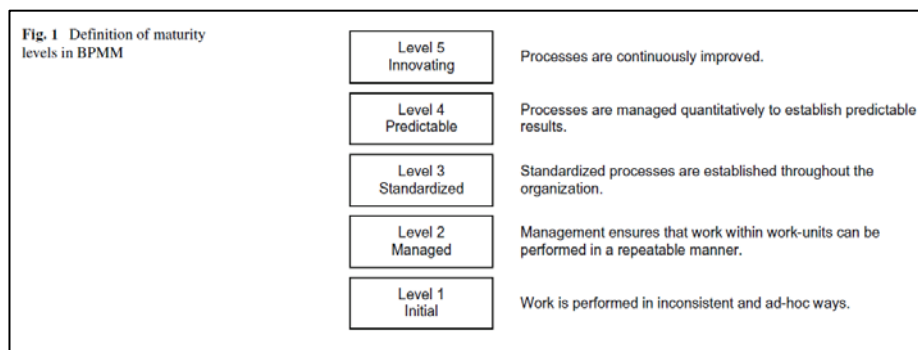


Figure 1

From this literature review, we can see that there is a strong link between BPM and organizational performance, however, there is little reference to Saudi Arabian market. Moreover, there is some mention about the maturity of BPM but there is no clear description and practical demonstration of how this maturity should look like on the ground and what are the signs that BPM needs to be visited as we live in a very dynamic state in current years and the coming future will obviously pose a great challenge. Hence, the need for this research as it will shed light on these areas.

Chapter 3

Research Methodology

This research will use a mixed-methods approach combination of inductive, deductive, and descriptive approaches.

The research will utilize qualitative analysis of information collected using interviews and focus groups.

Moreover, quantitative analysis will be utilized based on data collected from operational data from systems such as ERP based on historical analysis of impact happening after change introduced on some parts of BPM in the organization.

As for the descriptive part, A survey developed to measure the impact of the implementation and maturity of BPM. The survey will be administered to relevant stakeholders in the selected organization' managers, staff in the Quality Departments, or the assigned manpower responsible for BPM and continuous improvement such as the Center of Operational Excellence or equivalent departments. The research will. Additionally, through the experience of the author with interaction with these organizations, more analysis will be attainable from case studies with the chosen organizations in this research.

By utilizing a mixed-methods research approach, this study can offer a comprehensive analysis of BPM practices in Saudi Arabian organizations, explore the factors influencing BPM implementation success, and provide valuable insights for organizations looking to enhance their performance through BPM strategies.

Research Tools and Data Collection

Study Population: A non-random set of 4 organizations that the research will be based on due to previous interaction, experience and convenience as interactions were within the same field of the study. The selected organizations are listed in the appendices by name but in the body of the study will be described only due to their request not to appear by name in the body of the research or publishable content:

1. A Saudi IT and Telecom listed company. It is an ICT solutions service provider.
2. A family-owned closed shared company with business spanning several services and products namely, real estate development, real estate management, architectural design and construction, tourism, and entertainment.
3. A family-owned IT solutions provider

4. A governmental entity responsible for the PMO strategy and execution of vision-2030.

Sample Characteristics

The sample of the entities for the study are characterized by the following features that makes this study relevant and descriptive for the wider population of organizations in Saudi Arabia:

1. One publicly owned company that is owned by one of the biggest companies in Saudi Arabia, hence its performance and complexity of operations means it is very dependent on how successful its adoption of business process management and the monitoring and control over performance factors.
2. Another company which is a family-owned company which evolved in a very common business line for many family-owned businesses in Saudi Arabia emerging from real estate and expanding its business lines as the integral need for its growth. This integral growth happened over many years which creates a clear challenge for interdependence of business processes.
3. The third company which also a family-owned IT provider, one of the first companies to be involved with information technology in Saudi Arabia. The IT business is very well known to be dependent on the concepts of business processes as a pillar in the execution and delivery of its products and services. Hence, if BPM is not managed in the proper way, definitely we will notice the impact on its performance.
4. The fourth which a government entity initiated primarily to deliver the objectives of the strategic vision 2030 of Saudi Arabia would be a clear choice for the study of consistency requirements of business processes with the strategic goals.

All of these characteristics represent the required source of information for interpreting the results anticipated given the limitations of the study and the challenge in the time period of the study conducted mainly, data sources availability due to Ramadan period.

Data Collection:

- Develop a survey questionnaire to measure the effectiveness of BPM practice, adoption, impact on key performance indicators of the organization.
- Conduct interviews with key stakeholders (e.g., managers, employees) to gather insights on BPM implementation challenges, success factors, maturity, and outcomes.
- Collect data from case studies of the selected organizations to analyze BPM strategies, processes, and outcomes.

Data Analysis Method:

- The research will use topical analysis to identify common patterns, themes, and insights from interviews and case studies.
- Interpret qualitative data to provide rich descriptions of BPM practices, challenges, and impacts in Saudi Arabian organizations.
- Analyze survey data using statistical methods to measure the relationship between BPM adoption and maturity and organizational performance indicators/factors.
- Use descriptive analysis to assess the significance of BPM practices on efficiency, cost-effectiveness, customer satisfaction, agility, and innovation.

Research Scope:

- The research scope will be about studying current business processes documented.
- The processes in place for the improvement and change control for BPM.
- The implemented technological systems that are based on the BPM system such as ERP.
- Business-related key performance indicators statistics that are collected.

Chapter 4

Research Findings

In terms of BPM, the management of processes should be mature enough to have the following qualities must be regarded by organizations: (1) (4) (6) (8) (10)

1. Accurately documented.
2. Have a set standard model.
3. Consistent with the strategy.
4. Consistent with the automation tools.
5. Reviewed and updated regularly in a quality-controlled manner.
6. Continuously improved for efficiency and innovation.

Moreover, organizational performance factors that are majority identified to be affected by the maturity of business process management are: (3) (4) (6) (10) (11)

1. Operational efficiency.
2. Achieving strategic goals.
3. Operational streamline and effectiveness.
4. Cost competitiveness compared to the market.
5. Increased customer satisfaction.
6. Monitoring and control of KPIs.
7. The best use of innovations and technological transformation

Survey data and analysis

The survey was designed to collect feedback from key stakeholders in each organization. It has been verified by two subject matter experts in the fields of business strategy, business performance and business process management. After the feedback I have modified the questionnaire according to the feedback received as shown in the appendices of first version and final version of the survey.

The survey was designed in two sections:

- Section1: will get feedback about how well business processes are managed in a mature manner.
- Section2: will get feedback about how business performance factors are perceived.

A simple statistical analysis is used due to the limited number of responses and direct relationship between the two sections for the independent and dependent variables.

The following table is the survey's collected responses and summary of the feedback:

Section1: Business Process Management in your organization							
Responses to questions		A1	A2	A3	A4	A5	Total responses
Q1	Are work processes documented?		2		1	1	4
Q2	Does your organization use defined standard process model for each process category?	2		1	1		4
Q3	Are automation tools (such ERP) consistent with the documented processes?	3	1				4
Q4	Does your organization review and update work processes?	1	2	1			4
Q5	Does your organization apply change control on process documentation changes and improvements?	3			1		4
Q6	How well does your organization's business process management system support continuous improvement and innovation?	2	1	1			4
Section2: Business performance factors and measures							
Q1	How would you rate the operational efficiency of your organization?	1	2	1			4
Q2	How satisfied are you with the level of alignment between business process management and your organization's strategic goals?	1	2		1		4
Q3	How often does your organization's BPM system support the identification and elimination of bottlenecks in processes?	4					4
Q4	How effective is your organization's business process management in reducing costs and improving financial performance?	2	2				4
Q5	How well does your organization's business process management system support customer satisfaction and retention?	2	1		1		4
Q6	How successful is your organization in measuring and monitoring key performance indicators (KPIs) related to business processes?	1	3				4
Q7	How satisfied are you with the level of automation and digitization of business processes in your organization?	3	1				4

Summary

Answer selected	A1	A2	A3	A4	A5	Total
Total responses for section 1	11	6	3	3	1	24
Total responses for section 2	14	11	1	2	0	28
Total responses	25	17	4	5	1	52

Table 1

Comparing the scores of section1 for each answer:

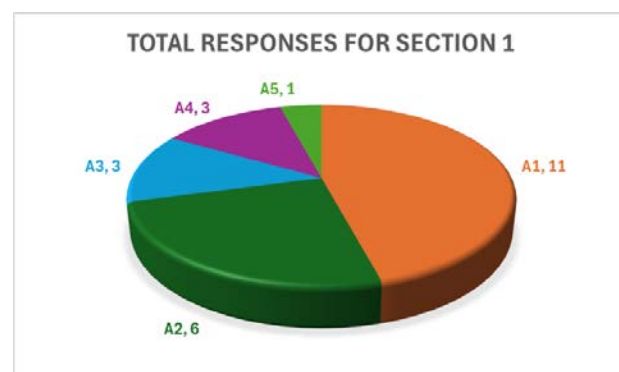


Figure 2

Comparing the scores of section2:

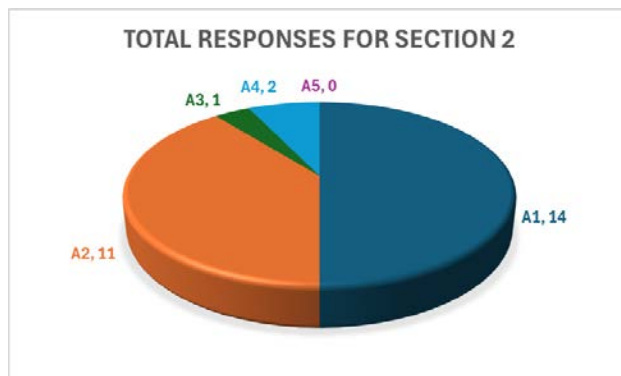


Figure 3

Combined responses for both sections:

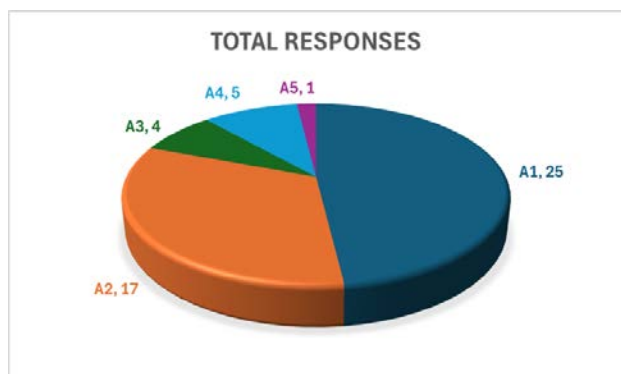


Figure 4

The lower score is A1 and highest score is A5, by the direct clear distinction shown from the highest scores ben in A1 and A2 for both sections, it is clear that the lack of business process management in Saudi Arabia is directly affecting the perceived business performance factors in all areas of business process management and business performance factors.

Interviews with key stakeholders Analysis

1. A Saudi IT and Telecom listed company. It is an ICT solutions service provider.

In this company, we had meetings with the following representatives:

- Head of quality management. His department is responsible for all quality documentation including business process management.
- Head of Operations. His department provides the day-to-day operations of business execution and customer support. They are project-based operations.

Challenges and Findings:

In terms of business processes both stakeholders agreed that they do exist and are accessible

However, as per Quality Management Head, business processes are not systematically challenged nor being reviewed for improvements. The quality management department is short-staffed and is mostly busy with keeping the documentation valid for acquisition of the relevant quality management certifications. Also, very limited time and effort is spared for initiatives like KPIs reviews and corrective actions.

Moreover, as per Operations Head, the operations staff turnover is high. The support function delivery is complicated due to the use of a combination of in-source and out-source delivery model, which means that there is a mix culture and a mix set of different processes that are constantly changing as the out-source companies change from time to time due to awarding by the contracting division of the business. There are also no standard methods for measuring the performance of the out-source companies in place. He also spoke about the challenges of keeping control of operations and support delivery due to lack of comprehensive process documentation for his department and the head count turnover causing training issues as they need to train the new support staff.

2. A family-owned closed shared company with business spanning several services and products.

In this company, we had meetings with the following representatives:

- The CEO of the group company. He is responsible for the strategy formulation along with the board and execution of the strategy
- CFO. He is responsible for all financial and accounting operations for all the 5 companies in the group

Challenges and Findings:

According to the CEO, there was an old initiative conducted to formulate the strategy of the group since 2011 and until now there was no review or refreshed strategy formulation. Moreover, this strategy formulation was focused on the shared services standard processes design with very little focus on the business lines of the group. That meant adopting and seeking best practice processes for how to do the support functions in isolation of the core business.

According to the CFO, there is no standard policy governing the various business lines of the 5 companies in the group which creates a great concern of how to track performance of the integrated

business of the group and the complex set of processes that are executed differently on the ground. Also, there is no consistency between what processes are documented, what processes are executed and what processes are automated.

3. A family-owned IT solutions provider

In this company, we had meetings with the following representatives:

- The Managing Director of the company. He is responsible for the strategy formulation along with the board and execution of the strategy.
- The Senior Vice President of Operations. He is accountable of the Project Management Office and responsible for the projects delivery and the relationships with the customers.

Challenges and Findings:

According to the MD, there is a lack of comprehensive process documentation in the company let aside improving the existing ones. Customer satisfaction is a challenge due to the slow responsiveness of the business to customer needs. Competition in the field of IT is getting higher and higher in an exponential rate when the strategy reviews are lagging.

According to the Snr VP Operations, there is a big challenge in the lack of systematic approach of project qualification. There is also no categorical differentiation for projects execution due to the size, the same process is being used to do small or large projects which make the agility of the business in responding to clients inconsistent.

4. A governmental entity responsible for the PMO strategy and execution of vision-2030.

In this company, we had meetings with the following representatives:

- The Head of Process Management entity. She is responsible for the managing of process documentation, reviews, and improvements.
- Project Management Office Head. He is responsible for the selection and performance monitoring and control of projects.

Challenges and Findings:

According to the Head of Process Management, all processes have been documented for all operational requirements of the VRO office, however, no proper review and systematic enhancements taking place due to the lack of proper KPI monitoring and control.

According to PMO Head, there is a challenge in project management knowledge and experience discrepancy amongst project managers. There is also a challenge in the maturity of project risk management and change management which results in degraded projects performance in general. Moreover, there is a lack of integrated technological tools that are consistent with the processes in place.

Case Studies Analysis

1. A Saudi IT and Telecom listed company. It is an ICT solutions service provider.

The Head of operations presented one issue related to operations in the customer support division that the cost of customer support is far more than the competition, which makes the business prices higher in the market that affect customer satisfaction and retention.

The other issue was an internal process concerning staff leave management process responsiveness which is affecting staff satisfaction and moral.

In this study, we have requested to review the processes. After reviewing the support delivery process, it was found that there is a standard procedure missed out completely which is the Return Material Authorization (RMA). This procedure is concerned with changing the broken devices under warranty and support by the EOM provider for free and means that the support agreement will be replaced on the newly acquired replacement devices. Hence, what was happening on the ground was that the support staff were replacing defective devices with new devices without using the RMA process this has resulted in buying a new device and buying a new warrant and extended support agreement for the newly bought device and the buying of a spare device from the OEM, all of which could have been provided free of charge based on the warranty agreement. See the figure below.

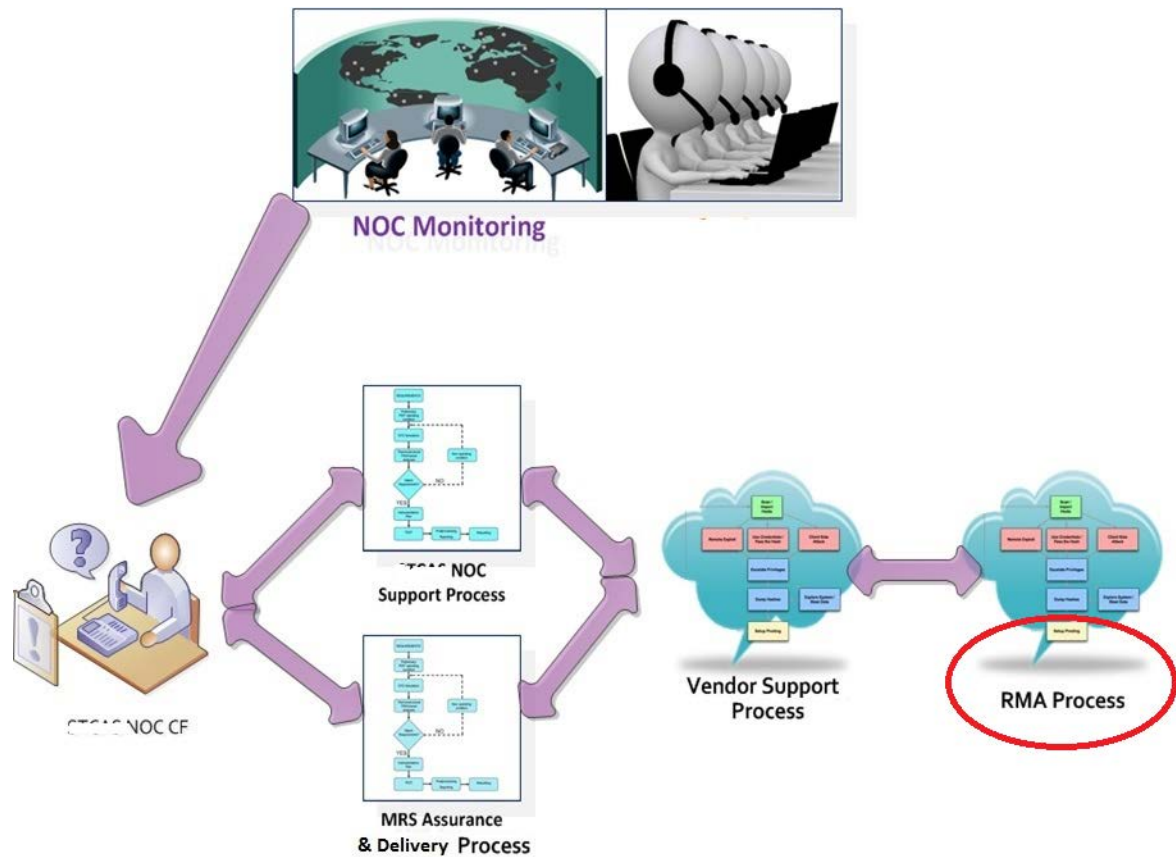


Figure 5

This meant that the cost of delivering the support requirement is 3 times what is required. This was happening due to the lack of periodic process reviews and systematically challenging process steps by asking why this step is needed.

The other issue related to the staff leave process, the review was conducted and again the simple method of challenging the steps was conducted. The process included 4 decisions that are holding the leave authorization. The 2nd and 3rd approvers when asked why they are required to approve the request of leave the answer was that the 2nd one reviews if the staff has enough leave balance and the 3rd approver was the HR operations manager that is 2nd approving the 2nd approver. Since the HR system was already digitalized, there is no need to have the 2nd and 3rd approvers in the cycle of the request management since the number of days and the policy for leave balance are already imbedded in the ERP system. Hence, we have found why the leave request were taking a longer time than needed to get granted.

2. A family-owned closed shared company with business spanning several services and products.

In a case study we worked with the CFO who explained an issue he has with the payroll as the payroll staff request that the cut-off date be the 10th of each calendar month due to the fact that it takes them 17 days to finalize the salary calculations for the 500 staff of the 5-company group. This came as a shock as other companies actually spend much less effort. Asking others in the same field they all mentioned no more than 3 days to finalize salaries adjustments, which gives them a cut-off date near to the end of the month. We asked to review the payroll process, but it was not existing, so we offered to design it based on a meeting with the payroll staff. See the figure below for the depicted payroll process:

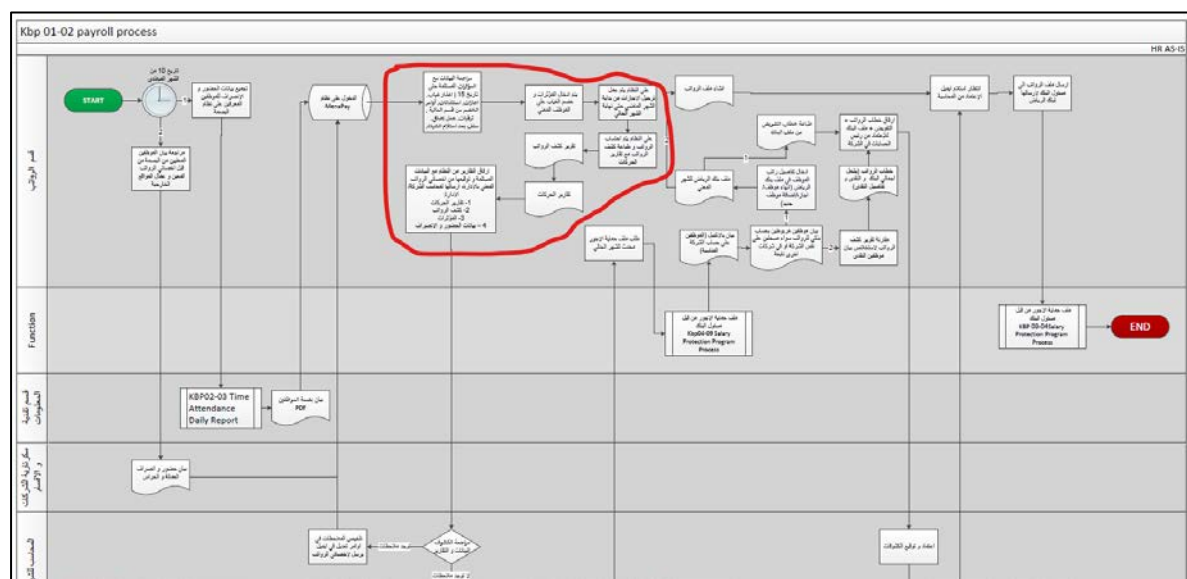


Figure 6

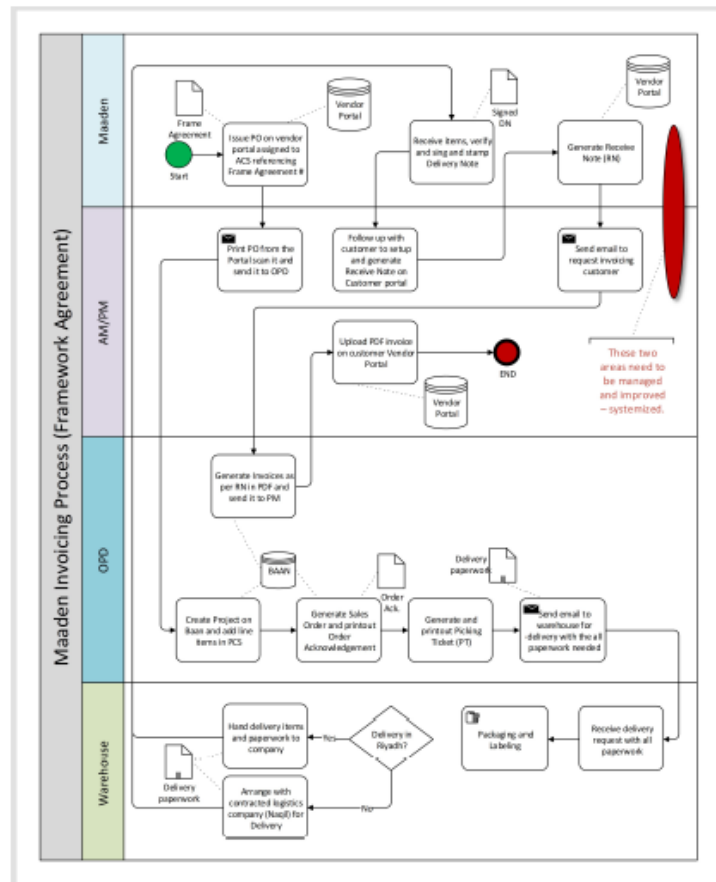
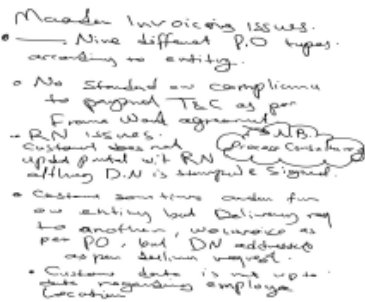
After depicting the payroll process diagram, we asked to see which steps take how much effort and time, the majority of the time was spent reviewing the adjustments that are based on different policies in the various companies served by HR. When challenged why it is taking this much time, the response from the staff was that they wait for receiving the adjustments like overtime, unauthorized absences, unauthorized out of office time and then apply all policies and calculations manually then reflect it manually on the payroll HR system, then pass the report to finance to execute the salary payments. We then challenged the system administrator of the HR system only to find out that the policies can be programmed in the HR system and there was no need for manual calculations. It took the system

administrator only 1 hour to implement the automated adjustment policies based on the HR written policy. The cycle of the payroll was drastically reduced from 17 days to 3 days only.

3. A family-owned IT solutions provider

The Snr VP of Operations presented a case where a customer namely Maaden company invoicing and collection is taking many months after delivering materials to them by the company. Maaden is a semi-government company does not have any issues with cash flow. We also here requested to see the invoicing process and it was not systematically documented. We had a small meeting with the logistics department head and the projects accounting manager. We offered to design the process diagram and analyze it for them. See diagram below:

 Maadaen invoicing fr-ag



In this case study when we reviewed the process diagram which we depicted from the interviews with the relevant operations staff, we found that the majority of effort and time is spent by trying to find a newly issued received note by the customer who post it in the client's own portal online, but there is no mechanism to notify the logistics staff of the company who has to go manually and serially through hundreds of RNs every day in order to find the update ones to send to the project accounting manager who will then invoice Maaden company. This was a clear system modification request to Maaden to introduce a system alert to the company that a certain delivery was received and a new RN was

generated. The request was sent by email and if granted, it will make the invoicing much more effective and faster.

4. A governmental entity responsible for the PMO strategy and execution of vision-2030.

In this case study the PMO Head presented the challenge that most of the projects do not finish on time and go through various change requests to extend the end-of-project, or the budget, or the scope of the project. Most of these requests for changes are made without prior anticipation by risk management of the projects. Hence, we requested to review the risk management process which in the case of this government entity well documented and controlled. So, we asked for a report of all risks registered on the project management system. After reviewing the report together, we found that most project managers register the same set of risks by copy and paste only to pass the system requirement on the project management system without proper risk management review. Hence, the solution was to introduce Risk Management Review process and assign it to the PMO for project gate pass requirements.

Conclusion:

The reviewed literature highlights the positive impact of Business Process Management (BPM) on performance improvement, in Saudi Arabian market. Key success factors identified include top management support, employee involvement, effective change management, and technology utilization. Cultural factors specific to the Saudi Arabian context are also emphasized. Adopting BPM practices can lead to enhanced operational efficiency, cost reduction, and improved customer satisfaction in Saudi Arabian organizations. Further research is recommended to explore specific industries and sectors to gain deeper insights into the impact of BPM on performance factors in Saudi Arabia.

As a clear conclusion from the analysis of the survey, the outcomes from the case studies, and the key stakeholders interviews, there is a clear gap in the adoption of Business Process Management maturity in Saudi Arabia which is impacting in a bad way on the business performance factors in general.

Recommendations:

There is a clear need for a greater awareness for the adoption of business process management concepts including quality management for the control so that in Saudi Arabia BPM can be a living culture in organizations operating in this region. Moreover, there is a clear need to establish the

performance monitoring and control in relations with the business processes in place to become as a starting point for process improvements and innovation.

References:

1. Mohamed Zairi "Business process management: a boundaryless approach to modern competitive." Business Process Management Journal ISSN: 1463-7154, 1 April 1997
Published online on <https://www.emerald.com/insight/content/doi/10.1108/14637159710161585/full/html>
2. Jr, Thomas R. Gullledge; Sommer, and Rainer A "Business process management: public sector implications." Business Process Management Journal, Volume 8, Number 4, 2002, pp. 364-376(13)
Published online on <https://doi.org/10.1108/14637150210435017>
3. Yousef Alotaibi and Fei Liu "Survey of business process management: challenges and solutions." Enterprise Information Systems, Volume 11, 2017 - Issue 8
Published on <https://doi.org/10.1080/17517575.2016.1161238>
4. Remco Dijkman & Sander Vincent Lammers, and Ad Jong. "Properties that influence business process management maturity and its effect on organizational performance," Information Systems Frontiers, Springer, vol. 18(4), pages 717-734, August. 2016
Published online on https://ideas.repec.org/a/spr/infosf/v18y2016i4d10.1007_s10796-015-9554-5.html
5. Arwa S. Bokhari and Rizwan J. Qureshi "Business Process Re-Engineering in Public Administration of Kingdom of Saudi Arabia." International Journal of Information Engineering and Electronic Business (IJIEEB), Vol.8, No.4, pp.10-17, 2016
Published Online <http://www.meecs-press.org>
6. Majed Al-Mashari and Mohamed Zairi. "BPR implementation process: an analysis of key success and failure factors." Business Process Management Journal, 1 March 1999
Published online on <https://www.emerald.com/insight/content/doi/10.1108/14637159910249108/full/html>
7. Villari, Bobby Chaitanya, and Sanjay Jharkharia. "Critical success factors for ERP implementation: A classification." Twelfth AIMS International Conference on Management. 2014.
Published online on <https://www.aims-international.org/aims12/12A-CD/PDF/K532-final.pdf>
8. Majed Al-Mashari, Zahir Irani and Mohamed Zairi. "Business Process reengineering: a Survey of International Experience." Business Process Management Journal, December 2001.
Published online on

https://www.researchgate.net/publication/242339548_Business_Process_Reengineering_A_Survey_of_International_Experience

9. Vlad Balanescu, et al. "The Impact Of Business Process Management On Organizational Strategy." Business Excellence and Management Vol. 3 Issue 2, June 2013
Published online on <https://beman.ase.ro/no32/3.pdf>
10. Omar Alshathry. "Business Process Management: a maturity check of Saudi Arabian organizations." Semantic Scholar, 2016, Corpus ID: 265762022
11. Haitham M. Alzoubi and Neama A. Khafajy. "The Impact of Business Process Management on Business Performance Superiority." The International Journal of Business and Management Review, Vol.3, No.2, pp.17-34, February 2015

Appendices

1. English Abstract
2. Arabic Abstract
3. Academic Survey Design and SME feedback towards final version
4. Responses
5. Key Stakeholder interview letter
6. STCS - NOC interactions
7. Madaen Group KBP02-01 Payroll Process
8. ACS Invoicing analysis for Maaden company
9. Mof VRO Risk mgmt list
10. References

Abstract:

This study aims to investigate the impact of business process management (BPM) on various performance improvement factors within organizations. BPM has gained significant attention in recent years as a strategic approach to streamline and optimize business processes to achieve better performance outcomes and operational excellence.

The research will analyze the existing literature on BPM and performance improvement factors such as cost reduction, operational efficiency, customer satisfaction, and organizational agility. The study will also explore the relationship between BPM practices and these performance metrics through a quantitative analysis of data collected from selected organizations in Saudi Arabia that have implemented BPM at different maturity level from ad-hoc to controlled BPM.

The findings of this research will provide valuable insights into the benefits of BPM in enhancing organizational performance and help businesses in identifying key areas for improvement. The results will contribute to the growing body of knowledge on BPM and its impact on performance improvement factors, ultimately guiding organizations in their strategic decision-making and implementation of BPM practices.

مختصر:

تهدف هذه الدراسة إلى معرفة تأثير إدارة إجراءات الأعمال (BPM) على عوامل تحسين الأداء المختلفة داخل المنظمات. لقد اكتسبت إدارة إجراءات الأعمال (BPM) اهتمامًا كبيرًا في السنوات الأخيرة باعتبارها نهجًا استراتيجيًا لتبسيط العمليات وتحسينها لتحقيق نتائج أداء أفضل وتميز تشغيلي.

سيقوم البحث بتحليل بحوث سابقة حول إدارة إجراءات الأعمال (BPM) وعوامل تحسين الأداء مثل خفض التكاليف، والكفاءة التشغيلية، ورضا العملاء، ومرونة المنظومة. سوف تستكشف الدراسة أيضًا العلاقة بين ممارسات BPM ومقاييس الأداء هذه من خلال التحليل الكمي للبيانات التي تم جمعها من مؤسسات مختارة في المملكة العربية السعودية التي طبقت BPM على مستويات نضج مختلفة من BPM من مستوى الخالي من التخطيط إلى التحكم في إدارة BPM.

ستوفر نتائج هذا البحث رؤى قيمة حول فوائد BPM في تعزيز الأداء التنظيمي ومساعدة الشركات في تحديد المجالات الرئيسية للتحسين. وسوف تساهم النتائج في تنامي المعرفة حول BPM وتأثيرها على عوامل تحسين الأداء، مما يؤدي في النهاية إلى توجيه المؤسسات في عملية صنع القرار الاستراتيجي وتنفيذ ممارسات إدارة إجراءات الأعمال BPM.

Academic Survey

The Impact of Business Process Management on the Improvement of Performance Factors in Saudi Arabia

Dear participant,

As part of our graduation requirements for the Master of Business Administration, we are required to submit a final project research paper. The purpose of this survey is to investigate the impact of BPM on performance factors in organizations in Saudi Arabia. The study aims to understand the current practices and to assess how these practices influence the performance factors.

We appreciate your contribution to this study by providing accurate feedback to the best of your knowledge. The survey will take you less than 15 minutes to complete and all the questions are rated using a scale from 1-to-5 ranking from worst-to-best respectively.

Thank you,

Jafar Alrashid and Reham Alzawad

Optional Participant's information:

Name: _____

Title: _____

Email: _____

Tel: _____

Section1: Business Process Management in your organization

Q1. Are work processes documented?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Q2. Does your organization use defined standard process model for each process category?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Q3. Are automation tools (such ERP) consistent with the documented processes?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Q4. Does your organization review and update work processes?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Q5. Does your organization apply change control on process documentation changes and improvements?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Q6. How well does your organization's business process management system support continuous improvement and innovation?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Section2: Business performance factors and measures

Q1. How would you rate the operational efficiency of your organization?

- ☐ 1. Far below average
- ☐ 2. Below average
- ☐ 3. Average
- ☐ 4. Above average
- ☐ 5. Far above average

Q2. How satisfied are you with the level of alignment between business process management and your organization's strategic goals?

- ☐ 1. Very dissatisfied
- ☐ 2. Dissatisfied
- ☐ 3. Neutral
- ☐ 4. Satisfied
- ☐ 5. Very satisfied

Q3. How often does your organization's BPM system support the identification and elimination of bottlenecks in processes?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Q4. How effective is your organization's business process management in reducing costs and improving financial performance?

- ☐ 1. Very ineffective
- ☐ 2. Ineffective
- ☐ 3. Somewhat effective
- ☐ 4. Effective
- ☐ 5. Very effective

Q5. How well does your organization's business process management system support customer satisfaction and retention?

- ☐ 1. Not well at all
- ☐ 2. Not well
- ☐ 3. No effect on the support
- ☐ 4. Well
- ☐ 5. Very well

Q6. How successful is your organization in measuring and monitoring key performance indicators (KPIs) related to business processes?

- ☐ 1. Not well at all
- ☐ 2. Not well
- ☐ 3. No effect on the support
- ☐ 4. Well
- ☐ 5. Very well

Q7. How satisfied are you with the level of automation and digitization of business processes in your organization?

- ☐ 1. Very dissatisfied
- ☐ 2. Dissatisfied
- ☐ 3. Neutral
- ☐ 4. Satisfied
- ☐ 5. Very satisfied



Jafar Al-Rashid <jafar.rashid@gmail.com>

Academic Survey on BPM impact on Business Performance Factors

2 messages

Jafar Al-Rashid <jafar.rashid@gmail.com>
To: Fadi Abbas Talal <fadi.abbas@ezorder.com.sa>

Wed, Mar 6, 2024 at 2:38 PM

Dear Mr. Fadi Abbas,

As a CEO for a reputable organisation working in Saudi Arabia with a strong knowledge on strategy, business process management and performance, please review the attached survey and would like your feedback on the validity of the survey questions for the purpose of the research as a SME on the topic.

Best regards
Jafar Alrashid and Reham Alzawad.



Academic Survey.pdf
107K

Fadi Abbas. Talal <fadi.abbas@ezorder.com.sa>
To: Jafar Al-Rashid <jafar.rashid@gmail.com>

Wed, Mar 6, 2024 at 6:51 PM

Hi Jafar

I think all questions are adequate and should be enough for your research.

Regards.

Fadi T. Abbas**General Manager****Talabat Al-Maktab Co. Ltd.**

P.O Box: 277109, Riyadh-11314.

Kingdom of Saudi Arabia

Phone: +966-11-244 4333 (111)

Fax: +966-11-244 1252 (Direct)

GSM: +966-50 167 0398

Website: www.ezorder.com.sa





Jafar Al-Rashid <jafar.rashid@gmail.com>

Academic Survey on BPM impact on Business Performance Factors

2 messages

Jafar Al-Rashid <jafar.rashid@gmail.com>
To: Dr. Yahya Alharthi <yh@gzfconsulting.com>

Mon, Mar 11, 2024 at 1:46 PM

Dear Dr. Yahya Alharthi,

As an expert in strategy, business performance measures and business process management, please review the attached questionnaire and let me know what you think and if there are any modifications you would like to recommend.

Best regards
Jafar Alrashid and Reham Alzawad.

 **Academic Survey.pdf**
107K

Dr. Yahya Alharthi <yh@gzfconsulting.com> To:
Jafar Al-Rashid <jafar.rashid@gmail.com>

Tue, Mar 12, 2024 at 4:31 PM

Dear Jafar,

The survey questions look very well to me for the purpose of the research in both sections. However, I have one suggestion which is to add the option for an open comment for each question in order to explain why he/she made the selection and final comment to express any extra feedback on the topic.

Good luck.

Best Regards.

Dr. Yahya Alharthi
CEO GFZ Consulting



Academic Survey

The Impact of Business Process Management on the Improvement of Performance Factors in Saudi Arabia

Dear participant,

As part of our graduation requirements for the Master of Business Administration, we are required to submit a final project research paper. The purpose of this survey is to investigate the impact of BPM on performance factors in organizations in Saudi Arabia. The study aims to understand the current practices and to assess how these practices influence the performance factors.

We appreciate your contribution to this study by providing accurate feedback to the best of your knowledge. The survey will take you less than 15 minutes to complete and all the questions are rated using a scale from 1-to-5 ranking from worst-to-best respectively.

Thank you,

Jafar Alrashid and Reham Alzawad

Optional Participant's information:

Name: _____
Title: _____
Company: _____
Email: _____
Tel: _____

Section1: Business Process Management in your organization

Q1. Are work processes documented?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q2. Does your organization use defined standard process model for each process category?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q3. Are automation tools (such ERP) consistent with the documented processes?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q4. Does your organization review and update work processes?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q5. Does your organization apply change control on process documentation changes and improvements?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q6. How well does your organization's business process management system support continuous improvement and innovation?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Section2: Business performance factors and measures

Q1. How would you rate the operational efficiency of your organization?

- ☐ 1. Far below average
- ☐ 2. Below average
- ☐ 3. Average
- ☐ 4. Above average
- ☐ 5. Far above average

Comments:

Q2. How satisfied are you with the level of alignment between business process management and your organization's strategic goals?

- ☐ 1. Very dissatisfied
- ☐ 2. Dissatisfied
- ☐ 3. Neutral
- ☐ 4. Satisfied
- ☐ 5. Very satisfied

Comments:

Q3. How often does your organization's BPM system support the identification and elimination of bottlenecks in processes?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q4. How effective is your organization's business process management in reducing costs and improving financial performance?

- ☐ 1. Very ineffective
- ☐ 2. Ineffective
- ☐ 3. Somewhat effective
- ☐ 4. Effective
- ☐ 5. Very effective

Comments:

Q5. How well does your organization's business process management system support customer satisfaction and retention?

- ☐ 1. Not well at all
- ☐ 2. Not well
- ☐ 3. No effect on the support
- ☐ 4. Well
- ☐ 5. Very well

Comments:

Q6. How successful is your organization in measuring and monitoring key performance indicators (KPIs) related to business processes?

- ☐ 1. Not successful at all
- ☐ 2. Not successful
- ☐ 3. No effect on the success
- ☐ 4. Successful
- ☐ 5. Very successful

Comments:

Q7. How satisfied are you with the level of automation and digitization of business processes in your organization?

- ☐ 1. Very dissatisfied
- ☐ 2. Dissatisfied
- ☐ 3. Neutral
- ☐ 4. Satisfied
- ☐ 5. Very satisfied

Comments:

Any other Comments on the topic:

Academic Survey

The Impact of Business Process Management on the Improvement of Performance Factors in Saudi Arabia

Dear participant,

As part of our graduation requirements for the Master of Business Administration, we are required to submit a final project research paper. The purpose of this survey is to investigate the impact of BPM on performance factors in organizations in Saudi Arabia. The study aims to understand the current practices and to assess how these practices influence the performance factors.

We appreciate your contribution to this study by providing accurate feedback to the best of your knowledge. The survey will take you less than 15 minutes to complete and all the questions are rated using a scale from 1-to-5 ranking from worst-to-best respectively.

Thank you,

Jafar Alrashid and Reham Alzawad

Optional Participant's information:

Name: علي محمد العتيبي
Title: Senior VP Operations
Company: ACS
Email: _____
Tel: 056 202773 7

Section1: Business Process Management in your organization

Q1. Are work processes documented?

- ☐ 1. Never
- ☒ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q2. Does your organization use defined standard process model for each process category?

- ☒ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q3. Are automation tools (such ERP) consistent with the documented processes?

- ☒ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q4. Does your organization review and update work processes?

- ☐ 1. Never
- ☒ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q5. Does your organization apply change control on process documentation changes and improvements?

- ☒ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q6. How well does your organization's business process management system support continuous improvement and innovation?

- ☒ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Section2: Business performance factors and measures

Q1. How would you rate the operational efficiency of your organization?

- ☐ 1. Far below average
- ☒ 2. Below average
- ☐ 3. Average
- ☐ 4. Above average
- ☐ 5. Far above average

Comments:

Q2. How satisfied are you with the level of alignment between business process management and your organization's strategic goals?

- ☐ 1. Very dissatisfied
- ☒ 2. Dissatisfied
- ☐ 3. Neutral
- ☐ 4. Satisfied
- ☐ 5. Very satisfied

Comments:

Q3. How often does your organization's BPM system support the identification and elimination of bottlenecks in processes?

- ☒ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q4. How effective is your organization's business process management in reducing costs and improving financial performance?

- ☒ 1. Very ineffective
- ☐ 2. Ineffective
- ☐ 3. Somewhat effective
- ☐ 4. Effective
- ☐ 5. Very effective

Comments:

Q5. How well does your organization's business process management system support customer satisfaction and retention?

- ☒ 1. Not well at all
- ☐ 2. Not well
- ☐ 3. No effect on the support
- ☐ 4. Well
- ☐ 5. Very well

Comments:

Q6. How successful is your organization in measuring and monitoring key performance indicators (KPIs) related to business processes?

- ☐ 1. Not successful at all
- ☒ 2. Not successful
- ☐ 3. No effect on the success
- ☐ 4. Successful
- ☐ 5. Very successful

Comments:

Q7. How satisfied are you with the level of automation and digitization of business processes in your organization?

- ☒ 1. Very dissatisfied
- ☐ 2. Dissatisfied
- ☐ 3. Neutral
- ☐ 4. Satisfied
- ☐ 5. Very satisfied

Comments:

Any other Comments on the topic:

Academic Survey

The Impact of Business Process Management on the Improvement of Performance Factors in Saudi Arabia

Dear participant,

As part of our graduation requirements for the Master of Business Administration, we are required to submit a final project research paper. The purpose of this survey is to investigate the impact of BPM on performance factors in organizations in Saudi Arabia. The study aims to understand the current practices and to assess how these practices influence the performance factors.

We appreciate your contribution to this study by providing accurate feedback to the best of your knowledge. The survey will take you less than 15 minutes to complete and all the questions are rated using a scale from 1-to-5 ranking from worst-to-best respectively.

Thank you,

Jafar Alrashid and Reham Alzawad

Optional Participant's information:

Name:	Muhammad Almaghrabi
Title:	CEO
Company:	Madaen Group
Email:	
Tel:	+966 55 334 3600

Section1: Business Process Management in your organization

Q1. Are work processes documented?

- ☐ 1. Never
- ☒ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Even when documented, the documentation is lacking professionalism and accuracy

Q2. Does your organization use defined standard process model for each process category?

- ☒ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q3. Are automation tools (such ERP) consistent with the documented processes?

- ☒ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q4. Does your organization review and update work processes?

- ☐ 1. Never
- ☒ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q5. Does your organization apply change control on process documentation changes and improvements?

- ☒ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q6. How well does your organization's business process management system support continuous improvement and innovation?

- ☒ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Section2: Business performance factors and measures

Q1. How would you rate the operational efficiency of your organization?

- ☒ 1. Far below average
- ☐ 2. Below average
- ☐ 3. Average
- ☐ 4. Above average
- ☐ 5. Far above average

Comments:

Q2. How satisfied are you with the level of alignment between business process management and your organization's strategic goals?

- ☒ 1. Very dissatisfied
- ☐ 2. Dissatisfied
- ☐ 3. Neutral
- ☐ 4. Satisfied
- ☐ 5. Very satisfied

Comments:

Q3. How often does your organization's BPM system support the identification and elimination of bottlenecks in processes?

- ☒ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q4. How effective is your organization's business process management in reducing costs and improving financial performance?

- ☒ 1. Very ineffective
- ☐ 2. Ineffective
- ☐ 3. Somewhat effective
- ☐ 4. Effective
- ☐ 5. Very effective

Comments:

Q5. How well does your organization's business process management system support customer satisfaction and retention?

- ☒ 1. Not well at all
- ☐ 2. Not well
- ☐ 3. No effect on the support
- ☐ 4. Well
- ☐ 5. Very well

Comments:

Q6. How successful is your organization in measuring and monitoring key performance indicators (KPIs) related to business processes?

- ☒ 1. Not successful at all
- ☐ 2. Not successful
- ☐ 3. No effect on the success
- ☐ 4. Successful
- ☐ 5. Very successful

Comments:

Q7. How satisfied are you with the level of automation and digitization of business processes in your organization?

- ☒ 1. Very dissatisfied
- ☐ 2. Dissatisfied
- ☐ 3. Neutral
- ☐ 4. Satisfied
- ☐ 5. Very satisfied

Comments:

Any other Comments on the topic:

Very old strategy not updated and the business processes were biased towards internal operational activities rather than core business profit center activities.

Academic Survey

The Impact of Business Process Management on the Improvement of Performance Factors in Saudi Arabia

Dear participant,

As part of our graduation requirements for the Master of Business Administration, we are required to submit a final project research paper. The purpose of this survey is to investigate the impact of BPM on performance factors in organizations in Saudi Arabia. The study aims to understand the current practices and to assess how these practices influence the performance factors.

We appreciate your contribution to this study by providing accurate feedback to the best of your knowledge. The survey will take you less than 15 minutes to complete and all the questions are rated using a scale from 1-to-5 ranking from worst-to-best respectively.

Thank you,

Jafar Alrashid and Reham Alzawad

Optional Participant's information:

Name:

Saed Al-Harthi

Title:

Head of Operations

Company:

STCS

Email:

Tel:

056 933 6 119

Section1: Business Process Management in your organization

Q1. Are work processes documented?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☒ 4. Often
- ☐ 5. Always

Comments:

Q2. Does your organization use defined standard process model for each process category?

- ☐ 1. Never
- ☐ 2. Rarely
- ☒ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q3. Are automation tools (such ERP) consistent with the documented processes?

- ☐ 1. Never
- ☒ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q4. Does your organization review and update work processes?

- ☒ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q5. Does your organization apply change control on process documentation changes and improvements?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☒ 4. Often
- ☐ 5. Always

Comments:

Q6. How well does your organization's business process management system support continuous improvement and innovation?

- ☐ 1. Never
- ☒ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Section2: Business performance factors and measures

Q1. How would you rate the operational efficiency of your organization?

- ☐ 1. Far below average
- ☒ 2. Below average
- ☐ 3. Average
- ☐ 4. Above average
- ☐ 5. Far above average

Comments:

Q2. How satisfied are you with the level of alignment between business process management and your organization's strategic goals?

- ☐ 1. Very dissatisfied
- ☒ 2. Dissatisfied
- ☐ 3. Neutral
- ☐ 4. Satisfied
- ☐ 5. Very satisfied

Comments:

Q3. How often does your organization's BPM system support the identification and elimination of bottlenecks in processes?

- ☒ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q4. How effective is your organization's business process management in reducing costs and improving financial performance?

- ☒ 1. Very ineffective
- ☐ 2. Ineffective
- ☐ 3. Somewhat effective
- ☐ 4. Effective
- ☐ 5. Very effective

Comments:

Q5. How well does your organization's business process management system support customer satisfaction and retention?

- ☐ 1. Not well at all
- ☒ 2. Not well
- ☐ 3. No effect on the support
- ☐ 4. Well
- ☐ 5. Very well

Comments:

Q6. How successful is your organization in measuring and monitoring key performance indicators (KPIs) related to business processes?

- ☐ 1. Not successful at all
- ☒ 2. Not successful
- ☐ 3. No effect on the success
- ☐ 4. Successful
- ☐ 5. Very successful

Comments:

Q7. How satisfied are you with the level of automation and digitization of business processes in your organization?

- ☒ 1. Very dissatisfied
- ☐ 2. Dissatisfied
- ☐ 3. Neutral
- ☐ 4. Satisfied
- ☐ 5. Very satisfied

Comments:

Any other Comments on the topic:

Academic Survey

The Impact of Business Process Management on the Improvement of Performance Factors in Saudi Arabia

Dear participant,

As part of our graduation requirements for the Master of Business Administration, we are required to submit a final project research paper. The purpose of this survey is to investigate the impact of BPM on performance factors in organizations in Saudi Arabia. The study aims to understand the current practices and to assess how these practices influence the performance factors.

We appreciate your contribution to this study by providing accurate feedback to the best of your knowledge. The survey will take you less than 15 minutes to complete and all the questions are rated using a scale from 1-to-5 ranking from worst-to-best respectively.

Thank you,

Jafar Alrashid and Reham Alzawad

Optional Participant's information:

Name:	<u>Mona Almarshadi</u>
Title:	<u>Business process consultant</u>
Company:	<u>Ministry of finance</u>
Email:	<u>M.almarshadi.elm@mof.gov.sa</u>
Tel:	<u></u>

Section1: Business Process Management in your organization

Q1. Are work processes documented?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☒ 5. Always

Comments:

Q2. Does your organization use defined standard process model for each process category?

- ☐ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☒ 4. Often
- ☐ 5. Always

Comments:

Q3. Are automation tools (such ERP) consistent with the documented processes?

- ☒ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q4. Does your organization review and update work processes?

- ☐ 1. Never
- ☐ 2. Rarely
- ☒ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q5. Does your organization apply change control on process documentation changes and improvements?

- ☒ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q6. How well does your organization's business process management system support continuous improvement and innovation?

- ☐ 1. Never
- ☐ 2. Rarely
- ☒ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Section2: Business performance factors and measures

Q1. How would you rate the operational efficiency of your organization?

- ☐ 1. Far below average
- ☐ 2. Below average
- ☒ 3. Average
- ☐ 4. Above average
- ☐ 5. Far above average

Comments:

Q2. How satisfied are you with the level of alignment between business process management and your organization's strategic goals?

- ☐ 1. Very dissatisfied
- ☐ 2. Dissatisfied
- ☐ 3. Neutral
- ☒ 4. Satisfied
- ☐ 5. Very satisfied

Comments:

Q3. How often does your organization's BPM system support the identification and elimination of bottlenecks in processes?

- ☒ 1. Never
- ☐ 2. Rarely
- ☐ 3. Sometimes
- ☐ 4. Often
- ☐ 5. Always

Comments:

Q4. How effective is your organization's business process management in reducing costs and improving financial performance?

- ☐ 1. Very ineffective
- ☒ 2. Ineffective
- ☐ 3. Somewhat effective
- ☐ 4. Effective
- ☐ 5. Very effective

Comments:

Q5. How well does your organization's business process management system support customer satisfaction and retention?

- ☐ 1. Not well at all
- ☐ 2. Not well
- ☐ 3. No effect on the support
- ☒ 4. Well
- ☐ 5. Very well

Comments:

Q6. How successful is your organization in measuring and monitoring key performance indicators (KPIs) related to business processes?

- ☐ 1. Not successful at all
- ☒ 2. Not successful
- ☐ 3. No effect on the success
- ☐ 4. Successful
- ☐ 5. Very successful

Comments:

Q7. How satisfied are you with the level of automation and digitization of business processes in your organization?

- ☐ 1. Very dissatisfied
- ☒ 2. Dissatisfied
- ☐ 3. Neutral
- ☐ 4. Satisfied
- ☐ 5. Very satisfied

Comments:

Any other Comments on the topic:

Dear Mr. Ahmed,

As per our telephone conversation, I would like to thank you for setting up a meeting with key stakeholders in your organization for the discussed interview for our research paper on “The Impact of Business Process Management on the Improvement of Performance Factors in Saudi Arabia”

The agenda would be to listen to your feedback on the subject and discuss getting access to staff and information on a selected study case that will be selected from listening to your issues and challenges related to BPM and organizational performance factors.

Best regards,

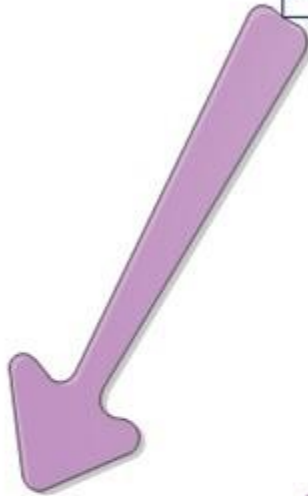
Jafar Al-Rashid and Reham Alzawad.

Master’s of Business Administration candidates – Midocean University.

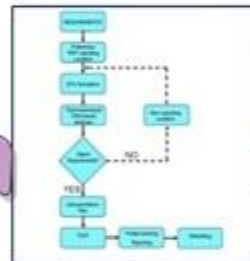


NOC Monitoring

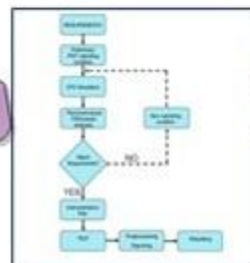
909



STCAS NOC CF



STCAS NOC Support Process



**MRS Assurance
& Delivery Process**



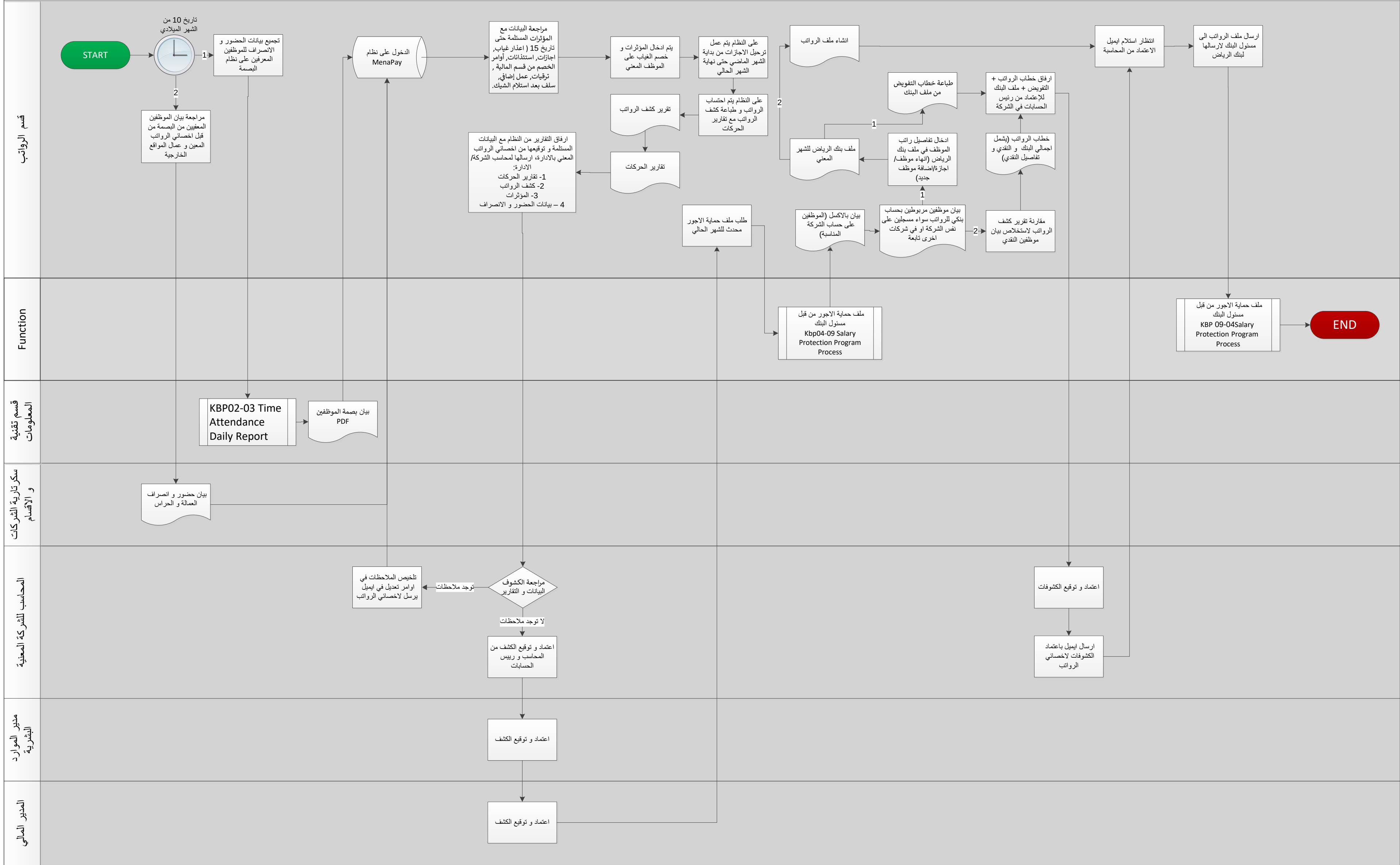
Vendor Support Process



RMA Process

Kbp 01-02 payroll process

HR AS-IS



Invoicing issue with Madaaen



Maadaen invoicing fr-ag

- 105 M

Initiative Ops Excellence.

PMO - Key Accs. - مکمل

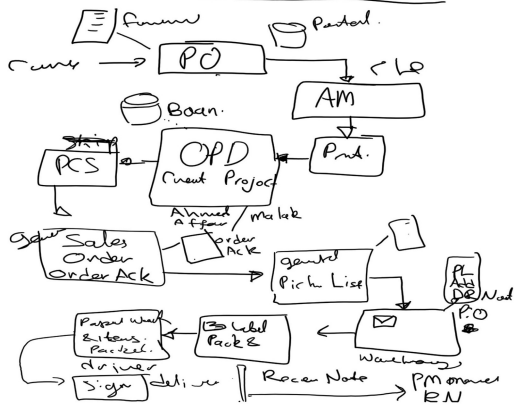
SABC + Mader

PM ← AM
Not doing his job
+
issues.

فوترة معادن %
(طاله اقدم) ٤ مليون
 ملاك - مست -
 أصفهان - معلومة خطه
 چان - طرف
 حرق النهر ٥٠٠ م
 نقا صل اثرات الفوترة

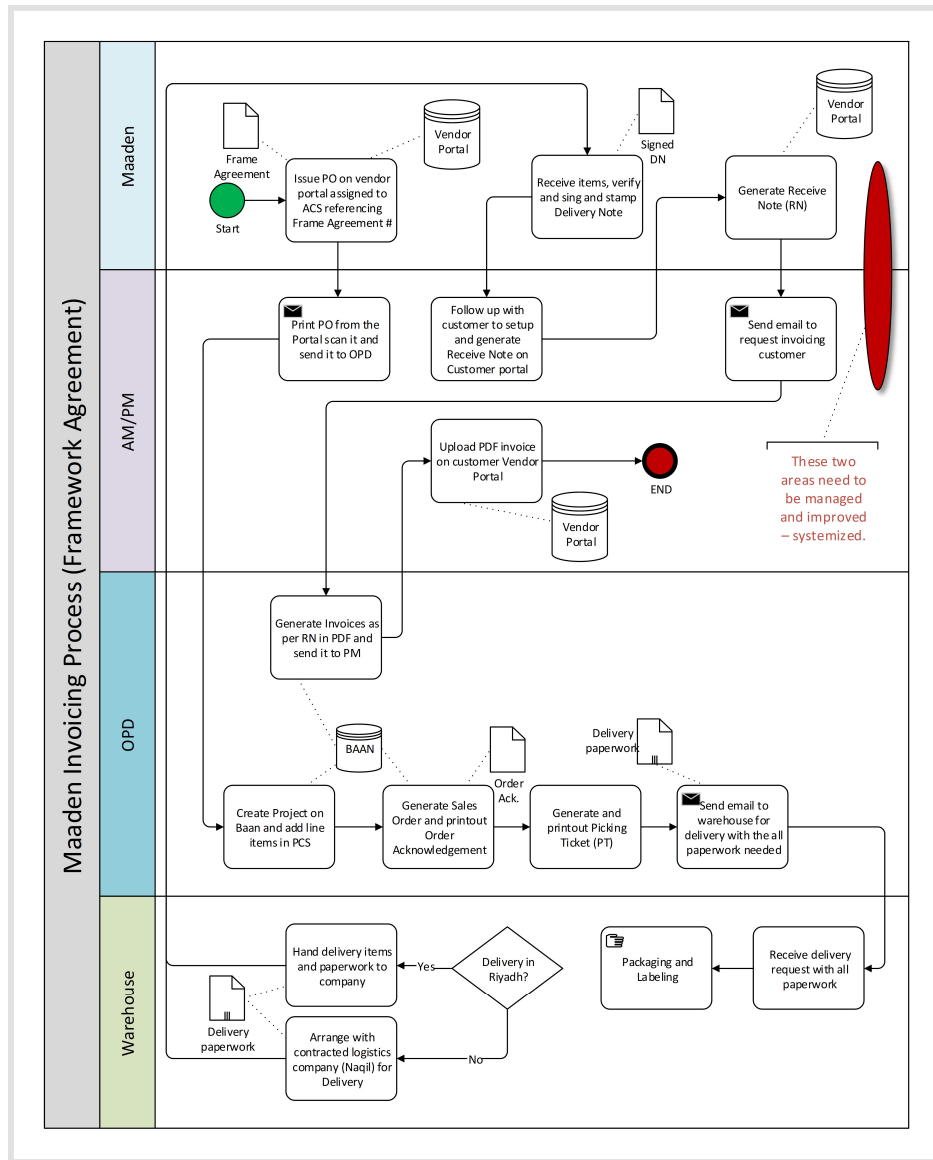
Master Invoicing Issues

Hazeeq access right to
involving by Khalid Mks



Maaden Invoicing Issues.

- o Nine different P.O types according to entity.
- o No standard on compliance to signed T&C as per France Work agreement.
- o RN issues. Process Consultancy N.B.
Customer does not update portal w/ RN although D.N is signed & Signed.
- o Customer sometimes order from one entity but Delivery req to another, warehouse as per PO, but DN addresses as per delivery request.
- o Customer data is not up to date regarding employee location.



#	رقم المشروع	مالك المشروع	مدير المشروع	المشروع	المخاطر	الحالة	الأولوية	الأثر	الاحتمالية	الفئة	خطة مواجهة الخطر	خطة نقل الأثر	تاريخ العمل
2	6.99.4.0.003	عامر بكر المومى		دائرة إطلاق الخدمات الالكترونية	عدم جاهزية البيئة التقنية لدى الجهات الحكومية	نشطة	متوسطة	4 - ع	3 - متوسط	الوقت	إرسال المتطلبات التقنية للجهات الحكومية لتوفير الأدوات اللازمة	إرسال المتطلبات التقنية للجهات الحكومية لتوفير الأدوات اللازمة	01 Jan 19
3	6.99.4.0.003	عامر بكر المومى		دائرة إطلاق الخدمات الالكترونية	نقص البنية لدى الجهات الحكومية	نشطة	منخفضة	3 - متوسط	3 - متوسط	الوقت	مقابلة مع الجهات الحكومية لرفع البنية لديها	مقابلة مع الجهات الحكومية لرفع البنية لديها	01 Jan 19
4	2.4.1.0.003	عبدالمجيد عبدالرحمن الفهد		دائرة التغيير لتفعيل نظام المنافسات والمشتريات الجديد	تأخر اعتماد الوثائق من قبل أصحاب العلاقة	نشطة	منخفضة	3 - متوسط	2 - منخفض	الوقت	التصديق على الوثائق	التصديق على الوثائق	18 Feb 20
5	2.4.1.0.003	عبدالمجيد عبدالرحمن الفهد		دائرة التغيير لتفعيل نظام المنافسات والمشتريات الجديد	تأخر إطلاق نظام المنافسات والمشتريات الحكومية	نشطة	عالية	4 - ع	4 - ع	الوقت	إعداد جدول مخرجات المشروع	إعداد جدول مخرجات المشروع	22 May 19
6	3.2.1.2.006	نايف عبدالله الغملاص		إدارة التغيير والتطوير والتدريب لتطبيق الرقابة الذاتية	عدم حضور كبار مسؤولين الجهات الحكومية ورش العمل	نشطة	منخفضة	4 - ع	1 - منخفض	الوقت	طلب من المهندسين الاستشاريين إعداد محتوى لبرنامج لرفع البنية لدى الجهات الحكومية	طلب من المهندسين الاستشاريين إعداد محتوى لبرنامج لرفع البنية لدى الجهات الحكومية	01 Jan 20
7	3.2.1.2.006	نايف عبدالله الغملاص		إدارة التغيير والتطوير والتدريب لتطبيق الرقابة الذاتية	عدم تعاون الجهات الحكومية لمبدأ الرقابة الذاتية	نشطة	متوسطة	4 - ع	3 - متوسط	الوقت	طلب الدعم من الجهات التشريعية	طلب الدعم من الجهات التشريعية	01 Jan 20
8	3.2.1.2.006	نايف عبدالله الغملاص		إدارة التغيير والتطوير والتدريب لتطبيق الرقابة الذاتية	تأخر جاهزية المنصة الالكترونية الخاصة بالتدريب	نشطة	متوسطة	4 - ع	3 - متوسط	الوقت	استكمال إعداد المنصة وطلب الدعم من قبل الزملاء وكالة التقنية	استكمال إعداد المنصة وطلب الدعم من قبل الزملاء وكالة التقنية	01 May 20
9	3.2.1.2.006	نايف عبدالله الغملاص		إدارة التغيير والتطوير والتدريب لتطبيق الرقابة الذاتية	عدم توافق المحتوى التدريبي مع أهداف المبادرة	نشطة	منخفضة	4 - ع	1 - منخفض	الوقت	تحديث البرامج التدريبية حسب الحاجة	تحديث البرامج التدريبية حسب الحاجة	01 Feb 20
10	3.2.1.2.006	نايف عبدالله الغملاص		إدارة التغيير والتطوير والتدريب لتطبيق الرقابة الذاتية	تأخر موافقة المقام السلي على استثناء الجهات محل التجربة من الأنظمة	نشطة	عالية	5 - ع	4 - ع	الوقت	مخاطبة هيئة الخبراء من قبل مدير مديرية المالية للتطبيق الذي تم رفعه	مخاطبة هيئة الخبراء من قبل مدير مديرية المالية للتطبيق الذي تم رفعه	09 Jun 19
11	7.99.2.1.003	Aljohara T. Alotaibi	لجوهرة العتيبي	إشقة وإدخال بيانات الموظفين بالوزارة	عدم تمكن الماول من إنهاء المشروع في التاريخ المتوقع	نشطة	متوسطة	5 - ع	3 - متوسط	الوقت	تطبيق غرامة مالية بنسبة 10% على الاستشاريين	تطبيق غرامة مالية بنسبة 10% على الاستشاريين	04 Jul 19
12	5.1.0.0.002	عبدالله محمد الغنام	عبدالله محمد الغنام	إستراتيجية تعزيز حضور الدوا والإقليمي للمملكة	عدم توفر الخبرة الكافية لتنفيذ إستراتيجية تعزيز حضور الدوا والإقليمي للمملكة	نشطة	منخفضة	5 - ع	1 - منخفض	الوقت	الحصول على الدعم اللازم من الجهات الغير ربحية والمتخصصة لتنفيذ المشروع	الحصول على الدعم اللازم من الجهات الغير ربحية والمتخصصة لتنفيذ المشروع	12 Jun 19
13	5.1.0.0.002	عبدالله محمد الغنام	عبدالله محمد الغنام	إستراتيجية تعزيز حضور الدوا والإقليمي للمملكة	عدم وجود عدد كاف من الخبراء لتفعيل هذه الإستراتيجية	نشطة	متوسطة	4 - ع	3 - متوسط	الوقت	التعاقد مع بيت خبرة لتفعيل هذه الإستراتيجية	التعاقد مع بيت خبرة لتفعيل هذه الإستراتيجية	20 Jun 19
14	5.1.0.0.002	عبدالله محمد الغنام	عبدالله محمد الغنام	إستراتيجية تعزيز حضور الدوا والإقليمي للمملكة	صعوبة قياس المؤشر الإستراتيجي	نشطة	عالية	5 - ع	5 - ع	الوقت	تطوير مؤشر ومؤشر مناسب بعد الدراسة	تطوير مؤشر ومؤشر مناسب بعد الدراسة	30 May 19
15	1.4.1.0.002	#N/A	ريان ظافر الدريس	إستكمال أتمتة الاجراءات الجمركية	صعوبة توليق متطلبات العمل	نشطة	متوسطة	5 - ع	3 - متوسط	الوقت	العمل على توثيق متطلبات العمل لإجتناب تأخر المشروع	العمل على توثيق متطلبات العمل لإجتناب تأخر المشروع	31 Jan 19
16	1.4.1.0.002	#N/A	ريان ظافر الدريس	إستكمال أتمتة الاجراءات الجمركية	إحتمالية عدم توفر أجهزة البنية التحتية	نشطة	متوسطة	5 - ع	3 - متوسط	الوقت	توفر أجهزة البنية التحتية اللازمة لتنفيذ المشروع	توفر أجهزة البنية التحتية اللازمة لتنفيذ المشروع	31 Jan 19
17	2.1.1.0.002	بدر سعود التميمي	مصطفى فتح علي	إعداد قاعدة بيانات لتكاليف المشاريع - البرامج	إلغاء المنافسة بسبب اعتماد راع المشروع لميزانية أقل مما هو مخطط للمرحلة الثانية	نشطة	عالية	5 - ع	5 - ع	الوقت	إرسال تفاصيل مخطط الميزانية إلى مالك المشروع	إرسال تفاصيل مخطط الميزانية إلى مالك المشروع	27 Jun 19
18	4.2.1.0.003	إيد فوزان الفهد	إيد فوزان الفهد	إعداد وتنفيذ خطة تحويل مصلحة أملاك الدولة إلى الهيئة العامة لمعارف الدولة	تأخر التجيزات والمكاتب والمتطلبات للإستشاريين	نشطة	عالية	4 - ع	4 - ع	الوقت	الحصول على الدعم اللازم من الجهات الحكومية لتوفير الأدوات اللازمة	الحصول على الدعم اللازم من الجهات الحكومية لتوفير الأدوات اللازمة	31 Jul 19
19	4.2.1.0.003	إيد فوزان الفهد	إيد فوزان الفهد	إعداد وتنفيذ خطة تحويل مصلحة أملاك الدولة إلى الهيئة العامة لمعارف الدولة	مقاومة التغيير وعدم إمتثال الموظفين للتغيير	نشطة	عالية	5 - ع	5 - ع	الوقت	العمل على إشراك أعضاء مجلس الإدارة في نشر توعية الموظفين	العمل على إشراك أعضاء مجلس الإدارة في نشر توعية الموظفين	31 Jul 19
20	3.2.1.2.008	عمر عبدالعزيز الحيلان	عمر عبدالعزيز الحيلان	إشياء وحدة مراقبة الأنظمة المالية المركزية	عدم توفر الكوادر البشرية المؤهلة للقيام بمهام الإدارة	نشطة	متوسطة	5 - ع	3 - متوسط	الوقت	استكمال إعداد الكوادر البشرية المؤهلة للقيام بمهام الإدارة	استكمال إعداد الكوادر البشرية المؤهلة للقيام بمهام الإدارة	31 Mar 21
21	3.2.1.2.008	عمر عبدالعزيز الحيلان	عمر عبدالعزيز الحيلان	إشياء وحدة مراقبة الأنظمة المالية المركزية	عدم تغطية جميع الأنظمة والخدمات والأنظمة والخدمات المستقطبة	نشطة	متوسطة	5 - ع	2 - منخفض	الوقت	التنسيق مع المعنيين لتنفيذ خطة عمل لتغطية النظام	التنسيق مع المعنيين لتنفيذ خطة عمل لتغطية النظام	31 Mar 21
22	3.2.1.1.002	خالد مامون الرواف	محمد رفيق عثمانة	تأثير التدريب والتطوير والتغيير لبرنامج التحول المحاسبي إلى أساس الاستحقاق	عدم جاهزية الأنظمة المحاسبية	نشطة	متوسطة	3 - متوسط	3 - متوسط	الوقت			28 Feb 19
23	1.6.1.0.004	#N/A	محمد امين الفراحنة	البنية التحتية الرقمية وأتمتة عمليات مكتب إدارة الدين	حتمال إعادة الطرح للمرة الثالثة	نشطة	عالية	5 - ع	5 - ع	الوقت	إستخدام نظام بلومبرغ AIM بإشتراك سنوي	إستخدام نظام بلومبرغ AIM بإشتراك سنوي	13 Jun 19
24	1.6.1.0.004	#N/A	محمد امين الفراحنة	البنية التحتية الرقمية وأتمتة عمليات مكتب إدارة الدين	عدم مطابقة المواصفات أو إتمام التعديلات التي تم بها (ضعف الجودة)	نشطة	منخفضة	1 - منخفض	1 - منخفض	الوقت	تفعيل الإجراءات التصحيحية تعاقدي ومنها توجيه إنذار إن لم يتم الأمر وتفعيل بند الخصم	تفعيل الإجراءات التصحيحية تعاقدي ومنها توجيه إنذار إن لم يتم الأمر وتفعيل بند الخصم	30 May 19
25	1.6.1.0.004	#N/A	محمد امين الفراحنة	البنية التحتية الرقمية وأتمتة عمليات مكتب إدارة الدين	زيادة التكاليف	نشطة	عالية	4 - ع	4 - ع	الوقت	الوقت اللازم من الإستراتيجية زيادة الميزانية أو عدم تنفيذ مخرج فعلي لإشراك بلومبرغ	الوقت اللازم من الإستراتيجية زيادة الميزانية أو عدم تنفيذ مخرج فعلي لإشراك بلومبرغ	13 Jun 19
26	1.6.1.0.004	#N/A	محمد امين الفراحنة	البنية التحتية الرقمية وأتمتة عمليات مكتب إدارة الدين	ضعف الجودة	نشطة	منخفضة	1 - منخفض	1 - منخفض	الوقت	طلب خدمات إستشاري في ليقوم بمراقبة الجودة والإسلام	طلب خدمات إستشاري في ليقوم بمراقبة الجودة والإسلام	01 Aug 19
27	1.6.1.0.004	#N/A	محمد امين الفراحنة	البنية التحتية الرقمية وأتمتة عمليات مكتب إدارة الدين	إستخدام الإستشاري لموظفين ذوي كفاءة أقل من المستوى المطلوب	نشطة	منخفضة	1 - منخفض	1 - منخفض	الوقت	تفعيل الإجراءات التصحيحية تعاقدي ومنها توجيه إنذار إن لم يتم الأمر وتفعيل بند الخصم	تفعيل الإجراءات التصحيحية تعاقدي ومنها توجيه إنذار إن لم يتم الأمر وتفعيل بند الخصم	01 Jul 19
28	1.6.1.0.004	#N/A	محمد امين الفراحنة	البنية التحتية الرقمية وأتمتة عمليات مكتب إدارة الدين	تأخر تجهيز البنية التحتية اللازمة	نشطة	منخفضة	1 - منخفض	1 - منخفض	الوقت	لتصعيد لأصحاب الصلاحية إن لم يتم الأمر من مرحلة التخطيط لتفعيل الخطة	لتصعيد لأصحاب الصلاحية إن لم يتم الأمر من مرحلة التخطيط لتفعيل الخطة	13 Jun 19
29	1.6.1.0.004	#N/A	محمد امين الفراحنة	البنية التحتية الرقمية وأتمتة عمليات مكتب إدارة الدين	تأخر الموافقات أو الإسلام	نشطة	منخفضة	1 - منخفض	1 - منخفض	الوقت	للبدية وإستخدام مصادر خارجية لتوفير خدمات مدفوعة	للبدية وإستخدام مصادر خارجية لتوفير خدمات مدفوعة	02 Jun 19
30	6.99.4.0.004	هديل محمد الوقيت		التحسينات العاجلة لفئة التكامل ومستودع البيانات	عدم تحديث/ إنشاء مركز البيانات الخاص ببيئة تعلم من الكوارث من قبل الوزارة خلال الوقت المحدد	نشطة	متوسطة	5 - ع	3 - متوسط	أخرى	طلب المساعدة من مرحلة التخطيط من أصحاب الصلاحية عند إستمرار المشكلة	طلب المساعدة من مرحلة التخطيط من أصحاب الصلاحية عند إستمرار المشكلة	31 Jul 19
31	6.99.4.0.004	هديل محمد الوقيت		التحسينات العاجلة لفئة التكامل ومستودع البيانات	تأخر إطلاق بعض المشاريع المرتبطة أو إلغاؤها من قبل الوزارة	نشطة	منخفضة	1 - منخفض	3 - متوسط	أخرى	تأخر الخطة، يقوم الفريق بإنشاء بيئة التعلم من الكوارث للتكامل في أي من مراكز البيانات، والوزارة قد تم تأجيله، والوزارة		

50	7.99.2.0.004	مشاري محمد الذبيان	مشاري محمد الذبيان	لخدمات الإستشارية لتوثيق وتحسين اجراءات العمل	عدم الإلمام التام بتفاصيل الإجراءات من قبل المعنيين	نشطة	متوسطة	5 - علي جدار	3 - متوسط	نشطة	عدم الإلمام التام بتفاصيل الإجراءات من قبل المعنيين	لخدمات الإستشارية لتوثيق وتحسين اجراءات العمل	مشاري محمد الذبيان	50
51	7.99.2.0.004	مشاري محمد الذبيان	مشاري محمد الذبيان	لخدمات الإستشارية لتوثيق وتحسين اجراءات العمل	مقاومة التطوير وعدم امتثال الموظفين للاجراءات المستحدنة	نشطة	عالية	4 - علي	4 - علي	نشطة	مقاومة التطوير وعدم امتثال الموظفين للاجراءات المستحدنة	لخدمات الإستشارية لتوثيق وتحسين اجراءات العمل	مشاري محمد الذبيان	51
52	7.99.2.0.004	مشاري محمد الذبيان	مشاري محمد الذبيان	لخدمات الإستشارية لتوثيق وتحسين اجراءات العمل	لنداخلية الخدمات والمهام بين الوكالات والادارات	نشطة	عالية	5 - علي جدار	5 - علي جدار	نشطة	لنداخلية الخدمات والمهام بين الوكالات والادارات	لخدمات الإستشارية لتوثيق وتحسين اجراءات العمل	مشاري محمد الذبيان	52
53	2.5.1.0.005	بشير احمد موسى		لدراسات التفصيلية لمبادرات برامج تحقيق الرؤية (المرحلة الثانية)	تأخر اعتماد الوثائق من قبل أصحاب العلاقة	نشطة	منخفضة	1 - منخفض جدار	1 - منخفض جدار	نشطة	تأخر اعتماد الوثائق من قبل أصحاب العلاقة	لدراسات التفصيلية لمبادرات برامج تحقيق الرؤية (المرحلة الثانية)	بشير احمد موسى	53
54	2.4.1.0.002	عبدالمجسن عبدالرحمن الفهيد	عبدالمجسن عبدالرحمن الفهيد	لدعم الاستشاري لوحدة الشراء الاستراتيجي	التأخرياعتماد النظام واللائحة التنفيذية	نشطة	متوسطة	5 - علي جدار	2 - منخفض جدار	نشطة	التأخرياعتماد النظام واللائحة التنفيذية	لدعم الاستشاري لوحدة الشراء الاستراتيجي	عبدالمجسن عبدالرحمن الفهيد	54
55	2.1.1.0.015	إليد فوزان الفهد		لائحة التنظيمية لاعاد وتنفيذ الميزانية	عدم الاظمنة والوثائق التي يجب موازنة معها	نشطة	عالية	4 - علي	4 - علي	نشطة	عدم الاظمنة والوثائق التي يجب موازنة معها	لائحة التنظيمية لاعاد وتنفيذ الميزانية	إليد فوزان الفهد	55
56	2.1.1.0.015	إليد فوزان الفهد		لائحة التنظيمية لاعاد وتنفيذ الميزانية	تأخير التجهيزات والمكاتب والمتطلبات للاستشاري	نشطة	عالية	4 - علي	4 - علي	نشطة	تأخير التجهيزات والمكاتب والمتطلبات للاستشاري	لائحة التنظيمية لاعاد وتنفيذ الميزانية	إليد فوزان الفهد	56
57	4.1.1.0.003	عبدالإله يوسف المسعود	حمد خيران الغبيغل	برنامج أملاك الحصر والمسح للأراضي والعقارات	زيادة عدد العقارات الغير معروفة	نشطة	عالية	4 - علي	4 - علي	نشطة	زيادة عدد العقارات الغير معروفة	برنامج أملاك الحصر والمسح للأراضي والعقارات	عبدالإله يوسف المسعود	57
58	4.1.1.0.003	عبدالإله يوسف المسعود	حمد خيران الغبيغل	برنامج أملاك الحصر والمسح للأراضي والعقارات	حدث التأخير بسبب عدم الحصول على البيانات والمعلومات الجغرافية من الجهات المالكة للبيانات وعدم الحصول على بيانات العقارات من الجهات المستفيدة	نشطة	منخفضة	1 - منخفض جدار	1 - منخفض جدار	نشطة	حدث التأخير بسبب عدم الحصول على البيانات والمعلومات الجغرافية من الجهات المالكة للبيانات وعدم الحصول على بيانات العقارات من الجهات المستفيدة	برنامج أملاك الحصر والمسح للأراضي والعقارات	عبدالإله يوسف المسعود	58
59	3.2.1.2.007	نايف عبدالله الغملاس		بناء إدارة التقييم والالتزام الرقيلي	عدم تماشي إجراءات الإدارة مع الإدارات/الوكالة/الجهات الرقابية	نشطة	متوسطة	4 - علي	2 - منخفض جدار	نشطة	عدم تماشي إجراءات الإدارة مع الإدارات/الوكالة/الجهات الرقابية	بناء إدارة التقييم والالتزام الرقيلي	نايف عبدالله الغملاس	59
60	3.2.1.2.007	نايف عبدالله الغملاس		بناء إدارة التقييم والالتزام الرقيلي	عدم تجاوب الجهات الحكومية مع عمل الادارة	نشطة	متوسطة	4 - علي	2 - منخفض جدار	نشطة	عدم تجاوب الجهات الحكومية مع عمل الادارة	بناء إدارة التقييم والالتزام الرقيلي	نايف عبدالله الغملاس	60
61	3.2.1.2.007	نايف عبدالله الغملاس		بناء إدارة التقييم والالتزام الرقيلي	عدم اعتماد القوانين والتشريعات من الجهات المسؤولة	نشطة	متوسطة	4 - علي	2 - منخفض جدار	نشطة	عدم اعتماد القوانين والتشريعات من الجهات المسؤولة	بناء إدارة التقييم والالتزام الرقيلي	نايف عبدالله الغملاس	61
62	3.2.1.2.007	نايف عبدالله الغملاس		بناء إدارة التقييم والالتزام الرقيلي	عدم توافر الكوادر البشرية المؤهلة للعملعلى الإدارة	نشطة	متوسطة	4 - علي	2 - منخفض جدار	نشطة	عدم توافر الكوادر البشرية المؤهلة للعملعلى الإدارة	بناء إدارة التقييم والالتزام الرقيلي	نايف عبدالله الغملاس	62
63	3.2.1.2.007	نايف عبدالله الغملاس		بناء إدارة التقييم والالتزام الرقيلي	تأخر موافقة المقام السليح باستثناء الجهات محل التجربة من الأنظمة بما سيؤدي إلى إيقاف المشروع	نشطة	عالية	5 - علي جدار	4 - علي	نشطة	تأخر موافقة المقام السليح باستثناء الجهات محل التجربة من الأنظمة بما سيؤدي إلى إيقاف المشروع	بناء إدارة التقييم والالتزام الرقيلي	نايف عبدالله الغملاس	63
64	2.2.1.0.006	بدر عبدالله العريخ		بناء وتأسيس وحدة الخزينة بوزارة المالية و التطبيق التجريبي	عدم جاهزية الجهات الحكومية المستهدفة بالتطبيق التجريبي لتنفيذ جراءات وسياسات إدارة الخزينة	نشطة	عالية	5 - علي جدار	4 - علي	نشطة	عدم جاهزية الجهات الحكومية المستهدفة بالتطبيق التجريبي لتنفيذ جراءات وسياسات إدارة الخزينة	بناء وتأسيس وحدة الخزينة بوزارة المالية و التطبيق التجريبي	بدر عبدالله العريخ	64
65	2.2.1.0.006	بدر عبدالله العريخ		بناء وتأسيس وحدة الخزينة بوزارة المالية و التطبيق التجريبي	مقاومة الجهات الحكومية لتطبيق إجراءات وسياسات إدارة الخزينة	نشطة	منخفضة	5 - علي جدار	1 - منخفض جدار	نشطة	مقاومة الجهات الحكومية لتطبيق إجراءات وسياسات إدارة الخزينة	بناء وتأسيس وحدة الخزينة بوزارة المالية و التطبيق التجريبي	بدر عبدالله العريخ	65
66	2.2.1.0.006	بدر عبدالله العريخ		بناء وتأسيس وحدة الخزينة بوزارة المالية و التطبيق التجريبي	تأخر طرح كراسات ومواصفات المشاريع المرتبط بأعمال إدارة الخزينة	نشطة	منخفضة	1 - منخفض جدار	1 - منخفض جدار	نشطة	تأخر طرح كراسات ومواصفات المشاريع المرتبط بأعمال إدارة الخزينة	بناء وتأسيس وحدة الخزينة بوزارة المالية و التطبيق التجريبي	بدر عبدالله العريخ	66
67	2.2.1.0.006	بدر عبدالله العريخ		بناء وتأسيس وحدة الخزينة بوزارة المالية و التطبيق التجريبي	لتأخر بالبدء بالتطبيق التجريبي خلال الربع الرابع من 2019 م	نشطة	متوسطة	5 - علي جدار	3 - متوسط	نشطة	لتأخر بالبدء بالتطبيق التجريبي خلال الربع الرابع من 2019 م	بناء وتأسيس وحدة الخزينة بوزارة المالية و التطبيق التجريبي	بدر عبدالله العريخ	67
68	2.2.1.0.006	بدر عبدالله العريخ		بناء وتأسيس وحدة الخزينة بوزارة المالية و التطبيق التجريبي	عدم توفر كفاءات بشرية لتشغيل إدارة الخزينة بفعالية	نشطة	عالية	5 - علي جدار	4 - علي	نشطة	عدم توفر كفاءات بشرية لتشغيل إدارة الخزينة بفعالية	بناء وتأسيس وحدة الخزينة بوزارة المالية و التطبيق التجريبي	بدر عبدالله العريخ	68
69	2.2.1.0.006	بدر عبدالله العريخ		بناء وتأسيس وحدة الخزينة بوزارة المالية و التطبيق التجريبي	تأخر اكتمال تنصيب نظام إدارة الخزينة	نشطة	عالية	5 - علي جدار	5 - علي جدار	نشطة	تأخر اكتمال تنصيب نظام إدارة الخزينة	بناء وتأسيس وحدة الخزينة بوزارة المالية و التطبيق التجريبي	بدر عبدالله العريخ	69
70	8.99.3.1.001	عبدالله عبدالمجيد الحمودي	عبدالعزیز سليمان المالك	تأسيس وتشغيل مركز الإنصال الموحد	التأخريتهجيز مبنى الخدمة الشامل	نشطة	عالية	5 - علي جدار	5 - علي جدار	نشطة	التأخريتهجيز مبنى الخدمة الشامل	تأسيس وتشغيل مركز الإنصال الموحد	عبدالله عبدالمجيد الحمودي	70
71	8.99.3.1.001	عبدالله عبدالمجيد الحمودي	عبدالعزیز سليمان المالك	تأسيس وتشغيل مركز الإنصال الموحد	إنهاء عقد مركز الإنصال الموحد	نشطة	متوسطة	3 - متوسط	5 - علي جدار	نشطة	إنهاء عقد مركز الإنصال الموحد	تأسيس وتشغيل مركز الإنصال الموحد	عبدالله عبدالمجيد الحمودي	71
72	4.3.1.0.001	عبدالمجسن عبدالرحمن الفهيد	عبدالمجسن عبدالرحمن الفهيد	تأسيس إطار سياسة مالية خاص بدعم الشراكة بين القطاعين العام والخاص من خلال استخدام ميزانية الحكومة	تواصل مع الجهات ذات نفس التخصص والاستفادة من تجربتهم	نشطة	منخفضة	1 - منخفض جدار	1 - منخفض جدار	نشطة	تواصل مع الجهات ذات نفس التخصص والاستفادة من تجربتهم	تأسيس إطار سياسة مالية خاص بدعم الشراكة بين القطاعين العام والخاص من خلال استخدام ميزانية الحكومة	عبدالمجسن عبدالرحمن الفهيد	72
73	4.3.1.0.001	عبدالمجسن عبدالرحمن الفهيد	عبدالمجسن عبدالرحمن الفهيد	تأسيس إطار سياسة مالية خاص بدعم الشراكة بين القطاعين العام والخاص من خلال استخدام ميزانية الحكومة	التأخريالتسليمات لأي سبب كان مما يترتب عليه التأخري مشروع نظرا لاعتمادية المشروع 4.3.2	نشطة	متوسطة	4 - علي	3 - متوسط	نشطة	التأخريالتسليمات لأي سبب كان مما يترتب عليه التأخري مشروع نظرا لاعتمادية المشروع 4.3.2	تأسيس إطار سياسة مالية خاص بدعم الشراكة بين القطاعين العام والخاص من خلال استخدام ميزانية الحكومة	عبدالمجسن عبدالرحمن الفهيد	73
74	4.3.1.0.001	عبدالمجسن عبدالرحمن الفهيد	عبدالمجسن عبدالرحمن الفهيد	تأسيس إطار سياسة مالية خاص بدعم الشراكة بين القطاعين العام والخاص من خلال استخدام ميزانية الحكومة	التأخرياعتماد الوثائق من قبل أصحاب المصلحة	نشطة	منخفضة	3 - متوسط	2 - منخفض جدار	نشطة	التأخرياعتماد الوثائق من قبل أصحاب المصلحة	تأسيس إطار سياسة مالية خاص بدعم الشراكة بين القطاعين العام والخاص من خلال استخدام ميزانية الحكومة	عبدالمجسن عبدالرحمن الفهيد	74
77	4.2.1.0.002	إليد فوزان الفهد	إليد فوزان الفهد	تحديد إطار لتوقعات العوائد على الأصول العقارية	تأخير التجهيزات والمكاتب والمتطلبات للاستشاري	نشطة	متوسطة	4 - علي	3 - متوسط	نشطة	تأخير التجهيزات والمكاتب والمتطلبات للاستشاري	تحديد إطار لتوقعات العوائد على الأصول العقارية	إليد فوزان الفهد	77
79	4.2.1.0.001	عبدالمجسن عبدالرحمن الفهيد	عبدالمجسن عبدالرحمن الفهيد	تحديد إطار لتوقعات العوائد على الاحتياطيات التقديرية (الودائع)	عدم اتمام مخرجات المشروع وقها المجدد	نشطة	متوسطة	4 - علي	3 - متوسط	نشطة	عدم اتمام مخرجات المشروع وقها المجدد	تحديد إطار لتوقعات العوائد على الاحتياطيات التقديرية (الودائع)	عبدالمجسن عبدالرحمن الفهيد	79
80	4.3.1.0.002	عبدالمجسن عبدالرحمن الفهيد	عبدالمجسن عبدالرحمن الفهيد	حديث تكلفة وتوقعات التمويل للوزارة من الشراكة بين القطاعين العام والخاص	تأخر اعتمادات الوثائق من اصحاب الصلاحية	نشطة	منخفضة	3 - متوسط جدار	1 - منخفض جدار	نشطة	تأخر اعتمادات الوثائق من اصحاب الصلاحية	حديث تكلفة وتوقعات التمويل للوزارة من الشراكة بين القطاعين العام والخاص	عبدالمجسن عبدالرحمن الفهيد	80
81	4.3.1.0.002	عبدالمجسن عبدالرحمن الفهيد	عبدالمجسن عبدالرحمن الفهيد	حديث تكلفة وتوقعات التمويل للوزارة من الشراكة بين القطاعين العام والخاص	تأخر انجاز التسليمات بمشروع 4.3.1	نشطة	متوسطة	5 - علي جدار	2 - منخفض جدار	نشطة	تأخر انجاز التسليمات بمشروع 4.3.1	حديث تكلفة وتوقعات التمويل للوزارة من الشراكة بين القطاعين العام والخاص	عبدالمجسن عبدالرحمن الفهيد	81
82	4.3.1.0.002	عبدالمجسن عبدالرحمن الفهيد	عبدالمجسن عبدالرحمن الفهيد	حديث تكلفة وتوقعات التمويل للوزارة من الشراكة بين القطاعين العام والخاص	تأخر توظيف موظفي وحدة التخصص	نشطة	متوسطة	4 - علي	2 - منخفض جدار	نشطة	تأخر توظيف موظفي وحدة التخصص	حديث تكلفة وتوقعات التمويل للوزارة من الشراكة بين القطاعين العام والخاص	عبدالمجسن عبدالرحمن الفهيد	82
83	1.14.1.0.001	غازي فيم السحبي		حسين إجراءات تحصيل الإيرادات-المرحلة الأولى	مقاومة التغيير	نشطة	منخفضة	1 - منخفض جدار	1 - منخفض جدار	نشطة	مقاومة التغيير	حسين إجراءات تحصيل الإيرادات-المرحلة الأولى	غازي فيم السحبي	83
84	1.14.1.0.001	غازي فيم السحبي		حسين إجراءات تحصيل الإيرادات-المرحلة الأولى	دقة البيانات	نشطة	متوسطة	4 - علي	3 - متوسط جدار	نشطة	دقة البيانات	حسين إجراءات تحصيل الإيرادات-المرحلة الأولى	غازي فيم السحبي	84
85	2.2.1.0.005	عبدالعزیز فهد المسعود		حسين نظام الوثائق بإدارة الرقابة المالية	التأخرياكتمال المشروع	نشطة	عالية	5 - علي جدار	5 - علي جدار	نشطة	التأخرياكتمال المشروع	حسين نظام الوثائق بإدارة الرقابة المالية	عبدالعزیز فهد المسعود	85
86	3.2.1.2.005	عبدالعزیز فهد المسعود		حسين نظام الوثائق بإدارة الرقابة المالية	عدم جاهزية البنية التحتية لتطبيق المتطلبات التقنية	نشطة	متوسطة	5 - علي جدار	3 - متوسط جدار	نشطة	عدم جاهزية البنية التحتية لتطبيق المتطلبات التقنية	حسين نظام الوثائق بإدارة الرقابة المالية	عبدالعزیز فهد المسعود	86
87	3.2.1.2.005	عبدالعزیز فهد المسعود		حسين نظام الوثائق بإدارة الرقابة المالية	تغير نطاق العمل	نشطة	متوسطة	5 - علي جدار	3 - متوسط جدار	نشطة	تغير نطاق العمل	حسين نظام الوثائق بإدارة الرقابة المالية	عبدالعزیز فهد المسعود	87
88	8.99.3.1.002	بدر سعود الثبيتي	عبدالعزیز سليمان المالك	تحول تجربة العملاء	امكانية تأخر استلام الموقع	نشطة	متوسطة	3 - متوسط جدار	3 - متوسط جدار	نشطة	امكانية تأخر استلام الموقع	تحول تجربة العملاء	بدر سعود الثبيتي	88
89	8.1.5.0.002	امجد محمد بقرشان	إليد فوزان الفهد	دشين برنامج تطوير الجدارات المالية المصاحبة لمبادرات لتحويل بالوزارة	تأخر مدة المشروع	نشطة	عالية	5 - علي جدار	5 - علي جدار	نشطة	تأخر مدة المشروع	دشين برنامج تطوير الجدارات المالية المصاحبة لمبادرات لتحويل بالوزارة	امجد محمد بقرشان	89
90	8.1.5.0.002	امجد محمد بقرشان	إليد فوزان الفهد	دشين برنامج تطوير الجدارات المالية المصاحبة لمبادرات لتحويل بالوزارة	عدم تعاون الجهات الحكومية المستهدفة	نشطة	متوسطة	5 - علي جدار	3 - متوسط جدار	نشطة	عدم تعاون الجهات الحكومية المستهدفة	دشين برنامج تطوير الجدارات المالية المصاحبة لمبادرات لتحويل بالوزارة	امجد محمد بقرشان	90
91	8.1.5.0.002	امجد محمد بقرشان	إليد فوزان الفهد	دشين برنامج تطوير الجدارات المالية المصاحبة لمبادرات لتحويل بالوزارة	عدم التزام منسفي الماليةالجهات الحكومية بالتدريب	نشطة	متوسطة	5 - علي جدار	3 - متوسط جدار	نشطة	عدم التزام منسفي الماليةالجهات الحكومية بالتدريب	دشين برنامج تطوير الجدارات المالية المصاحبة لمبادرات لتحويل بالوزارة	امجد محمد بقرشان	91
92	8.1.5.0.002	امجد محمد بقرشان	إليد فوزان الفهد	دشين برنامج تطوير الجدارات المالية المصاحبة لمبادرات لتحويل بالوزارة	نشاط الكوادر الوظيفية الغير مستهدفة بالتدريب	نشطة	عالية	5 - علي جدار	5 - علي جدار	نشطة	نشاط الكوادر الوظيفية الغير مستهدفة بالتدريب	دشين برنامج تطوير الجدارات المالية المصاحبة لمبادرات لتحويل بالوزارة	امجد محمد بقرشان	92
93	8.1.5.0.002	امجد محمد بقرشان	إليد فوزان الفهد	دشين برنامج تطوير الجدارات المالية المصاحبة لمبادرات لتحويل بالوزارة	لتداخل والتعارض مع المشاريع القائمةالوزارة أو وزارة الخدمة المدنية	نشطة	منخفضة	5 - علي جدار	1 - منخفض جدار	نشطة	لتداخل والتعارض مع المشاريع القائمةالوزارة أو وزارة الخدمة المدنية	دشين برنامج تطوير الجدارات المالية المصاحبة لمبادرات لتحويل بالوزارة	امجد محمد بقرشان	93
94	8.1.5.0.002	امجد محمد بقرشان	إليد فوزان الفهد	دشين برنامج تطوير الجدارات المالية المصاحبة لمبادرات لتحويل بالوزارة	ضعف المهارات المالية الأساسية للشرائح المستهدفة بالتدريب	نشطة	عالية	5 - علي جدار	5 - علي جدار	نشطة	ضعف المهارات المالية الأساسية للشرائح المستهدفة بالتدريب	دشين برنامج تطوير الجدارات المالية المصاحبة لمبادرات لتحويل بالوزارة	امجد محمد بقرشان	94
95	8.99.3.1.003	عبدالله عبدالمجيد الحمودي		تشغيل مركز الخدمة الشامل	عدم استقرار موارد مزود الخدمة	نشطة	منخفضة	3 - متوسط جدار	1 - منخفض جدار	نشطة	عدم استقرار موارد مزود الخدمة	تشغيل مركز الخدمة الشامل	عبدالله عبدالمجيد الحمودي	95
96	1.6.1.0.003	محمد امين الفراحنه	#N/A	تشغيل مكتب إدارة الدين	ضعف جودة الأداء	نشطة	منخفضة	2 - منخفض جدار	2 - منخفض جدار	نشطة	ضعف جودة الأداء	تشغيل مكتب إدارة الدين	محمد امين الفراحنه	96
97	1.6.1.0.003	محمد امين الفراحنه	#N/A	تشغيل مكتب إدارة الدين	التأثير على عمليات المكتب سلبا	نشطة	منخفضة	1 - منخفض جدار	1 - منخفض جدار	نشطة	التأثير على عمليات المكتب سلبا	تشغيل مكتب إدارة الدين	محمد امين الفراحنه	97
98	1.4.1.0.003	سليمان الغليط	#N/A	تطبيق التدقيق الجيميعي اللاحق بعد الفسخ	عدم التعاون من قبل الشركات	نشطة	متوسطة	5 - علي جدار	3 - متوسط جدار	نشطة	عدم التعاون من قبل الشركات	تطبيق التدقيق الجيميعي اللاحق بعد الفسخ	سليمان الغليط	98
105	3.2.1.2.004	نايف عبدالله الغملاس	نايف عبدالله الغملاس	تطوير أعمال الرقابة المالية المرحلة الثالثة	تأخر موافقة المقام السليح باستثناء الجهات محل التجربة من الأنظمة بما سيؤدي إلى إيقاف المشروع	نشطة	عالية	5 - علي جدار	4 - علي	نشطة	تأخر موافقة المقام السليح باستثناء الجهات محل التجربة من الأنظمة بما سيؤدي إلى إيقاف المشروع	تطوير أعمال الرقابة المالية المرحلة الثالثة	نايف عبدالله الغملاس	105
106	1.2.1.0.004	غازي فيم السحبي	#N/A	تطوير آليات حوافز تنمية الإيرادات –المرحلة التجريبية	زول مستوى الإيرادات مع تطبيق التنظيم الجديدلايرادات الدولة	نشطة	متوسطة	3 - متوسط جدار	3 - متوسط جدار	نشطة	زول مستوى الإيرادات مع تطبيق التنظيم الجديدلايرادات الدولة	تطوير آليات حوافز تنمية الإيرادات –المرحلة التجريبية	غازي فيم السحبي	106
107	1.2.1.0.004	غازي فيم السحبي	#N/A	تطوير آليات حوافز تنمية الإيرادات –المرحلة التجريبية	عدم دقة المعلومات الواردة من الجهات المستهدفة	نشطة	متوسطة	3 - متوسط جدار	3 - متوسط جدار	نشطة	عدم دقة المعلومات الواردة من الجهات المستهدفة	تطوير آليات حوافز تنمية الإيرادات –المرحلة التجريبية	غازي فيم السحبي	107
108	1.2.1.0.004	غازي فيم السحبي	#N/A	تطوير آليات حوافز تنمية الإيرادات –المرحلة التجريبية	التأخريتوقيع محاضر الإيرادات مع الجهات	نشطة	منخفضة	3 - متوسط جدار	2 - منخفض جدار	نشطة	التأخريتوقيع محاضر الإيرادات مع الجهات	تطوير آليات حوافز تنمية الإيرادات –المرحلة التجريبية	غازي فيم السحبي	108
109	8.99.4.0.010	امجد محمد بقرشان		تطوير استراتيجية الإدارة القانونية والبيكل التنظيمي التابع لها	مقاومة الفئات المستهدفة لتبنى البات العمل الجديدة	نشطة	منخفضة	1 - منخفض جدار	1 - منخفض جدار	نشطة	مقاومة الفئات المستهدفة لتبنى البات العمل الجديدة	تطوير استراتيجية الإدارة القانونية والبيكل التنظيمي التابع لها	امجد محمد بقرشان	109
110	8.99.2.0.002	لجوهرة العنبي	Aljohara T. Alotaibi	تألوير استراتيجية مركز الشراكات و المعرفة	وجود أي تدخلا مع مشروع بيئة العمل	نشطة	عالية	5 - علي جدار	5 - علي جدار	نشطة	وجود أي تدخلا مع مشروع بيئة العمل	تألوير استراتيجية مركز الشراكات و المعرفة	لجوهرة العنبي	110
111	8.99.2.0.002	لجوهرة العنبي	Aljohara T. Alotaibi	تألوير استراتيجية مركز الشراكات و المعرفة	عدم وجود شراكة فعالة بين الأطراف المعنيةبالمشروع	نشطة	متوسطة	5 - علي جدار	3 - متوسط جدار	نشطة	عدم وجود شراكة فعالة بين الأطراف المعنيةبالمشروع	تألوير استراتيجية مركز الشراكات و المعرفة	لجوهرة العنبي	111
112	8.99.2.0.002	لجوهرة العنبي	Aljohara T. Alotaibi	تألوير استراتيجية مركز الشراكات و المعرفة	عدم وجود اطر قانونية واضحة لعدد الشراكات	نشطة	منخفضة	3 - متوسط جدار	2 - منخفض جدار	نشطة	عدم وجود اطر قانونية واضحة لعدد الشراكات	تألوير استراتيجية مركز الشراكات و المعرفة	لجوهرة العنبي	112
113	8.99.2.0.001	مصطفى علي	Aljohara T. Alotaibi	تطوير السياسات والإجراءات والخطط التنفيذية لوكالة لتواصل والإعلام	مقاومة بعض موظفي للتغيرات المتوقعةالسياسات والإجراءات	نشطة	عالية	5 - علي جدار	5 - علي جدار	نشطة	مقاومة بعض موظفي للتغيرات المتوقعةالسياسات والإجراءات	تطوير السياسات والإجراءات والخطط التنفيذية لوكالة لتواصل والإعلام	مصطفى علي	113
114	8.99.2.0.001	مصطفى علي	Aljohara T. Alotaibi	تطوير السياسات والإجراءات والخطط التنفيذية لوكالة لتواصل والإعلام	عدم توفر الموارد البشرية المطلوبة للعملبالمشروع	نشطة	عالية	5 - علي جدار	5 - علي جدار	نشطة	عدم توفر الموارد البشرية المطلوبة للعملبالمشروع	تطوير السياسات والإجراءات والخطط التنفيذية لوكالة لتواصل والإعلام	مصطفى علي	114

[illegible]

170	2.2.1.0.005	بدر عبدالله العريفي	دراسة الآثار المترتبة على تطبيق الحساب الموحد للدولة وإدارة التغيير
171	3.2.1.1.004	خالد مامون الرواف	دراسة شمولية الكراسات وتقدير التكاليف لتطبيق التحول المحاسبي المبني على أساس الاستحقاق
172	3.2.1.1.004	خالد مامون الرواف	دراسة شمولية الكراسات وتقدير التكاليف لتطبيق التحول المحاسبي المبني على أساس الاستحقاق
174	2.1.1.0.010	محمد معيض الجعيد	دعم إعداد ميزانية العام 2020
175	2.1.1.0.010	محمد معيض الجعيد	دعم إعداد ميزانية العام 2020
177	2.1.1.0.010	محمد معيض الجعيد	دعم إعداد ميزانية العام 2020
178	2.1.1.0.010	محمد معيض الجعيد	دعم إعداد ميزانية العام 2020
179	2.2.1.0.004	محمد امين الفراحنه	ضمان جودة تنصيب نظام الخزينة
180	2.2.1.0.004	محمد امين الفراحنه	ضمان جودة تنصيب نظام الخزينة
181	7.99.2.0.006	امجد محمد بقشان	مراجعة وتطوير الأنظمة و اللوائح بالوزارة
182	#N/A	#N/A	دركز الإحصاءات والبيانات المالية والاقتصادية
183	6.99.5.1.001	Abdullah A. Almalki	مستودع البيانات و حوكمتها (لمسار الاستشاري وضبط الجودة)
184	6.99.5.1.001	Abdullah A. Almalki	مستودع البيانات و حوكمتها (لمسار الاستشاري وضبط الجودة)
185	6.99.5.1.001	Abdullah A. Almalki	مستودع البيانات و حوكمتها (لمسار الاستشاري وضبط الجودة)
186	1.12.1.0.003	عبدالله محمد الغنام	مشروع إعداد إطار لمخاطر المالية العامة وأثرها على القطاع المالي
187	2.2.1.0.107	بدر عبدالله العريفي	شروع المراجعة القانونية لتطبيق حساب الخزينة الموحد للدولة على الجهات الحكومية
188	2.2.1.0.107	بدر عبدالله العريفي	شروع المراجعة القانونية لتطبيق حساب الخزينة الموحد للدولة على الجهات الحكومية
189	2.2.1.0.107	بدر عبدالله العريفي	شروع المراجعة القانونية لتطبيق حساب الخزينة الموحد للدولة على الجهات الحكومية
190	7.99.1.0.003	بدر سعود الثبيتي	شروع تخطيط القوى العاملة (أعداد،جدارات، تكاليف)
191	7.99.2.0.005	غازي فيهم السحجي	مشروع تطوير نظام موارد بلس
192	3.2.1.2.003	نايف عبدالله الغملاس	مشروع دعم وتطوير أعمال الرقابة المالية (المرحلة الثانية (المسار الثاني التطبيق التجريبي للرقابة الذاتية
194	3.2.1.2.003	نايف عبدالله الغملاس	مشروع دعم وتطوير أعمال الرقابة المالية (المرحلة الثانية (المسار الثاني التطبيق التجريبي للرقابة الذاتية
198	3.2.1.2.003	نايف عبدالله الغملاس	مشروع دعم وتطوير أعمال الرقابة المالية (المرحلة الثانية (المسار الثاني التطبيق التجريبي للرقابة الذاتية
199	3.2.1.2.003	نايف عبدالله الغملاس	مشروع دعم وتطوير أعمال الرقابة المالية (المرحلة الثانية (المسار الثاني التطبيق التجريبي للرقابة الذاتية
201	2.1.1.0.112	زيد فوزان الفهد	شروع عمل مراجعة وقياس أداء تنفيذ الميزانية للجهات الحكومية المشمولة في ميزانية الدولة
202	2.6.1.0.002	بشير احمد موسى	شروع معايير تخطيط الأصول ذات الأولوية للمشاريع الرأسمالية –المرحلة الأولى
203	2.6.1.0.002	بشير احمد موسى	شروع معايير تخطيط الأصول ذات الأولوية للمشاريع الرأسمالية –المرحلة الأولى
204	6.99.2.0.001	عبدالله فؤاد الغنيم	معاملات-إدارة المحتوى
205	2.1.1.0.009	Nader R. Abusalameh	شر نظام إعداد وتنفيذ الميزانية على الجهات الحكومية
206	2.2.1.0.007	محمد امين الفراحنه	ظام بناء وتطوير نظام تقني لإدارة الخزينة وأتمتة عمليات مكتب الدين العام
207	2.2.1.0.007	محمد امين الفراحنه	ظام بناء وتطوير نظام تقني لإدارة الخزينة وأتمتة عمليات مكتب الدين العام
208	2.2.1.0.007	محمد امين الفراحنه	ظام بناء وتطوير نظام تقني لإدارة الخزينة وأتمتة عمليات مكتب الدين العام
209	2.2.1.0.007	محمد امين الفراحنه	ظام بناء وتطوير نظام تقني لإدارة الخزينة وأتمتة عمليات مكتب الدين العام

Business process management: a boundaryless approach to modern competitiveness

Mohamed Zairi

SABIC Chair in Best Practice Management, University of Bradford, UK

Introduction

The literature on business process re-engineering, benchmarking, continuous improvement and many other approaches of modern management is very abundant. One thing which is noticeable, however, is the growing usage of the word “process” in everyday business language. This suggests that most organizations adopt a process-based approach to managing their operations and that business process management (BPM) is a well-established concept. Is this really what takes place? On examination of the literature which refers to BPM, it soon emerged that the use of this concept is not really pervasive and what in fact has been acknowledged hitherto as prevalent business practice is no more than structural changes, the use of systems such as EN ISO 9000 and the management of individual projects.

What is a process?

A process is an approach for converting inputs into outputs. It is the way in which all the resources of an organization are used in a reliable, repeatable and consistent way to achieve its goals.

Post Office Counters Ltd, for instance, define a process as: “A related series of actions, directed to the achievement of a goal, that transforms a set of inputs into desired outputs, by adding value”.

Essentially, there are four key features to any process (*Bulletpoint*, 1996). A process has to have:

- (1) predictable and definable inputs;
- (2) a linear, logical sequence or flow;
- (3) a set of clearly definable tasks or activities;
- (4) a predictable and desired outcome or result.

What is business process management?

BPM is a structured approach to analyse and continually improve fundamental activities such as manufacturing, marketing, communications and other major elements of a company's operation.

Essentially, BPM is concerned with the main aspects of business operations where there is high leverage and a big proportion of added value. BPM has to be governed by the following rules:

BPM: an approach to competitiveness

- Major activities have to be properly mapped and documented.
- BPM creates a focus on customers through horizontal linkages between key activities.
- BPM relies on systems and documented procedures to ensure discipline, consistency and repeatability of quality performance.
- BPM relies on measurement activity to assess the performance of each individual process, set targets and deliver output levels which can meet corporate objectives.
- BPM has to be based on a continuous approach of optimization through problem solving and reaping out extra benefits.
- BPM has to be inspired by best practice to ensure that superior competitiveness is achieved.
- BPM is an approach for culture change and does not result simply through having good systems and the right structure in place.

65

The importance of accredited quality systems

Accredited quality assurance systems such as EN ISO 9000 are essential and perhaps not enough by themselves in providing a culture based on process management. Quality systems are widely acknowledged as a starting point and a key element for the implementation of total quality management (TQM) (Oakland and Porter, 1994; Porter and Parker, 1993; Price and Chen, 1993). Various companies have reported the real value of quality assurance systems such as EN ISO 9000:

- Carnaud Metalbox plc found that the ISO 9000 registration process provided the foundation on which a quality culture was built and helped the company move on in developing the total quality process (Oakland and Porter, 1994);
- Tioxide Group Ltd found that the registration programme pushed quality to a much higher profile in the company as everyone was actively involved in the process. In addition, Tioxide saw themselves in a better position to meet the specific requirements of customers (Oakland and Porter, 1994);
- Esso Research Centre (UK) found that the use of the discipline of a recognized industry accreditation such as ISO 9000 helps in the integration of the quality process into the site culture. "The systematic approach as stipulated under the various elements such as calibration and maintenance of laboratory equipment, staff training, and sample

management assist in minimizing errors and increase the incidents of 'right first time'" (Price, 1990; Thiagarajan, 1996).

- Nissan Motors UK, Federal Express and Club Med, view operating standards as an important requirement in the quality stakes. They do not however see the need to have a recognized industry accreditation (Binney, 1992).

In many cases however registration to internationally-recognized quality assurance systems such as ISO 9000 is not done by choice but can be a necessary requirement imposed by the customer's minimal requirements. The common message which seems to be coming out from this discussion is that quality assurance systems can assist in the development of a process-based approach to competitiveness since the former's principles place emphasis on doing the "right things" "right first time" and to continue doing the same in a consistent, repeatable and predictable manner.

The importance of quality structure

Structure is often described as one of the "hard" elements of modern management. Although extremely important in the setting up of a BPM-based culture, structure on its own is incapable of changing the culture of the organization in order to do what the "blue prints" may be recommending. This is an area of great controversy. The proponents of business process re-engineering (BPR) through information technology means have suggested that this is the quickest and most effective way of bringing about change. Referring to their Model of Integrated Management based on the seven Ss, Peters and Waterman (1982) have presented the following analysis:

In retrospect, what our framework has really done is to remind the world of professional managers that "soft" is hard. It has enabled us to say, in effect, all that ... you have been dismissing for so long as intractable, irrational, intuitive, informal organization can be managed. Clearly, it has as much or more to do with the way things work (or don't) around your companies as the formal structures and strategies do.

Further, to make it explicitly clear that focusing on structural changes alone is not enough for inducing an effective process-based culture, Waterman *et al.* (1980) have presented the following justification:

Our assertion is that productive organization change is not simply a matter of structure, although structure is important. It is not so simple as the interaction between strategy and structure, although strategy is critical, too. Our claim is that effective organizational change is really the relationship between structure, strategy, systems, style, skills, staff, and something we call superordinate goals.

The seven Ss model is sometimes referred to as the "happy atom". It reflects the following characteristics:

- multiplicity of factors – all influence how organizations behave;
- interconnectedness of variables – progress can be achieved by giving attention to all areas;

- all seven variables act as a driving force – at particular points in time, one or more of the seven Ss will emerge as the most critical variable(s).

In the process of implementing TQM, the type, role and usefulness of structure was found to vary from organization to organization (Black, 1993). It has also been suggested that differences in structural approaches may reflect cultural differences (Smith, 1994). Structure is a sub-servant of strategy and has to be assessed and reviewed in line with corporate objectives:

- In BP Chemicals the structure which served the purpose of introducing TQM has been dismantled and changed as the programme moved from the planning to educational, to the implementation phase (Stark, 1990).
- In Thomas Cork SML, the high-powered quality council set up at the outset to oversee the introduction of total quality, was disbanded and its functions taken over by the management committee once the quality initiatives got off the ground (Oakland and Porter, 1994).

The importance of strategy

The achievement of a BPM culture depends very much on the establishment of total alignment to corporate goals and having every employee's efforts focused on adding value to the end customer. This is acknowledged by many authors (Olian and Rynes, 1991) and all quality gurus. Deming (1986), for instance, through the first of his 14 points, "strive for consistency of purpose", stresses the need to link quality efforts within an organization to a larger sense of corporate purpose. The objectives of an organization are best communicated to all employees through a formal process of policy and strategy development and deployment. In fact many strategies fail to deliver because what is planned and what is implemented are not the same (Zairi, 1995; Easton, 1993). It is acknowledged very widely that policy deployment and implementation processes are difficult ones (Grocock, 1986).

Examples of effective management of strategic processes have a lot in common:

- When Rank Xerox Corp. made the commitment to adopt TQM back in 1984, their first step was to articulate a simple and direct quality policy and to communicate it to all employees (Coleman, 1991).
- Grundos have ensured that a quality policy is central to their efforts to win a sustainable competitive edge (Binney, 1992). Typically, it is found that the quality policy, strategy, goals, vision/mission and values are contained within the larger quality policy.
- At Procter and Gamble, through their CEO, strategic planning is management leadership's job (Bemowski, 1992; Davidson, 1995).
- Mitel Telecom Ltd UK views the publishing of its quality policy as the first evidence of its commitment to quality improvement (Boyer, 1990).

- Southern Pacific Airlines, in implementing continuous quality improvement, have emphasized that a strong and clear leadership statement of mission and strategy is essential. This statement must make clear that quality is the strategy.
- World Class organizations, such as Procter and Gamble, NEC Japan, Komatsu, Unilever Hewlett Packard, Rank Xerox, Florida Power and Light, in the process of ensuring success in developing, communicating and reviewing strategic plans at all levels, have heavily depended on a structured planning process termed: quality policy deployment (Zairi, 1994). The latter is defined at Rank Xerox as: "A key process which Rank Xerox can articulate and communicate the Vision, Mission, Goals and Vital Few Programmes to all employees. It provides answers to the two questions: What do we need to do? And how are we going to do it?" (Zairi, 1994).
- At NEC Japan, the quality policy deployment process (called *Hosin Kanri*) starts with the CEO first by setting the long-term policy in line with the aims and philosophy of the corporation (Smith, 1994).

The importance of process management

Kanji argues that most, if not all, organizational activities are considered as processes which cut across traditional functional boundaries. The functional approach creates barriers to achieving customer satisfaction. It allows control points between departments to be vulnerable to organizational "noise" (Edson and Shannahan, 1991) such as "turf protection" and poor communication. In contrast, however, the process-based approach improves customer focus and avoids the limitations of managing by vertical functions (McAdam, 1996).

Best in class organizations have recognized the need to move away from the traditional functionally-based approach to managing through a set of clearly defined customer-driven processes. This is certainly the case of Rank Xerox (Coleman, 1991), IBM (Snowden, 1995), ICL and Shell Chemicals UK (Sinclair, 1994).

The following are examples of world-class organizations where a radical change from a functionally driven to a process-based approach took place.

Elida Fabergé Ltd

Elida Fabergé is a leader in personal products, part of Unilever plc, with famous brands such as Sure, Lynx, Brut, Impulse, Organics, Timotei, Ponds, Vaseline, Mentadent, Signal.

Elida Fabergé Ltd relies very much on TQM principles in the running of its operations. Numerous benefits were achieved from the use of TQM, such as:

- reduction in changeover time;
- improved teamwork;
- reduction in NPD cycle time.

The driving themes of Total Quality are:

- continuous improvement;
- the importance of the customer;
- empowerment of employees;
- business activities as processes.

Elida Fabergé decided to undergo a radical change for the creation of a business process management culture, driven by the following factors:

- a number of key challenges which started to face company A, during the 1990s, such as the need to improve its service to retain customers;
- the need to move to a European manufacturing centre;
- the need to move to a European then global innovation centre for deodorant/fragrance products;
- the need to “right size” the company, to improve productivity and competitiveness.

Three cross-functional teams were created, each led by a director, and facilitation was provided by a consultant. The results led to the creation of:

- new organization based on five core processes, including business planning/strategy as one of core processes (Figure 1);

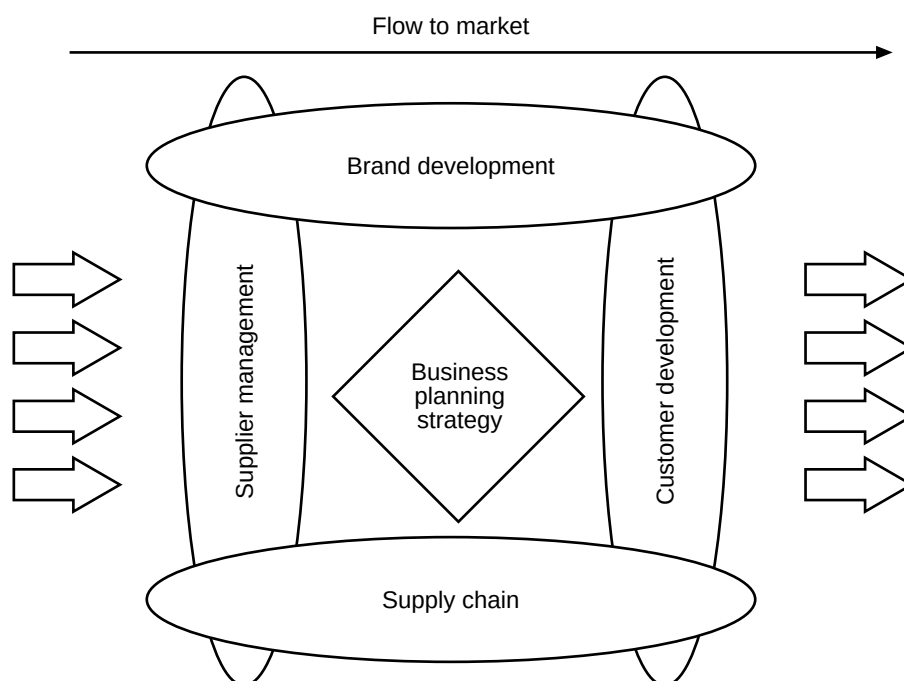


Figure 1.
Business process
management at Elida
Fabergé Ltd

BPMJ
3,1

- realignment of senior management responsibility;
- responsibilities based on natural boundaries between processes (not functional boundaries which cut across processes).

Rank Xerox Corp.

Rank Xerox (*Bulletpoint*, 1996):

70

- from a manufacturer of copier, printer and fax products, became a provider of document tools and services;
- appreciated that processes are liberating and empowering rather than constraining;
- focused on core processes to become customer focused and more efficient and effective.

British Telecom

British Telecom (*Bulletpoint*, 1996):

- changed from technology-based divisions to customer sector and international market-based divisions;
- used to manage through a project-based approach by focusing on the management of risk rather than effective planning, continuously improving routine processes, eliminating waste and duplication, learning from previous experience and injecting innovation and best practice.

SmithKline Beecham

SmithKline Beecham (*Bulletpoint*, 1996):

- realized that the customer has changed and therefore decided to move away from the doctor-driven approach;
- reorganized the four traditional divisions – pharmaceuticals, consumer health care, animal health, clinical laboratories – into three key areas: care delivery, care management, and care coverage, each area having many layers of sub-processes;
- recognizes that the big task now is to ensure that each process is mapped, documented, with performance measures and a consistent, repeatable and predictable performance;
- has recognized that it will take many years (at least five) to become a fully process-oriented organization.

Building a culture based on process management: examples of best practice

It emerged from the previous discussions that an effective approach to change management has to rely on a combination of soft and hard aspects of organizational systems. In particular, if a BPM culture is to ensue, there has to be a systematic approach to designing, prioritizing, managing, controlling and monitoring business processes, which can lead to superior competitive

standards. Performance, therefore, is very much dependent on the dynamism generated and the degree to which organizations can develop their capabilities to compete in the marketplace.

There are numerous examples of methodological approaches covered in the literature. One of the most comprehensive frameworks is perhaps the one recommended by Harrington (1995), the process breakthrough methodology.

The process breakthrough methodology

Essentially, this approach consists of five major phases which are sub-divided into 27 key activities. Table I illustrates the breakdown of the various key activities.

Harrington (1995) reports that by subscribing to sound systematic methodological approaches such as the one he initiated (see Table I), business process improvement can be made to work effectively and lead to positive results. He reported the following examples:

Phase	Key activities
Organizing for quality	Defining critical business processes Selecting process owners Defining preliminary boundaries Forming and training process improvement teams Boxing in the process Establishing measurements Developing project and change management plans
Understanding the process	Flowcharting the process Preparing the simulation model Conduct a process walk-through Performing process cost and cycle-time analysis Implementing quick fixes Aligning the process and the procedures
Streamlining the process	Process redesign (focused improvement) New process design (process re-engineering, process innovation, big picture analysis) Benchmarking the process Improvement, cost, and risk analysis Preferred process selection Preliminary implementation plan
Implementation, measurements and controls	Finalized implementation plan New process implementation In-process measurements Feedback systems Poor-quality cost
Continuous improvement	Major breakthrough in performance Process improvement must continue Natural work teams or department Improvement teams take over

BPM: an approach to competitiveness

71

Table 1.
The key activities of the process breakthrough methodology

BPMJ
3,1

72

(1) McDonnell Douglas

- reduction in overheads: 20-40 per cent;
- inventory reduction: 30-70 per cent;
- material cost reduction: 5-25 per cent;
- quality improvement: 60-90 per cent;
- administrative cost reduction: 20-40 per cent.

(2) Federal Mogul

- reduction in NPD cycle time from 20 weeks to 20 business days, thus leading to a 75 per cent reduction in throughput time.

Harrington acknowledges that BPM is fundamentally a senior management responsibility. They have the task of determining the right vision for the organization, determine the top strategic priorities, design the right processes, break down walls and barriers to effective performance and put in place the key enabling factors for all employees to make optimum contributions.

Harrington (1995) argues that:

The process and the system which controls it represents the real problem facing business today, not the people who work within the boundaries set for them by management. Employees must work within the process and management must work on the process. The improvement efforts and their supporting systems must be directed at the process and not the individual. This means that all functions must work together to optimize the efficiency, effectiveness, and adaptability of the total process.

Rank Xerox approach to process improvement and management

Rank Xerox Ltd is known for its leadership in TQM. Its achievements are reflected by its superior competitive position in the marketplace and the large number of prestigious awards and major accolades that the company has won over the years. What propels the quality improvement effort within rank Xerox is an initiative called “leadership through quality” which represents an integrated philosophy with the following key areas of focus:

- a *goal* for Rank Xerox to attain and maintain;
- a *strategy* to enable Xerox to achieve its competitive advantage; and
- a *way of working* or *process* to use for managing operation of the business, and at all levels.

Leadership through quality is based on the use of key tools, including the:

- problem-solving process;
- quality improvement process;
- benchmarking process;
- self-assessment process (business excellence certification model).

The last two will not be discussed in the context of this paper. However, the problem-solving process, which is illustrated in Figure 2, is used to enable people to close gaps in performance and to analyse problems, develop solutions and put action plans together (Zairi, 1996).

The quality improvement process. This is a more pervasive tool, it is not just related to internal problems. It focuses more on process routes for products and services which are delivered to the end customer. It is therefore customer-related. Table II illustrates the differences between the problem-solving process (PSP) and the quality improvement process (QIP). Although the differences are very apparent, the two approaches are, however, very complementary and the use of one will trigger the utilization of the other.

The QIP process has nine steps which are grouped into planning, organizing and monitoring stages (Figure 3):

- (1) *Identify output.* The team is to brainstorm and define the desired output.
- (2) *Identify customer.* This refers to customers of the desired output, outcome of using the QIP (often internal customers).

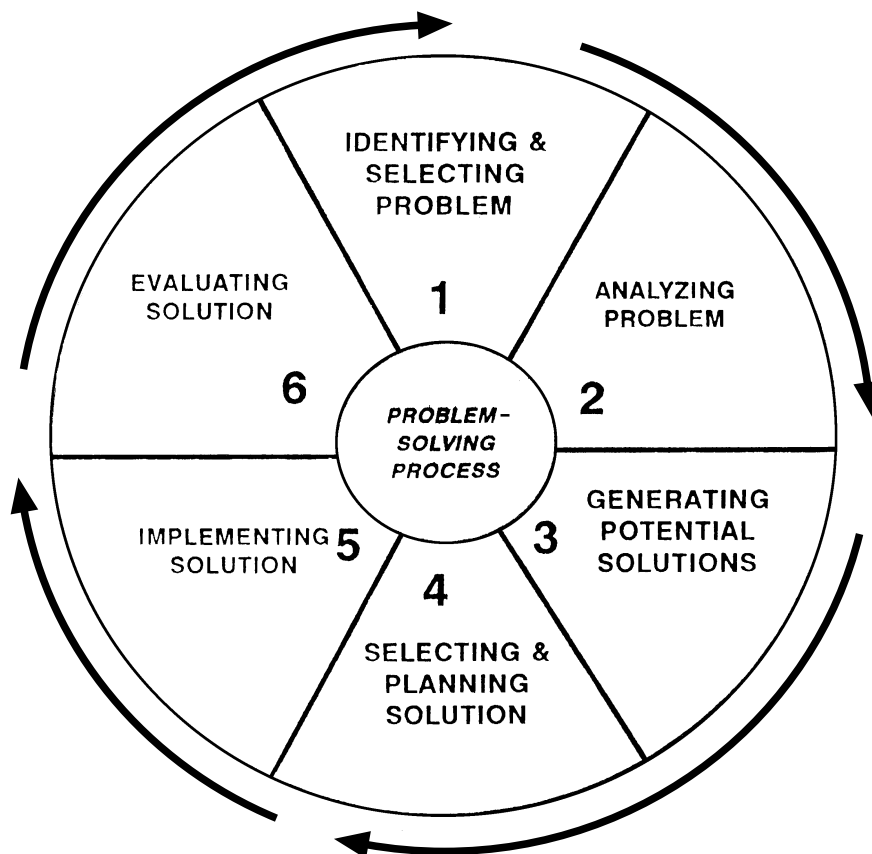


Figure 2.
Problem-solving process
at Rank Xerox Ltd

- (3) *Identify customer requirements.* This stems from Stage 2 and will prompt the project team (suppliers) to work closely with customers (beneficiaries of the output) to define what is required and therefore how it is going to be delivered.
- (4) *Translate requirements into supplier specification.* All requirements are put into measurable and achievable deliverables.
- (5) *Identify steps in the work process.* A step-by-step approach to how the output which is going to be produced needs to be developed, using perhaps existing work procedures and guidelines and producing a flow chart.
- (6) *Select measurement.* Measures need to be selected to assess before, during and after scenarios and also measures need to be designed for continuous monitoring and prevention purposes.
- (7) *Determine process capability.* This is to test the recommended process and to ensure that it can do the right things right first time. Otherwise the team can use the PSP to fine-tune the process for full capability to deliver customer requirements.
- (8) *Evaluate results.* This is to answer the following two questions:
 - Did the process work?
 - Did the results of what we did meet customer requirements?
- (9) *Recycle.* This is for continuous monitoring and the changing of steps following changes in customer requirement and exploiting best practice and new learning opportunities.

Process management methodology at Ford Motors

Ford introduced a new process management approach back in 1992, called quality operating systems (QOS). Ford felt there is a need for an operating system to guide improvement and optimization efforts. The following arguments were put forward in an internal document:

Ford trained thousands of our people in the quality engineering tools and we developed Q-1 facilities only to find we needed more. QOS was the management “glue” that improved our success with our customers.

Table II.
The difference between the problem-solving and quality improvement processes at Rank Xerox Ltd

Problem solving	Quality improvement
Use when:	Use when:
• there is a gap between what is happening and what you want • you want to move from a vague dissatisfaction to a solvable, clearly-defined problem • You are not sure how to approach an issue	• You need to improve the quality of a particular, currently existing output • You do not have agreed-on customer requirements for an output • You are about to produce a new output

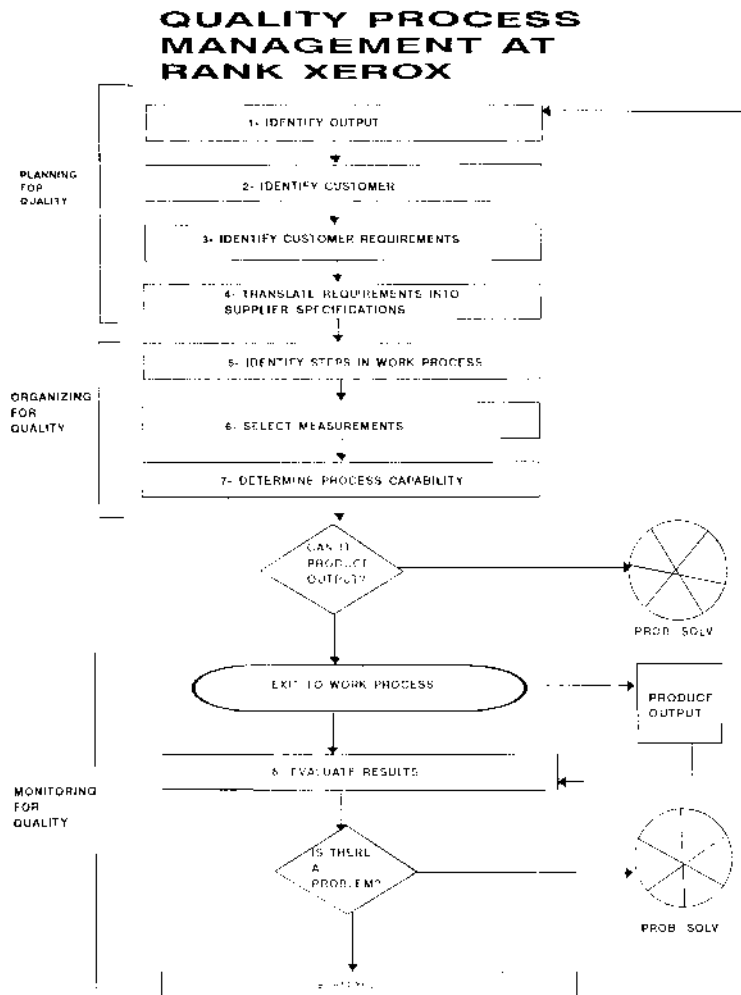


Figure 3.
Quality improvement
process at Rank Xerox
Ltd

QOS is defined as a systematic, disciplined approach that uses standardized tools and practices to manage business and achieve ever-increasing levels of customer satisfaction. QOS relies on the following sets of policies for its effective implementation:

- the assembly and analysis of existing data into a system of key process and result measurables which are correlated and can be quickly reviewed and acted on;
- a set of standardized management practices and system standards which maximize performance through a total systems approach;
- a set of standardized tools and methodologies for implementing continuous and breakthrough improvements in both manufacturing and non-manufacturing applications;

- the establishment of effective communication links between all people in the system through cross-organizational uniformity.

Figure 4 illustrates the QOS process at Ford. The QOS at Ford Motors is a generic process which can be applied in manufacturing and non-manufacturing operations. It is based on eight steps driven by a continuous involvement of all employees and the principle of Plan-Do-Check and Act. The reported benefits of QOS include:

- provides senior management with a tool to determine the correlation between customer expectations and company results;
- enhances empowerment;
- combines the power of team dynamics and management authority.

Process management at Post Office Counters Ltd

Post Office Counters Ltd (POCL) has over 25 million customers. In the late 1980s it appreciated the need to introduce quality in its business operations. In 1989, the "Customer First" initiative was launched. Customer First was defined as: "The way we manage the business in a way which continually focuses on the customer and harnesses everyone's commitment".

The business process improvement (BPI) methodology was introduced as a structured approach which will assist with the simplification and streamlining

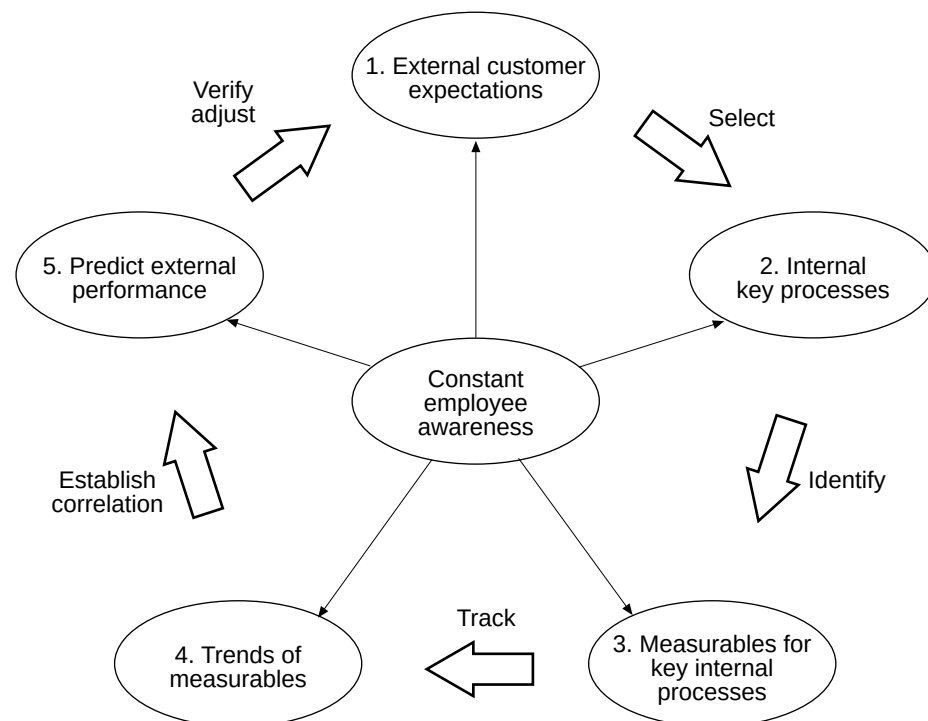


Figure 4.
Process management at
Ford Motors

of business processes, thus leading to the efficient and effective use of resources such as facilities, people, equipment, time and capital.

BPI has three main objectives:

- (1) Making processes more effective (producing the desired results);
- (2) Making processes more efficient (minimizing the resources used);
- (3) Making processes adaptable (being able to meet changing customer and business needs).

Similarly to Rank Xerox, POCL uses a quality improvement process (QIP) as a problem-solving process used within functions and cross-functions. Figure 5

BPM: an
approach to
competitiveness

77

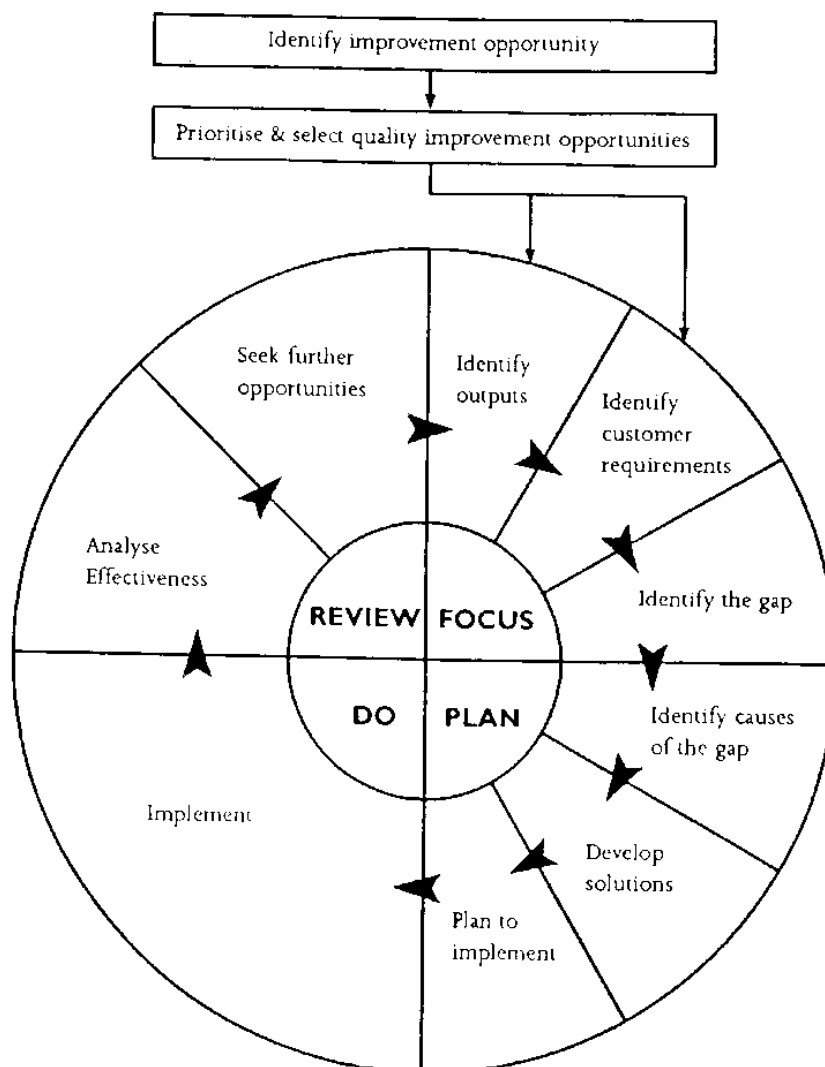


Figure 5.
Quality improvement
process at Post Office
Counters Ltd

illustrates the QIP at POCL. The BPI, however, starts and ends with customer needs identification and their fulfilment to customer satisfaction. BPI:

- provides a structured approach for focusing improvement activity on external customer satisfaction and business objectives;
- has a measurement framework which is clearly positioned;
- emphasizes the use of in-process measurement and display, especially promoting service level agreements.

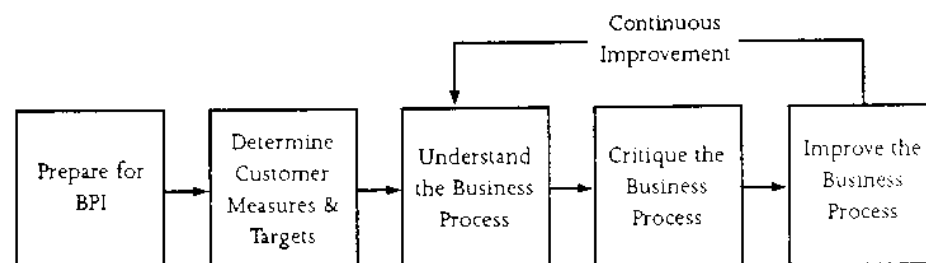
Figure 6 illustrates the BPI at POCL, which consists of five phases, each with a specific purpose described in Table III.

Sustaining BPM – some guidelines

It is clear that BPM is an approach which is all-encompassing and is dependent on strategic elements, operational elements, use of modern tools and techniques, people involvement and, more importantly, on a horizontal focus which will best suit and deliver customer requirements in an optimum and satisfactory way.

The development of a culture based on BPM can be greatly assisted by using total quality principles, a systematic methodology, a problem-solving or QIP which can help with developing local solutions within functions or across functions, the use of performance measures for monitoring inputs, outputs and

Figure 6.
Business process
improvement at Post
Office Counters Ltd



Phase	Purpose
Prepare for BPI	To ensure the success of BPI effort by building understanding and commitment
Determining customer measures and targets	Define success criteria for the BPI effort
Understand the business process	To understand all dimensions of the current business process
Critique the business process	To determine the best solution(s) to improve the quality and efficiency of the business process
Improve the business process	To implement changes that will improve the effectiveness and efficiency of the business process

Table III.
The business process
improvement model at
Post Office Counters Ltd

the control of each process, and a culture of continuous improvement based on learning from within and outside the organization.

The following is proposed as a set of rules which can assist in the development of a BPM culture:

- BPM is the way in which key activities are managed and continuously improved to ensure consistent ability to deliver high quality standards of products and services.
- Business processes are the critical and all-encompassing activities of design, manufacture, marketing, innovation, sales and others which deliver quality to the end customers.
- Process management also refers to the way companies constantly strive for excellence and how they stimulate innovation and creativity for process improvement and optimization.
- BPM also includes activities which refer to supplier quality management issues.
- The management of processes is conducted through performance measurement for setting targets for improvement and also for measuring product/service capability, process capability, supplier capability and efficiency/effectiveness aspects in terms of cycle time, quality standards, costs, etc.
- BPM, through continuous measurement and improvement will determine effectiveness of process design for streamlining and simplification. It ensures the introduction of best practice through benchmarking information and is based on valuable inputs from customers.
- Process management challenges practices (i.e. the dynamic aspects of each process and its behaviour) as much as the performance of each process (its output/metrics). Further, process management seeks to continuously strengthen all activities through the introduction of best practice, to ensure that internal standards of performance are competitively acceptable.
- BPM relies on a systematic methodology supported by a problem-solving methodology to strengthen newly-designed processes, to reinforce the linkages between various functions and to ensure that optimum performance can be achieved.

BPM: an
approach to
competitiveness

References

- Bemowski, K. (1992), "Carrying on the P&G tradition", *Quality Progress*, Vol. 27 No. 3, pp. 51-4.
- Binney, G. (1992), *Making Quality Work: Lessons from Europe's Leading Companies*, The Economist Intelligence Unit, London.
- Black, S.A. (1993), "Measuring the critical factors of total quality management", unpublished Ph.D thesis, University of Bradford Management Centre, Bradford.
- Boyer, S.M. (1990), "TQM and new product development", in Oakland, J.S. (Ed.), *Proceedings of the 3rd International Conference on Total Quality Management*, IFS Publications, Bedford.

-
- Bulletpoint* (1996), "Creating a change culture – not about structures, but winning hearts and minds", sample issue, pp. 12-13.
- Carman, J.M. (1993), "Continuous quality improvement as a survival strategy: the Southern Pacific experience", *California Management Review*, Vol. 35 No. 3, pp. 118-32.
- Coleman, R. (1991), "People and training – the progressive evolution of a training strategy in support of the implementation of total quality management", in Oakland, J.S. (Ed.), *Proceedings of the 4th International Conference on Total Quality Management*, IFS Publications, Bedford.
- Davidson, A.R. (1995), "Quality management – do we believe in it 'totally'?", in Kanji, G.K. (Ed.), *Total Quality Management Proceedings of the 1st World Congress*, Chapman & Hall, London.
- Deming, W.E. (1986), *Out of the Crisis*, University Press, Cambridge, MA.
- Easton, G.S. (1993), "The 1993 state of US total quality management: a Baldrige examiner's perspective", *California Management Review*, Vol. 35 No. 3, pp. 32-54.
- Edson, J. and Shannahan, R. (1991), "Managing quality across barriers", *Quality Progress*, February, pp. 45-7.
- Grocock, J.M. (1986), *The Chain of Quality*, John Wiley, Chichester.
- Harrington, J.J. (1995), *Total Improvement Management – The Next Generation in Performance Improvement*, McGraw-Hill, New York, NY.
- McAdam, R. (1996), "An integrated business improvement methodology to refocus business improvement efforts", *Journal of Business Process Re-engineering and Management*, Vol. 2 No. 1, pp. 63-71.
- Oakland, J.S. and Porter, L.J. (1994), *Cases in Total Quality Management*, Butterworth Heinemann, Oxford.
- Olian, J.D. and Rynes, S.L. (1991), "Making total quality work: aligning organizational processes, performance measures, and stakeholders", *Human Resources Management*, Vol. 30 No 3, pp. 303-33.
- Peters, T.J., and Waterman, R.H. (1982), *In Search of Excellence*, Harper & Row, New York, NY.
- Porter, L.J. and Parker, A.J. (1993), "Total quality management – the critical success factors", *Total Quality Management*, Vol. 4 No 1, pp. 13-22.
- Price, F. (1990), *Right Every Time*, Gower Publishing Co., Aldershot.
- Price, M. and Chen, E. E. (1993), "Total quality management in a small, high-technology company", *California Management Review*, Vol. 35 No. 3, pp. 96-117.
- Sinclair, D.A.C. (1994), "Total quality-based performance measurement: an empirical study of best practice", unpublished Ph.D thesis, University of Bradford Management Centre, Bradford.
- Smith, S. (1994), *The Quality Revolution*, Management Books 2000 Ltd, Didcot.
- Snowden, D. (1991), "Business process management and TQM", in Oakland, J.S. (Ed.), *Proceedings of the 4th International Conference on Total Quality Management*, IFS Publications, Bedford.
- Stark, J.A.L. (1990), "Experience of TQM at BP Chemicals", in Oakland, J.S. (Ed.), *Proceedings of the 3rd International Conference on Total Quality Management*, IFS Publications, Bedford.
- Thiagarajan, T. (1996), "An empirical study of total quality management (TQM) in Malaysia: a proposed framework of generic application", Ph.D thesis, Bradford University Management Centre, Bradford.
- Waterman, R.H., Peters, T.J. and Philips, J.R. (1980), "Structure is not organization", *Business Horizons*, June, pp. 14-16.
- Zairi, M. (1994), *Measuring Performance for Business Results*, Chapman & Hall, London, UK.
- Zairi, M. (1995), "Strategic planning through quality policy deployment: a benchmarking approach", in Kanji, G.K. (Ed.), *Total Quality Management: Proceedings of the 1st World Congress*, Chapman & Hall, London.
- Zairi, M. (1996), *Effective Benchmarking – Learning from the Best*, Chapman & Hall, London.



Business process management: public sector implications

Thomas R. Gullledge Jr and Rainer A. Sommer
George Mason University, Fairfax, Virginia, USA

Keywords BPR, Public sector, Implementation

Abstract Business process management has received much attention in the industrial engineering and management literature, and its benefits are well known. Much less has been written in the public sector management literature, and what has been written has been very general. Hence, there is confusion among public managers about how business process management concepts should be implemented. How should public organizations reorganize to accommodate business process management? How are existing or new enterprise systems aligned with business process management methodologies? This paper addresses these issues, and concludes that public organizations will have to change their organizational structures radically as well as their enterprise systems in order to implement business process management concepts successfully. The paper also discusses the benefits of public sector process management, and focuses in some detail on two of the reasons that public organizations have incentive to implement business process management methodologies.

Why business process management?

Business process management is as old as the discipline of industrial engineering. Localized implementations of process management (e.g. manufacturing processes, shipping processes, etc.) have been prevalent for years[1]. The process management approach involves:

- Documenting the process to obtain an understanding of how work flows through the process[2].
- The assignment of process ownership in order to establish managerial accountability.
- Managing the process to optimize some measures of process performance.
- Improving the process to enhance product quality or measures of process performance.

Process management was firmly established on the shop floor, but it was more difficult to establish as an enterprise management strategy, primarily because it was extremely difficult to control large systems of integrated processes. Hierarchical models that emphasized strict managerial control were the models of choice for industrial-age managers. Computers were new and integrated systems were non-existent. Insufficient managerial information was present to support a distributed process management model. Managerial control was the primary reason for selecting the industrial-age hierarchical model.



In the late 1980s, US manufacturers discovered that the new information technologies allowed managerial control of enterprise-wide process management (Davenport and Short, 1990). Business process management provided competitive advantage through cycle-time reduction, and the new information technologies provided managerial control. The constant quest for competitive advantage, enabled by new information technologies, unleashed the private sector management transformation that is still underway today. Davenport and Short (1990) state that “thinking about information technology should be in terms of how it supports new or redesigned business processes, and business processes and process improvements should be considered in terms of the capabilities that information technology can provide”. Davenport and Short (1990) go so far as to call this new approach to process management: “the new industrial engineering”.

What are processes?

One source of continual confusion is the imprecise use of terminology. Process is a word that means different things to different people. Even for practitioners who are extremely familiar with the concepts of process management, there is still confusion across disciplines. When software engineers document processes, they are often interested in the relationships among static activities. When industrial engineers discuss process, they most often focus on the dynamic linking of activities; e.g. process flows. For this reason, it is important to precisely define “process” for each implementation context. If not, it is impossible to communicate. For example, Davenport and Short (1990) define a business process as “a set of logically related tasks to achieve a defined business outcome”. It is difficult to argue with this definition, but it is not sufficiently precise for our purposes. For example, “logically related” has no temporal workflow connotations.

When we speak of processes, we imply event-driven process chains. According to Scheer (1993), a “process is an occurrence of some duration that is started by an event and completed by an event”[3].

We present the concept with an example from a hypothetical manufacturing organization. The high-level business functions of this organization are presented in Figure 1.

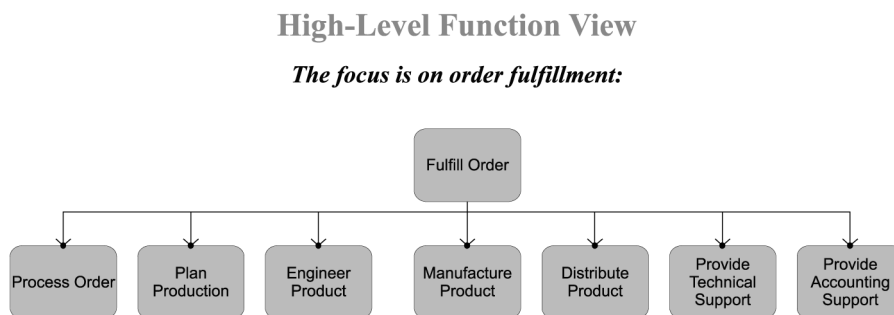


Figure 1.
High-level functions for
a hypothetical
organization

The primary function is to “fulfill order”, which is decomposable to second-level functions that are executed to complete order fulfillment. Of course, the second-level functions could be decomposed to lower levels as desired.

Some would argue that Figure 1 represents a process. Figure 1 seems to meet the requirements of the Davenport and Short definition; i.e. it presents a set of logically related tasks to achieve a defined business outcome, a fulfilled order. By our terminology, Figure 1 is a static functional decomposition; i.e. a set of hierarchically decomposed activities. Figure 2 combines the functions of Figure 1 with the necessary events for converting the functions in Figure 1 into a business process.

Figure 2 is more complex, but it is easy to read and understand. First, notice that the process chain in Figure 2 contains all of the second-level functions in Figure 1. These functions are linked using events, which “trigger” the functions. To describe events, we use a blow-up of the far left of Figure 2. This picture is provided in Figure 3.

Figure 3 presents two events and one function. The important concept in this figure is the understanding that events “trigger” functions. The order arrives, it is processed, and then a notification is submitted. The combination of events and functions describes a specific time sequencing of the functions, and the sequencing is explicitly documented. This time sequencing defines a dynamic relationship (as in Figure 2) as opposed to a static relationship (as in Figure 1).

Now we can review Figure 2 with a better understanding of the concepts. First, as mentioned above, the process chain in Figure 2 is dynamic; i.e. there is an explicit time sequencing of the events. Second, some functions are executed simultaneously, and Boolean logic defines the relationships. Third, the process in Figure 2 is cross-functional. In fact, the business process spans every function in our hypothetical organization. This understanding of cross-functional business processes (documented as event-driven process chains) is necessary to understand the public sector business process management problem. This is a critical point. The most difficult problems in business process management involve managing across functional boundaries. Hence, an appreciation for dynamic cross-functional business processes is absolutely essential[4].

Public sector process management

In the public sector, the primary benefit of business process management is the “increased effectiveness and efficiency achieved from restructuring the organization along cross-functional processes”. In the application of the Defense Planning and Management Framework (Sullivan *et al.*, 1999) to The Army Plan, other benefits were noted:

- By managing processes, the Department of Defense (DoD) can better integrate warfighting perspectives and priorities with resource management (this is equivalent to the increased private sector focus on managerial accounting through activity-based management).

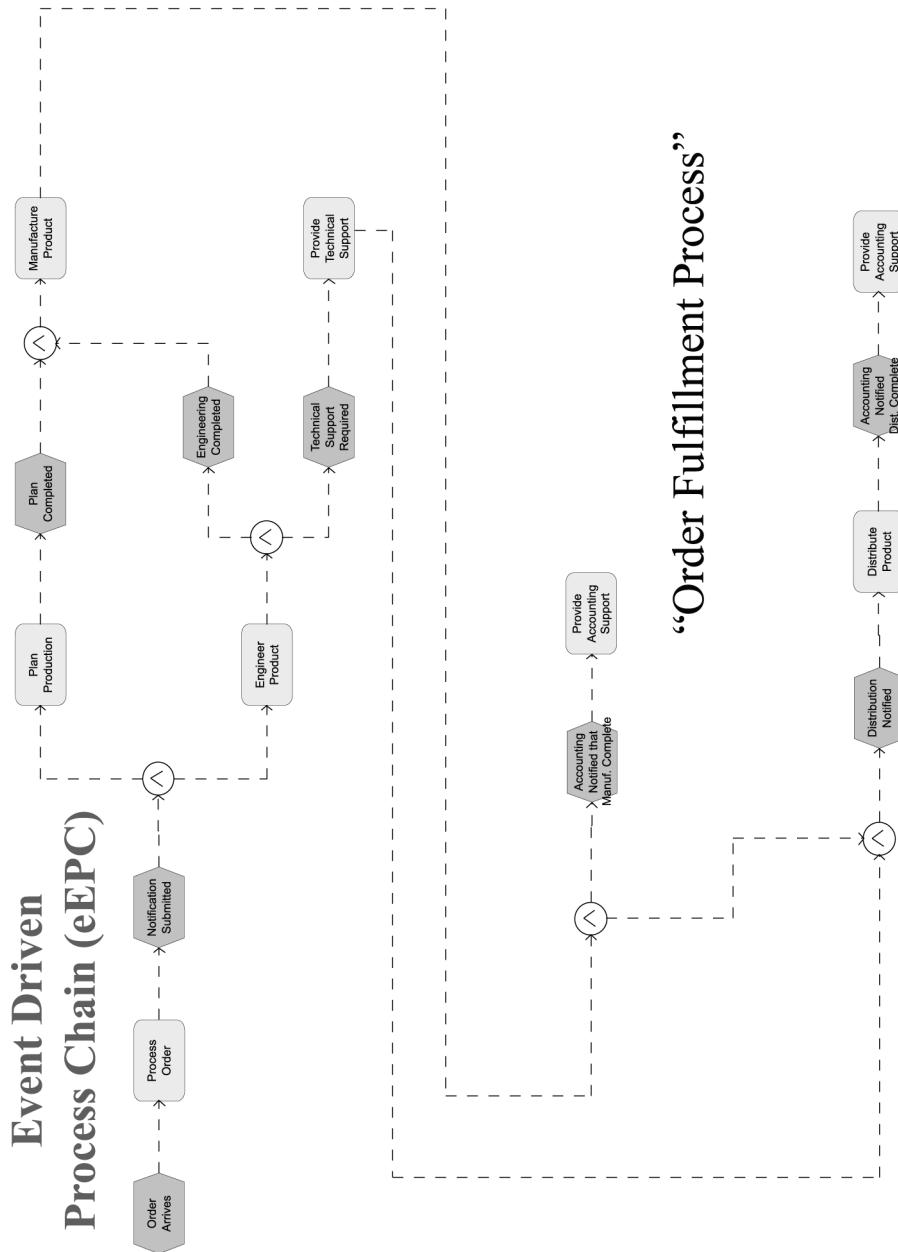


Figure 2.
Event-driven process
chain diagram for the
hypothetical
organization

- Many new DoD management initiatives (e.g. the Government Performance and Results Act and Information Technology Management Reform Act) require process management, and it is impossible to implement process management concepts under the old industrial-age management models.
- Process management opens the door for creative and innovative approaches to enhancing organizational performance.
- Process management allows the effective implementation of modern systems and standard software; i.e. most new implementations are process-oriented.

We agree with all of the above, but we note some subtle differences that others have not fully elucidated.

A process orientation for implementing the law

This section relates to one of the above bullets. A number of recent US legislative actions have forced process management to be implemented in public sector organizations. One could argue that the impacts of such mandates were not completely understood at the time of the mandates, but never-the-less, public sector organizations have a process management mandate. Some of these mandates are reviewed below, but we first offer the following general observation.

Managing by business process is an all or nothing proposition. You cannot maintain a command and control hierarchical management structure and expect process management to be effective. Likewise, you cannot maintain “stovepiped” information systems and expect process management to operate efficiently and effectively. One problem that has hindered the DoD implementation of the Government Performance and Results Act (GPRA) and the Information Technology Management Reform Act (ITMRA) is that both call for process management concepts, without changing the fundamental organizational model. That is, they mandate process management concepts on a hierarchical command and control management structure. The private sector experience is that this approach enhances the probability of failure. However, the mandates exist and they must be understood. Hence, the process-oriented mandates of several of the more important laws and executive orders are presented below.

The Government Performance and Results Act. The Government Performance and Results Act is the primary legislative framework through

Functions and Events

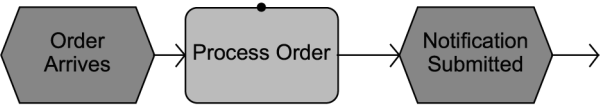


Figure 3.
The relationship
between functions and
events in a process

which agencies are required to set strategic goals, measure performance, and report on the degree to which goals were met. It requires each federal agency to develop strategic plans that cover a period of at least five years. The plan should include the agency's mission statement, identify the agency's long-term strategic goals, and describe how the agency intends to achieve those goals through its activities and through its human, capital, information, and other resources. Under the GPRA, agency strategic plans are the starting point for agencies to set annual goals for programs and to measure the performance of the programs in achieving those goals.

The law calls for an agency strategic plan with specific goals and objectives. Furthermore, the agency is required to provide:

... a description of how the goals and objectives are to be achieved, including a description of the operational processes, skills and technology, and the human, capital, information, and other resources required to meet those goals and objectives.

The focus of this section of the law is on formally linking planning objectives to organizational processes. Furthermore, the agency shall:

... establish performance indicators to be used in measuring or assessing the relevant outputs, service levels, and outcomes of each program activity.

That is, performance measures will be defined that are linked to organizational functions (i.e. activities).

The Information Technology Management Reform Act. The Information Technology Management Reform Act of 1996 (i.e. ITMRA or the Clinger-Cohen Act), which took effect August 8, 1996, abolished the Brooks Act (it repealed Section 111 of the Federal Property and Administrative Services Act of 1949 (40 U.S.C. 759)). The Brooks Act made the General Services Administration (GSA) the central authority for procurement of automatic data processing (ADP) resources. The Federal Information Resources Management Regulation (FIRMR) was issued to implement the Brooks Act and established a process that required federal agencies to obtain a Delegation of Procurement Authority (DPA) from GSA to acquire ADP, initially, and telecommunications (TC) resources. Passage of the ITMRA is causing a major paradigm shift in the process for acquiring and managing IT. The task of understanding the objectives of ITMRA and establishing a program or process to manage IT in a federal agency is a major undertaking.

The word "process" is used throughout the act, but here is one reference that is particularly relevant:

In fulfilling the responsibilities under section 3506(h) of title 44, United States Code, the head of an executive agency shall – where comparable processes and organizations in the public or private sectors exist, quantitatively benchmark agency process performance against such processes in terms of cost, speed, productivity, and quality of outputs and outcomes.

The intent is clear in this passage. It is a direct mandate to manage by process, while benchmarking against other public and private sector organizations.

Executive Order 13011 of July 16, 1996. One section of the executive order relates specifically to the duties of the Chief Information Officer (CIO) Council:

The CIO Council shall share experiences, ideas, and promising practices, including work process redesign and the development of performance measures, to improve the management of information resources.

370 This extends process management to include the private sector concept of business process improvement[5].

A process mandate without a process management structure

The law is clear in its intent. It is pushing public sector organizations in the direction of private sector process management. However, process management does not work very well when overlaid on a hierarchical command and control management structure. This has been documented in the research literature[6]. Hence, the shift to process management requires a restructuring (i.e. a reengineering) of management[7].

The next compelling reason for implementing process management is less understood, but equally important. The business process provides the internal organizational structure for integrating process-oriented information systems. Integrated systems deliver competitive advantage when they are aligned with the organization's value adding processes.

Properly aligned and integrated systems

We use an example from the US Navy to make this case, but there are many public and private sector examples.

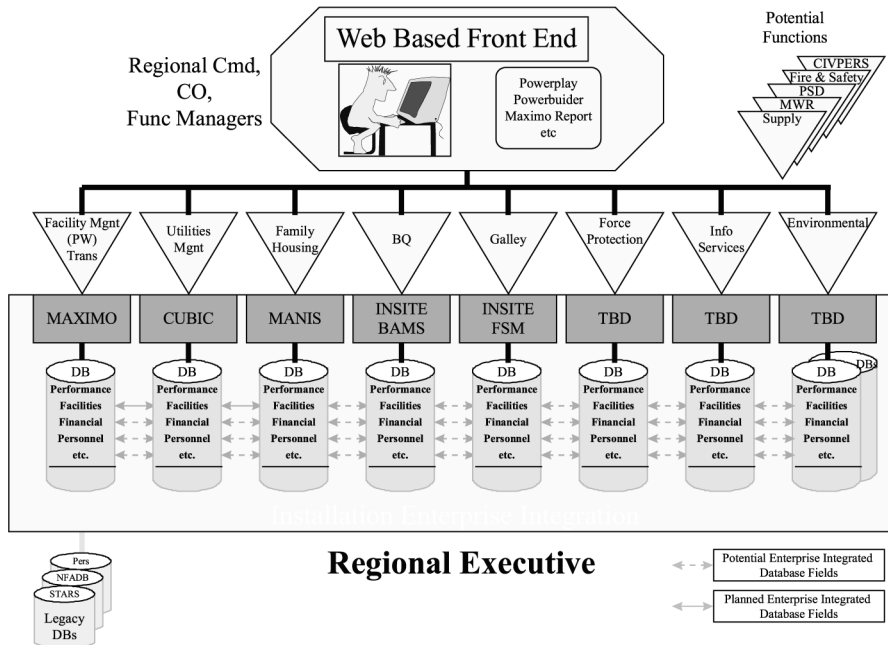
Figure 4 (taken from a Logistics Management Institute briefing) indicates a problem in providing base-level system support, while providing senior managers with the information necessary to manage Navy installations.

This figure provides a model for extracting information from a sequence of stand-alone systems, and presenting that information to a senior or regional executive. Ignoring the technical issues, the idea is to provide the executive with a "roll-up" (using an intranet architecture) of information from various information systems. From the executive's point-of-view, an information query should be to a single integrated system, as opposed to a number of stand-alone systems. This is a relative standard presentation, and the executive has better access to information; i.e. he queries a single system as opposed to searching for information from multiple systems.

Figure 4 represents a model that has been implemented by the private sector. However, it is well known that this architecture is suboptimal because it ignores the business processes that define the executive's management responsibilities. In modern enterprise integration implementations, it is the business process that provides the mechanism for integrating the systems (Scheer, 1994). That is, the business processes generate organizational outputs and executives are responsible for managing this process of output creation.

Regional Performance Based Management Support

Business process management



371

Figure 4.
Systems to support installation management

The information systems should align with (i.e. integrate in accordance with) the business processes. The concept is indicated in Figure 5.

This is a key point. The business processes of the organization deliver value to the customer. The executive's primary objective relates to the delivery of value to the customer. The integrated systems are secondary and subservient; they enable a more efficient and effective delivery of value to the customer. The organization's systems should be integrated around the business process. It is possible to integrate systems without this alignment, but there is no guarantee that these non-aligned systems support the customer.

Empirical evidence

The academic literature on information system alignment is relatively sparse. However, there are some references in the trade literature, and there is one significant study by the Boston Consulting Group (BCG) (2000). The BCG study is comprehensive and based on a survey of 100 executives who were leading (or had led) enterprise implementation projects. Booker (2000) provides a good summary of the data from the BCG study that is relevant to this paper. Booker noted that the managers who spent the necessary upfront time to analyze how their systems aligned with their business processes were much more likely to view their projects as being successful. Booker quotes the BCG research team as saying, "Users who followed these procedures achieved positive outcomes

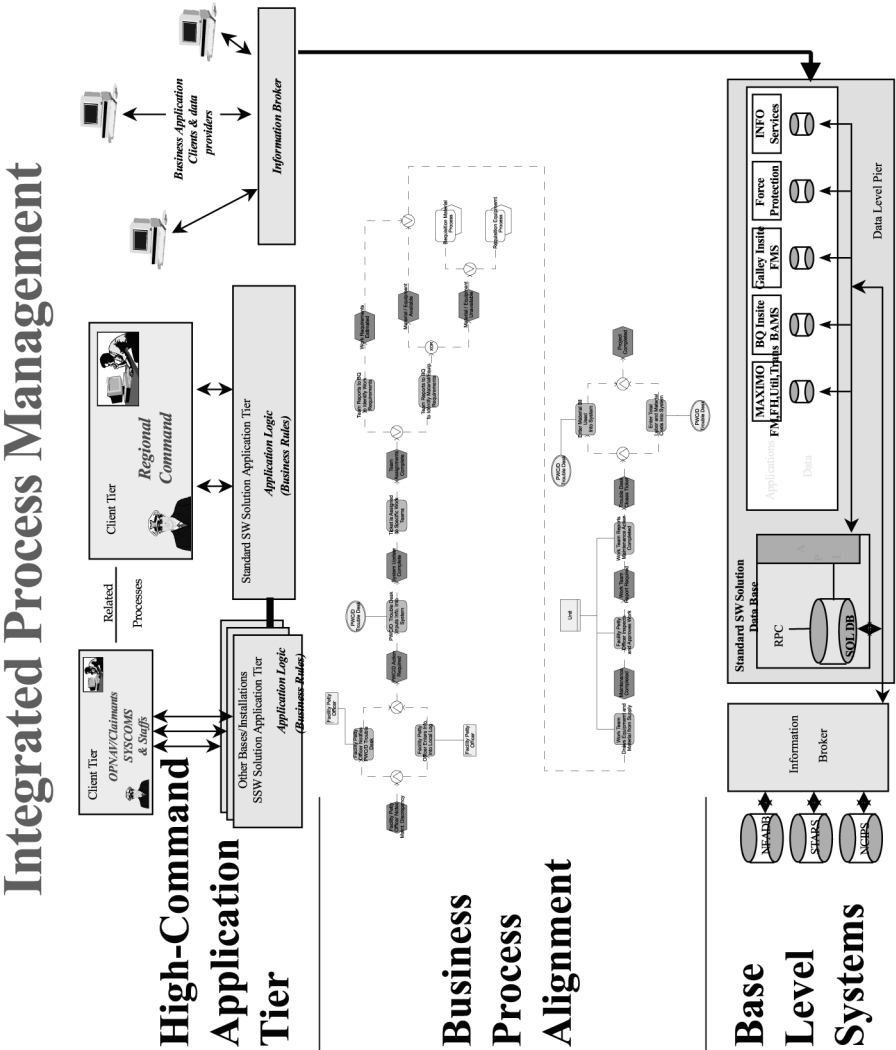


Figure 5.
Properly aligned process
management model

56 per cent of the time versus only 8 per cent for those who failed to conduct such an analysis". In the commercial sector, the empirical evidence is overwhelming. Organizations that take the time to align their business processes with their information systems are more like to achieve success. On the surface, it only makes common sense. The software executes one set of business processes, and the organization has particular business process requirements. If the business process requirements do not align with the business processes that are supported by the software, then there is a gap. If the gap is not closed, then projects do not achieve their intended results. The only way to close the gap is by business process modeling and analysis, followed by careful software configuration or customization. The concepts of requirements modeling, gap analysis, and gap closure are discussed in detail in Blick *et al.* (2000). The Blick *et al.* (2000) paper shows how the concept of gap analysis was used to achieve business process alignment in a large enterprise system implementation project. Kirchmer (1999) also addresses these issues at a higher level.

The culture of processes

Organizations that attempt business process management without realigning their information systems will not realize the full benefits that process management can deliver. These organizations cannot quickly respond to the customer, and management does not have appropriate decision-support information, but these are only the obvious observations.

If organizations maintain their stovepiped systems while attempting business process management, the information owners within the stovepipes inhibit effective process management. Given this scenario, there is tremendous pressure to revert to hierarchical management practices. However, the reverse is also true. If systems are aligned with processes, then it is much easier to maintain a process-oriented culture. That is, the stovepipe owners have less power, and it is difficult for them to inhibit the process management efforts.

International comparisons

The major arguments of this paper have been written from a US perspective. Hence, an international comparison is required. Osborne and Gaebler (1992) presented the general concepts for "reinventing government", and a general increase in interest in the topic ensued in the USA. The concepts were popularized by Vice President Gore's National Performance Review, which later became the National Partnership for Reinventing Government.

Similar programs evolved in other countries, but primarily in developed western governments. The Local Government Act in the UK has characteristics that are similar to the US Government Performance and Results Act. The Local Government Act requires that Best Value Performance Plans be constructed to provide "a clear practical expression of an authority's performance in delivering local services and its proposals to improve". The Department of the Environment, Transport, and the Regions (DETR, 1999) provides an overview

of implementation guidelines, and the requirements are similar to those in the GPRA. For example, a best value performance plan includes:

- a summary of objectives;
- a summary of current performance;
- a comparison of performance with previous years;
- a strategy and approach for generating improvements in efficiency; and
- planning documents that include financial statements and performance targets for future years.

While the wording of the Local Government Act is different, the general intent of Best Value Performance Plans is the same as the planning requirements of the Government Performance and Results Act.

Similar initiatives in other countries include *Results for Canadians* (Treasury Board of Canada, Secretariat, 2000) and New Zealand's *Improving Accountability* project (State Services Commission, 1999). Additional examples can be identified at many levels of government (e.g. federal, state, regional, and local) in many parts of the world. While the requirements and content vary, the concept is the same: establish better accountability and service delivery by using modern planning and performance measure methodologies and techniques.

These programs share one common feature. Their links to business process management and information system alignment are not well defined. In fact, in many cases the content is intentionally left vague. For example, for best value performance plans, "the Government does not propose to issue explicit guidance concerning the exact format". The idea is to allow "local authorities maximum flexibility as how to present and publish key performance information". Given this flexibility across initiatives and countries, the results of this paper can be universally applied. The government initiatives only require plans and performance measures. Specific guidance on how to link these planning objectives to business processes and eventually align organizational information systems is not included. While cultural differences may suggest different approaches to implementation, there is no technical difference. It is good management practice to align plans, business processes, and organizational information systems.

Conclusions

Business process management has received much attention in the private sector management literature, and its benefits are well known. Much less has been written in the public sector management literature, and what has been written has been very general. This paper precisely defines business processes as extended event-driven process chains. The paper discusses the benefits of public sector process management, and focuses in some detail on two of the reasons that public organizations have incentive to move to process management.

The first reason relates to the public law. The law mandates process management approaches on public organizations. However, the mandate to date has been implemented in the traditional command and control organizational structures that are holdovers from the industrial age. These mandated process management concepts are not likely to be effective when implemented in these organizational structures.

The second reason relates to the interaction between organizational processes and the new information technologies. Integrated information systems are desirable, but they are effective when they enable the organization's value adding business processes. The business process forms the basis for integration, with the organization's information systems integrated in such a way that they are aligned with the business process. Process-aligned information systems help to create a culture that enables business process management.

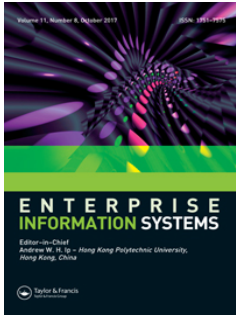
However, we are not so optimistic about public organizations being able to meet their legal mandate. Even though there are significant incentives, there are major cultural impediments, and it will be many years before we can assess the implementation effectiveness of the GPRA, ITMRA, and similar initiatives from other countries.

Notes

1. Industrial engineers commonly used the term "process engineer" as opposed to "process owner" or "process manager" (Grass, 1956).
2. Very elaborate and paper-based "mapping" methodologies were designed for this documentation process (Mullee and Porter, 1956).
3. If the reader has a good understanding of event-driven process chains, then the remainder of this section may be skipped without loss of continuity. If the reader is unfamiliar with the concept, this material is critical for understanding our views on business process documentation and should be read.
4. The empirical evidence to support this assertion is overwhelming. In fact, event-driven process chains are the basis for the SAP R/3 business process architecture and for all business process-oriented information system implementations (Kirchmer, 1999).
5. The terminology differences are subtle. Some argue that business process improvement (BPI) is different from business process reengineering (BPR). This paper uses Harrington's (1991) definition of BPI. "BPI is a systematic methodology developed to help an organization make significant advances in the way its business processes operate. It attacks the heart of the current white-collar problem in the United States by focusing on eliminating waste and bureaucracy. It provides a system that will aid you in simplifying and streamlining your operations, while ensuring that both your internal and external customers receive surprisingly good outputs. The main objective is to ensure that the organization has business processes that; eliminate errors, minimize delays, maximize the use of assets, promote understanding, are easy to use, are customer friendly, are adaptable to customers' changing needs, provide the organization with a competitive advantage, and reduce excess head count."
6. See, for example, Majchrzak and Wang (1996).
7. This is one of Champy's (1995) major points.

References

- Blick, G., Gullledge, T. and Sommer, R. (2000), "Defining business process requirements for large-scale public sector ERP implementations: a case study", Proceedings of the European Conference on Information Systems, Wirtschafts Universität, Wien.
- Booker, E. (2000), "Enterprise software projects rarely satisfy", *InternetWeek*, 28 March, available at: www.internetweek.com/story/INW20000328S0004/
- Boston Consulting Group (BCG) (2000), *Getting Value from Enterprise Initiatives: A Survey of Executives*, A Boston Consulting Group Report, The Boston Consulting Group, Boston, MA, March.
- Champy, J. (1995), *Reengineering Management: The Mandate for New Leadership*, Harper Business, New York, NY.
- Davenport, T.H. and Short, J.E. (1990), "The new industrial engineering: information technology and business process redesign", *The Sloan Management Review*, Vol. 31 No. 4, Summer, pp. 11-27.
- Department of the Environment, Transport, and the Region (DETR) (1999), *Implementing Best Value: A Consultation Paper on Draft Guidance*, DETR, London.
- Grass, I.E. (1956), "Processing and operation planning", in Maynard, H.B. (Ed.), *Industrial Engineering Handbook*, McGraw-Hill, New York, NY.
- Harrington, H.J. (1991), *Business Process Improvement*, McGraw-Hill, New York, NY.
- Kirchmer, M. (1999), *Business Process-Oriented Implementation of Standard Software*, Springer-Verlag, New York, NY.
- Majchrzak, A. and Wang, Q. (1996), "Breaking the functional mind-set in process organizations", *Harvard Business Review*, Vol. 74 No. 5, September-October, pp. 93-9.
- Mullee, W.R. and Porter, D.B. (1956), "Process chart procedures", in Maynard, H.B. (Ed.), *Industrial Engineering Handbook*, McGraw-Hill, New York, NY.
- Osborne, D. and Gaebler, T. (1992), *Reinventing Government*, Addison-Wesley, Reading, MA.
- Scheer, A.-W. (1993), "Architecture of integrated information systems (ARIS)", in Yoshikawa, H. and Goossenaerts, J. (Eds), *Information Infrastructure Systems for Manufacturing*, North-Holland, Amsterdam.
- Scheer, A.-W. (1994), *Business Process Engineering: Reference Models for Industrial Enterprises*, Springer-Verlag, Berlin.
- State Services Commission (1999), *Improving Accountability: Setting the Scene*, Occasional Paper No. 11, State Services Commission, Wellington.
- Sullivan, L., Kelly, L. and Olson, D. (1999), "Defense enterprise planning and management", in Elzinga, D.J. et al. (Eds), *Business Process Engineering: Advancing the State of the Art*, Kluwer Academic, Boston, MA.
- Treasury Board of Canada, Secretariat (2000), *Results for Canadians: A Management Framework for the Government of Canada*, Treasury Board of Canada, Secretariat, 30 March.



Survey of business process management: challenges and solutions

Youseef Alotaibi & Fei Liu

To cite this article: Youseef Alotaibi & Fei Liu (2017) Survey of business process management: challenges and solutions, Enterprise Information Systems, 11:8, 1119-1153, DOI: [10.1080/17517575.2016.1161238](https://doi.org/10.1080/17517575.2016.1161238)

To link to this article: <https://doi.org/10.1080/17517575.2016.1161238>



Published online: 28 Mar 2016.



Submit your article to this journal [↗](#)



Article views: 496



View related articles [↗](#)



View Crossmark data [↗](#)



Citing articles: 2 View citing articles [↗](#)

REVIEW



Survey of business process management: challenges and solutions

Youseef Alotaibi^a and Fei Liu^b

^aDepartment of Computer Science, Umm Al-Qura University, Makkah, Saudi Arabia; ^bDepartment of Computer Science and Computer Engineering, La Trobe University, Bundoora, Australia

ABSTRACT

The current literature shows that creating a good framework on business process model (PM) is not an easy task. A successful business PM should have the ability to ensure accurate alignment between business processes (BPs) and information technology (IT) designs, provide security protection, manage the rapidly changing business environment and BPs, manage customer power, be flexible for reengineering and ensure that IT goals can be easily derived from business goals and hence an information system (IS) can be easily implemented. This article presents an overview of research in the business PM domain. We have presented a review of the challenges facing business PMs, such as misalignment between business and IT, difficulty of deriving IT goals from business goals, creating secured business PM, reengineering BPs, managing the rapidly changing BP and business environment and managing customer power. Also, it presents the limitations of existing business PM frameworks. Finally, we outline several guidelines to create good business PM and the possible further research directions in the business PM domain.

ARTICLE HISTORY

Received 2 April 2013
Accepted 29 February 2016

KEYWORDS

Business process management (BPM); business process modelling (PM); business process (BP); business process reengineering (BPR); business PM challenges; alignment; customer power; manage change; security; survey

1. Introduction

Business process management (BPM) is a systematic approach to improve an organisation's business processes (BPs) where the BPs are the set of coordinated activities and tasks performed by people in order to achieve the organisational goals and objectives. BPM activities aim to create efficient and effective BPs which can be adapted in a rapidly changing business environment (Arbogast et al. 2008; Doebeli et al. 2011).

BPM is usually the top business priority for organisations and constructing a BP capability is one of the main challenges for senior executives (Gartner GROUP 2010). Business process modelling (PM) is the act of capturing and graphically describing organisational processes. Business PM is widely used by organisations as a way to increase BP awareness and knowledge, and develop or change organisational structures (Bandara, Gable, and Rosemann 2005), information systems (IS) (Dreiling et al. 2006) and web services (Van-Der-Aalst, Benetallah et al. 2007; Recker et al. 2010; Vidgen and Wang 2006).

Business PM is a management discipline that provides support to organisational processes using different methods, techniques and software tools in order to control and analyse organisational processes and activities, which include people, organisations, applications, documents and other related information (Tan et al. 2013).

Business PM provides useful support for the following three business goals: (1) describing the BP where the BP is modelled in order to be able to be described by humans or machines (Curtis,

Kellner, and Over 1992); (2) analysing the BP by using either a qualitative method or quantitative method (Phalp and Shepperd 2000; Reijers and Mendling 2011) and (3) enacting the BP for simulation purposes or to support BP execution (Mili et al. 2010).

The implementation of good business PM has many advantages, such as improving business performance, directly involving the employees from the beginning of the modification of the BP to ensure they understand and support the redesign of the BP and identifying erroneous models (Gruhn and Laue 2007; Schuh, Boos, and Kuhlmann 2010). However, there are several challenges to create a good business PM, such as the misalignment between BPs and IT designs, difficulties in driving the IT goals from business goals, difficulties in creating a secure business PM, difficulties in reengineering the BP, complexities in managing the rapidly changing business environment and BPs and problems associated with managing customer power.

The current literature shows that it is not easy to create a good business PM, therefore, a successful business PM should have the ability to ensure better alignment between BPs and IT goals, provide security, manage the rapidly changing business environment and BPs, manage customer power, be easy to reengineer, ensure IT goals can be easily derived from business goals and be built and implemented easily as a web service.

This article presents an overview of research in the business PM domain. It presents a review on the challenges associated with business PM and the limitations of existing business PM frameworks. Also, we outline several guidelines to create good business PM and the possible further research directions in the business PM domain.

This article is developed over the following sections. Section 2 presents an overview of the BPM history and lifecycle. Section 3 provides an overview of BPs and business PM. Section 4 outlines the challenges facing business PM. Section 5 describes our methodology to analyse and review the existing work on business PM to address these challenges and their limitations and possible further research directions in these areas. Section 6 outlines several guidelines to create good business PM. Finally, Section 7 presents the conclusion and recommendations.

2. Business process management (BPM)

Over recent years, managing the BPs of organisations have become increasingly important. There are several factors affecting the profitability and survival of small and large companies including (among others) an increase in the number of products and services ordered, a need for quick decision-making, fast information transfer, an ability to adapt to changes in demand, demands for shorter product development time and more international competitors (Simchi-Levi, Kaminsky, and Simchi-Levi 2000; Ko, Lee, and Lee 2009). Information technology (IT) has been used to manage BPs to deal with these challenges (Davenport 1993; Georgakopoulos, Hornick, and Sheth 1995; Ravesteyn and Versendaal 2009), marking the beginning of BPM.

BPM has been an important priority for organisations since the 1990s. Since the 1990s, many companies have tried to increase the number of products and services they offer, improve their relationships with customers, decrease the time it takes to launch new products and services and increase customer satisfaction (Sentanin, Santos, and Jabbour 2008). One of the major challenges for senior executives has been to build BP capability (Gartner GROUP 2009; Recker et al. 2009) to both understand, analyse and communicate organisational knowledge and to automate high functioning BP. BPM has also been used to establish quality manuals, establish control mechanisms, assess and define added value and create an automatic workflow (Viriyasitavat, Li Da, and Martin 2012). Therefore, BPM tools and techniques are considered to be one of the most valuable and useful assets of business organisations (Turetken and Demirors 2011).

BPM uses methods, techniques and software to support the BPs to design, enact, control and analyse the operational processes involving organisations, humans, applications, documents and all other information sources (Rohloff 2009). Software tools support the management of the operational processes as the business process management system (BPMS) (Xu et al. 2009). The BPMS market reached

approximately US\$1.7 billion in total software revenue at the end of 2006 while it had a compound annual growth rate of more than 24% to 2011 (Hill et al. 2007, Hill, Kerremans, and Bell 2007).

2.1 BPM history

The literature shows that BPM research directions have been studied since 1770s. For example, the idea of managing labour in the manufacturing industry was proposed by Adam Smith in 1776. He divided the process into different sub-parts to make the process more efficient (Kesari, Chang, and Seddon 2003). Furthermore, 'time and motion' management method was proposed by Frederick Taylor in 1911 for documenting and analysing the work involved in the BPs. By using this method, the number of functions and the time involved in such process could be reduced. As a result, the quality of the end product and employees' efficiency will be improved (Green and Rosemann 2000).

S. Williams was the first author used the term BPM in the field of system engineering in the 1960s (Becker, Rosemann, and Uthmann 2000). As in the 1960s, companies aimed to increase their production to meet consumer demands; this approach was to handle the BPM issues for supporting the companies to produce a large amount of products in less time (Kim 1995).

Several techniques, such as workflow, manufacturing automation and transaction process systems as well as managing BPs automatically concept were proposed in the 1970s (Gao et al. 2013). In addition, the concept of total quality management (TQM) with some ideas, such as Six Sigma and lean manufacturing was proposed in the early 1980s. The benefits behind these concepts were produced the highest quality products with the most services in less time and the lowest cost (Weske, Van-Der-Aalst, and Verbeek 2004; Raghu and Vinze 2007; Antony 2006). In the 2000s, the TQM concept could be successfully adapted to suit BPs.

In the 1990s, business process reengineering (BPR) was proposed by Michael Hammer (Hammer 1990; Wu 2003). Davenport and Short (1990) defined BPR as a way to analysis and redesign BPs and their workflow between and in organisations (Herzog, Tonchia, and Polajnar 2009). Hammer and Champy (1993) defined BPR as a basic rethinking and a radical redesign of BPs that aims to improve business performance, quality, cost and services (Ramirez, Melville, and Lawler 2010; Ozcelik 2010). Talwar (1993) defined BPR as the way to rethink, restructure and streamline structured BPs, working methods, management systems and the external relationships throughout the created and delivered value (O'Neill and Sohal 1999).

Petrozzo and Stepper (1994) defined BPR as a technique involving the BPs of organisations, redesigning and supporting their IS in order to achieve radical improvement in cost, quality, time and consumer satisfaction regarding the company's services and products. BPR aims to improve the critical measures of business performance by using IT services in order to fundamentally rethink and redesign BPs (Hammer and Champy 1993; Cheng, Tsai, and Sutan 2009). There are several tools and techniques used in BPR, such as process visualisation, process mapping/operation, change management, benchmarking and process and customer focus (Rao, Mansingh, and Osei-Bryson 2012).

In the twenty-first century, BPM is used to support different aspects of BPs in and between organisations, such as advanced reporting and analysis methodologies, executing BPs with workflow management, BP quality assurance and optimising and redesigning BPs (Wang et al. 2012). In addition, an important omission in current development practice for workflow management systems is modelling of data and access for a BP. For example, Sun, Su, Wu et al. (2014) initiate a study on data mappings between BPs and databases through formalising the data models and formulating a mapping language. This study allows many interesting problems to be studied in the presence of data, such as process evolution.

In the twenty-first century, the aim of companies was provided the most high quality services. Thus, BPM helps the organisations to abstract their BPs from the IT innovations and supports them to adapt their BPs rapidly, according to different customers' requirements (Kesari, Chang, and Seddon 2003).

2.2 BPM lifecycle

Different techniques are used in the BP lifecycle for the effective management of BPs. BPM is a cycle methodology where several perspectives of BPs are investigated during its various stages (Lodhi, Koppen, and Saake 2011). In order to effectively understand BPM terminologies and features, we start with an overview of the BPM life cycle. There are many views of the BPM life cycle (Havey 2005; Hill et al. 2006; Van-Der-Aalst 2003; Van-Der-Aalst 2004; Van-Der-Aalst, Ter-Hofstede, and Weske 2003).

According to Van-Der-Aalst, Ter-Hofstede, and Weske (2003), the BPM life cycle comprises four stages: process design, system configuration, process enactment and diagnosis.

- *In the process design stage*, the AS-IS BPs are electronically modelled into the BPMS by using graphical standards, such as UML and BPMN.
- *In the system configuration stage*, the BPMS and the underlying system infrastructure are configured.
- *In the process enactment stage*, electronically modelled BPs are deployed in the BPMS engines by using execution standards, such as BPEL and BPML.
- *In the diagnosis stage*, the BPM analysts define and improve bottlenecks in the BPs by using analysis and monitoring tools, such as business activity monitoring (BAM) (Kang et al. 2009) and process mining (De Weerd et al. 2013).

According to Lodhi, Koppen, and Saake (2011), the BPM lifecycle comprises seven stages: plan, design, implement, execute, evaluate, analyse or post-execution and recommend. In the planning stage, the BPs which need to be performed are defined by analysts in order to achieve the desired goals and objectives where the BP goals and objectives are described in detail. Thus, the processes are conceptualised and the design characteristics are identified at an abstract level. Furthermore, the desired output of the BP is identified in this stage and the target To-BE design characteristics are provided to the design stage. In the design stage, several aspects of the processes are considered in detail. For example, the BPs are analysed from different perspectives: functional, behavioural, organisational and informational (Curtis, Kellner, and Over 1992). Also, several elements are explicitly involved, such as inputs, resources, operations, conditions and process flow. In addition, the target values of all objects are specified for the evaluation stage and thus the detailed design model is ready for the implementation stage.

In the implementation stage, process enactment where the resources are allocated to process operations is carried out which leads to the creation of the execution environment (Houy, Fettke, and Loos 2010). In the execution stage, the resources carry out operations on inputs and transform them into outputs with the help of IS in order to fulfil the customer requirements (Busch and Fettke 2011). IS is used to evaluate, analyse, control and manage the BP which consists of measuring, monitoring and analysing the BP to make changes in real time. In the evaluation stage, BPs are evaluated for performance analysis by using different quantitative and qualitative measurements, such as statistics and process mining (Van Der Aalst, Reijers et al. 2007). Moreover, the objects' actual values are compared with the objects' target values and actual process behaviour is compared with planned process behaviour. In the post-execution analysis stage, the results of the evaluation stage are used to analyse the BPs' performance in a broader context and the enterprise's achievement of its goals and objectives is analysed from process, customer and organisational performance perspectives. This is the starting point for the BP improvement techniques where the AS-IS PM is built. In the recommend stage, the BP is improved where the TO-BE concept is practiced (Xu et al. 2008).

According to Andrikopoulos et al. (2008), the BPM lifecycle comprises six stages: BP modelling, integrating, executing, analysing and monitoring, measuring and optimising (Papazoglou and Leymann 2008; Davenport 2004).

- *In the BP modelling stage*, the PMs are used to graphically capture, design and simulate the BPs.
- *In the BP integration stage*, the process elements are connected to exchange information in order to achieve the business goals and objectives.
- *In the BP execution stage*, the BP is deployed and executed within the BPM execution engine.
- *In the BP analysis and monitoring stage*, the graphical administrative tools are provided to illustrate the processes which are in progress and completed and to integrate the business metrics and the key performance indicators within the BP descriptions.
- *In the BP measurement stage*, the definition of familiar business metrics is captured and related to the computational measurements.
- *In the BP optimisation stage*, which refers to process improvement, process flows of all sizes involved across any application are optimised and BP design and BP maintenance are coordinated.

3. Business process modelling (business PM): an overview

3.1 Business process (BP)

BPs contain the transformation of inputs to outputs and express the behaviour of organisations (Goldkuhl and Lind 2008). The BP is a set of activities whose final purpose is the production of a specific output which has value to the customer (Melao and Pidd 2000). Each BP which has a goals and objectives can be affected by events that have happened in other BPs or in the external world. It is the central concept used to model the business (Capozucca and Guelfi 2010).

BPs can be classified into core or primary and supportive or secondary BPs. A core BP starts from outside the organisation, such as the chain of BP activities which realise product delivery to the customers. On the other hand, a supportive BP generates the conditions for the core BP to carry out. Many authors have defined BPs in different ways. Table 1 presents the most important definitions and comments:

In reviewing the literature on BPs, it can be observed that BPs include the following important elements which are related to each other (Aldin and De Cesare 2011).

- *Process*: is a major element of the business which is made up of several business activities and procedures that work together to achieve business goals, such as the mobile phone order management process.
- *Activity*: which can be a function, task or operation is the specific behaviour carried out in the organisation, such as collecting and passing the customer details to the account department.
- *Product and service*: is the value of the process outcome.
- *Role*: is the actor or agent types which take part in the BPs, such as the general office.
- *Goal*: is the aim of the process, such as serving the customer automatically and reducing the number of staff.
- *Event*: is an occurrence which takes place at a specific time and is capable of inducing several observable behaviours, processes or activities, such as a customer's request for finance.
- *Rule*: which can be a behaviour, control or action is the constraint identified for any part of the organisation and its BPs, such as only considering customers with a clear credit check for a loan.

3.2 Business PM

A process is a major element of the business which consists of several business activities and procedures that work together to achieve business goals. The literature shows many ISs fail due

Table 1. Different BP definitions.

Authors	Definitions	Comments
Hammer and Champy (1993)	BPs are a set of activities acquiring one or more inputs and generating output as rate to the customer.	The definition shows the importance of BP to organisations and highlights how business activities can be achieved which meet customers' expectations.
Aguilar-Savén (2004), ENV (1995)	BPs are a set of organisational procedures that are structured together to achieve business goals.	BPs are made up of several business organisational activities, such as goals, people and objectives.
Jacobson (1995), Lindsay, Downs, and Lunn (2003)	BPs are a set of organisational procedures or activities that work together to achieve a business organisation's goals and objectives to fulfil the customers' expectations.	This definition first discusses the importance of BP activities within the organisation, especially internal activities (e.g. strategies, goals, policies and objectives); and second, how these activities can assist in increasing the satisfaction of customers.
Eriksson and Penker (2000)	BPs highlight how to execute work rather than how to model business services and products.	BPs are more concerned with the implementation of organisational activities rather than modelling them.
Davenport and Short (1990)	BPs are ways to simply design how to achieve specific tasks in the organisations.	BPs are only used to narrow the business activities.
Guha et al. (1997), Trkman (2010)	BPs are a complete set of related dynamic business organisational activities that are scientifically worked in order to meet customers' expectations or fulfil the business goals and objectives that have been defined at the business strategic level.	A set of structured organisational activities needed to work together to increase customer satisfaction and meet company's goals.
Hull, Su, and Vaculin (2013)	BPs refer to an assembly of tasks performed by humans to achieve business goals and they are ubiquitous and occur in all sectors, such as government agencies, universities and institutions, funding agencies and conference organisations, etc.	The definition shows the importance of BP to organisations and all sectors and highlights how business activities can be achieved (Sun, Su, and Yang 2014).
Rafael and Andreas (2012)	BPs specify how operational activities are executed to provide a service.	This definition shows how to execute the BPs activities to provide the customers services.

to a lack of information on BPs where the system is going to be used. As a result, business performance suffers. The Standish Group conducted a study on the success of ISs within the business organisational sector, finding 29% of ISs successfully fulfilled business needs, 53% were found to perform poorly and 18% failed to achieve fully their objectives. In other words, the success rate of IS projects was low. According to the results only 16–28% of IS projects were considered to be successful (Lee and Xia 2005; STANDISH GROUP 2001). However, managing BPs is a critical task which needs constant and rapid improvement and updating (Barjis 2008).

Business PM is an essential element in BPM as it enhances our understanding of business concerns and communication between stakeholders (Van-Der-Aalst, Ter-Hofstede, and Weske 2003). Business PM is used for visualising BP operations for a more thorough understanding and analysis (Leopold, Smirnov, and Mendling 2012). It can be used as a medium of communication between stakeholders, such as employees, developers and executives. It also increases management's ability to understand BPs and to make rational decisions to enhance the traceability and understandability of organisational activities (Cumberlidge 2007).

Business PM is a well-accepted method within the business organisational sector for structuring BPs (Koliadis et al. 2006). There are three important pillars to business PMs: model, strategy and operations. A business model includes knowledge of creating an organisation and deliverables, and identification of business goals and objectives. Business strategies provide rules and guidelines to fulfil all model-related elements. Business operations include people, processes and technology, where different people work in groups together to meet the organisational goals by using IS services help (Hung 2006).

Business PM is used to achieve the following (Bernhard and Recker 2012):

- It supports BP reengineering and improvement through BP analysis and simulation (Recker, Safrudin, and Rosemann 2012; Damij 2007).
- It creates an appropriate IS which can support the organisation by providing the descriptive business model to learn (Wijesekera and Sykes 2003).
- It facilitates the ability of the organisation to share its understanding of BPs by using common BP representations which enhances understanding and communication. This occurs by agreeing to adopt a well-defined set of BP concepts to be used by different stakeholders (Lind and Seigerroth 2010).
- It supports the decision-making process during BP control and execution (Caetano, Silva, and Tribolet 2005; Indulska, Green, et al. 2009; Indulska, Recker, et al. 2009; Luo and Tung 1999).

There are many techniques and methods available, such as BPMN (Dijkman, Dumas, and Ouyang 2008), BPEL (Ma, Xu, and Sanders 2009), *i** (Yu, Mylopoulos, and Lesperance 1996) modelling language, etc. Many authors have defined business PM in different ways. Table 2 presents the most important definitions and comments:

In this literature review of business PM definitions, we selected Weske et al.'s (2004) which views business PM as a management discipline that provides support to organisational processes using different methods, techniques and software tools in order to control and analyse organisational

Table 2. Different BP modelling definitions.

Authors	Definitions	Comments
Amaral et al. (2011)	Business PM is a way to support BPs by using several techniques, methodologies, models and systems to design, control and analyse BPs, where many resources are used: human, applications, technology, organisations, etc.	This definition only focuses on how the processes are going to be operationalised, however, process clarification at the business strategic level is also important.
Tsalgatidou and Junginger (1995)	Business PM aims to provide information on real world activities at an abstract level rather than a detailed description of business activities and hence the information is used to reduce the complexity of real world activities.	This definition represents the BP as a slice of reality with only a brief description. However, in the context of business PM, a detailed description of each activity is required.
Kesari, Chang, and Seddon (2003)	PM is a way to assist humans to understand, describe and document process-related information using effective diagrams rather than explanations using text.	This definition shows that the BP and other process-related activities within the business organisation can be described easily using different UML diagrams: activity diagrams, state charts, use cases, sequence diagrams, etc.
Green and Rosemann (2000)	PM in an organisation is a method that focuses on the management of organisational activities in business transactions.	The BP activities need to be managed in a way that goals can be achieved.
Becker, Rosemann, and Uthmann (2000)	PM is the logical and temporal order of related business functions that have been performed on the process objectives.	Business activities have been used as functions that fulfil the process objectives.
Kim (1995)	Business PM is a method to understand and redesign the BP to better support customer services.	This definition views the business PM as a technique for understanding and redesigning BPs.
Gambini et al. (2011)	Business PM documents organisational procedures in order to support both business and IT stakeholders. It is used to communicate and agree on requirements among business analysts.	This definition views the business PM as a technique for analysing and documenting the organisations.
Reijers et al. (2010)	BPM is an integrated management philosophy and set of practices including incremental change and radical change in BP, and emphasises continuous improvement, customer satisfaction and employee involvement.	This definition views the BPM from management view to understand the organisations and enhance their performance.

processes and activities, including people, organisations, applications, documents and other related information. This definition incorporates all business PM-related components, as well as defines how to analyse business-included components, and highlights the role of business PM for organisational success.

There are two existing approaches for modelling BPs: the top-down approach and the bottom-up approach. On the one hand, in the top-down approach, a model of how BPs should be executed is proposed by experts. This approach starts from an overall assumption that BP can be considered as a black box. From this position, the black box is broken down into smaller details, such as tasks and activities, until all the details are specified. On the other hand, the bottom-up approach starts modelling the details at a lower level, looking at how the functions should be executed at an operational level. The next step is to combine the functions to make the activities where the activities are connected to each other to build processes. From here, the whole business PM is created. This approach presents detailed information on the processes and their execution (Lodhi, Koppen, and Saake 2011).

4. BPM challenges

Implementing a good business PM has many advantages, such as improving business performance, identifying erroneous models and directly involving the employees from the beginning of the modification of the BP to ensure they understand and support the redesign of the BP (Gruhn and Laue 2007; Schuh, Boos, and Kuhlmann 2010). However, there are several challenges in creating a good business PM. Acknowledging the different key stakeholders of business PM is an essential concept in order to understand the issues and future challenges of business PM (Rito Silva and Rosemann 2012).

There are three stakeholder groups involved in business PM. The first group of stakeholders is the practitioners, including the business analysts, the system designers and any staff who implement business PM in their organisations. The second group of stakeholders is the academics who provide the educational services and develop the next generation of business PM. The third group of stakeholders is the business PM software designers and the consultants who provide support to the end users (Indulska, Recker, et al. 2009). The literature shows that business PM faces many challenges, as shown in Table 3.

Table 3. Challenges of business PM.

Challenges	Descriptions	References
People with different skills and background.	People working on business processes are not the same people working in software engineering to develop the system.	Gruhn and Laue (2007)
Misalignment between business strategies and IT.	The lack of alignment or misalignment between business strategies and IT results in the business failing to use the available IT support.	Silva and Chaix (2008)
Driving IT goals from business goals.	It is not easy to drive IT goals from business goals.	Wim Van et al. (2007)
Security.	Integrating security into a developed business process model is not very well understood.	Haley et al. (2006), Mcdermott and Fox (1999)
Manage BPs.	IS managers view BPM from a technical perspective and senior executives view BPM from a business perspective.	Tosic (2006)
Business environment changes rapidly.	The business environment can be affected by several forces, such as the customers assuming they are in control instead of the product or service provider.	Hvolby and Trienekens (2010)
BPs change rapidly.	The transition from one BP stage to another BP stage can be slow and can contain faults.	Alexandrou and Mentzas (2009)
Manage customer power.	Flexibility is an important attribute for businesses in order to deal with the rapid changes in the business environment and manage customer power.	Lepmets, McBride, and Ras (2012)

4.1 Misalignment between business and IT and the difficulty in deriving IT goals from business goals

IT has the power to change the way an organisation does business (Overby, Bharadwaj, and Sambamurthy 2006; Aburub and Almahamid 2010; Shin and Jemella 2002) and the role of IT in organisations is to make a value-added contribution to the business. However, it has been acknowledged that there is a gap between the IS department and the rest of the business in the majority of organisations (Peppard 2001) while strategic IT alignment occurs when the business goals and activities of the organisation are in harmony with the IS that support them (Onita and Dhaliwal 2011; McKeen and Smith 2003).

Alignment between the needs of IT and business is considered to be one of the major challenges for many organisations (Luftman, Kampaiah, and Nash 2005; Khaiata and Zualkernan 2009). A survey conducted on European IT managers by SYNSTAR (2004) and WINMARK and SOFTWARE (2004) indicated that 78% of their projects do not have alignment with IT and business strategy (Silvius 2007). The literature shows that IT projects fail due to misalignment between IS and business at the implementation stage. For example, a study conducted by Taylor (2000) found that only 12.7% of IT projects were successful (Gutierrez et al. 2008).

Hence, it is important to develop a strong link between the IS and IT and business PM in order to support, mirror and automate BPs. However, there are several challenges to creating a good business PM to manage BPs and IS/IT (Odeh and Kamm 2003). Furthermore, it is very complicated to specify IT development requirements (Larsen and Klischewski 2004).

The alignment of IT with underlying BPs is one of the main challenges of business PM (Chan and Reich 2007). Commonly, the people who work in BPs are not the same people who work in software engineering to develop the system (Gruhn and Laue 2007). Studies show that a lack of alignment between business strategies and IT results in the business failing to use the available IT support (Sabherwal and Kearns 2007). However, several organisations have successfully aligned business strategies and IT service performance (Silva and Chaix 2008).

Another challenge facing business PM is that IS managers view business PM from a technical perspective and senior executives view business PM from a business perspective. For instance, the aim of the technical management of software and IS is to maximise the transaction system throughput while the objective of senior executives is to maximise the profits of the transaction system (Tosic 2006).

It is very difficult to manage BPs as they change rapidly (Alexopoulos and Theodoulidis 2003). Also, BPs involve people from different backgrounds, such as business or IT, and also involves difficult and comprehensive organisational analyses. It is very hard to find one person with a complete understanding of every system process because each person in the system is usually only familiar with one area of the overall system (Luftman 2003). For example, the IS team lacks BP knowledge and the BP team lacks IS knowledge. Furthermore, communication between IS and BP teams is very complicated because of their different experiences, culture and skills (Filipowska et al. 2009; Atle Gulla and Brasethvik 2000; Rosemann 2006). In addition, the relationship between IT professionals and business professionals is described in problematic terms (Van Den Hooff and De Winter 2011). Moreover, the number of model designers and users has increased dramatically, especially representatives from different IT and business departments who may not be fully involved in the business PM design (Becker, Rosemann, and Uthmann 2000).

4.2 Security

Security is an essential aspect in business PM (Rodríguez et al. 2011). For several reasons, it is quite challenging to add security into BPs (Backes, Pfitzmann, and Waidner 2003; Chung and Nixon 1995). First, it is not easy to understand the integration of security into a developed business PM (Haley et al. 2006; Mcdermott and Fox 1999). Second, security properties are complex and error

prone when integrated manually (Alotaibi and Liu 2012b, 2012d). Furthermore, security leaks could be caused by a lack of experienced IS developers. Therefore, IS developers need to have appropriate tools and guidelines to develop secured business PM applications (Alotaibi and Liu 2012a; Kokolakis, Demopoulos, and Kiountouzis 2000).

4.3 Business processes in a rapidly changing business environment, and managing customer power

The rapidly changing business environment and BPs are the major challenges of business PM (Neubauer 2009; Hwang and Yang 2002; Box and Platts 2005; Alexopoulos and Theodoulidis 2003). The business environment is continually and dramatically changing. Thus, companies face several challenges, such as increased competition, raised customer expectations and expanded markets. As a result, companies need to consider lowering costs, decreasing inventories, reducing throughput times, expanding product choices, improving the quality of customer services and supplying more delivery dates in order to compete (Simatupang, Wright, and Sridharan 2002).

Hummer and Champy (1993) found that the business environment can be affected by several forces. First, customers assume that they are in control instead of the product or service provider. Customers tell the product or service provider what kind of products they require, how much they can pay and, how and when they need them. Second, competition between companies is stronger (Olalla 1999).

Furthermore, the transition from one BP stage to another BP stage can be slow and error prone (Alexandrou and Mentzas 2009; Rosemann 2006). In order to decrease the costs and risks and to obtain an advantage from changing IT and business strategies, change management is considered as very important concept. For complex systems, it is impractical to modify them; rather, they need to be totally rebuilt in order to meet the system requirements. Hence, it is important to consider the rapidly changing requirements of BPs in a BPMS (Rajabi and Sai Peck 2009).

Another challenge in creating good business PM is managing customer power. Customer power manifests itself in two ways. First, customer power enhances the customers' ability to improve their decision-making position to reduce the price; and second, it enables the customer to specify their required goods and services (Piccoli & Lloyd 2010; Alotaibi and Liu 2013a). Therefore, it is a priority to satisfy customers' needs and demands in order to stay ahead of the competition in the current rapidly changing competitive business environment by managers of well-operating organisations (Fullerton and Ness 2010; Dominic et al. 2010; Daim, Basoglu, and Tanoglu 2010). Thus, in order to deal with the rapid changes in the business environment, manage customer power and respond quickly to customer requirements, flexibility is an important attribute that businesses need to possess (Cauvet and Guzelian 2008; Liu et al. 2012).

5. Methodology

This survey reports academic publications on business PM challenges over 15 years from 2000 to 2014. It includes all business PM challenges, tools, standards, techniques and methodologies encountered in the literature resulting from an extensive and systematic search within the academic peer-reviewed literature. It reviews previous research on misalignment between business and IT, driving IT goals from business goals, security issues for better alignment between business and IT, managing the rapidly changing business environment and BPs and managing customer power (Alotaibi 2014).

It is important to establish an effective method to process this large amount of literature while capturing the essential elements of the overall picture. Therefore, our literature review comprises two stages, as depicted in Figure 1. As shown in Table 4, 36 IS journals were searched and we have also searched IEEE and ACM databases to identify relevant papers. Additionally, seven highly ranked conferences were also inspected. Details are listed in Table 5. A completed list of referred

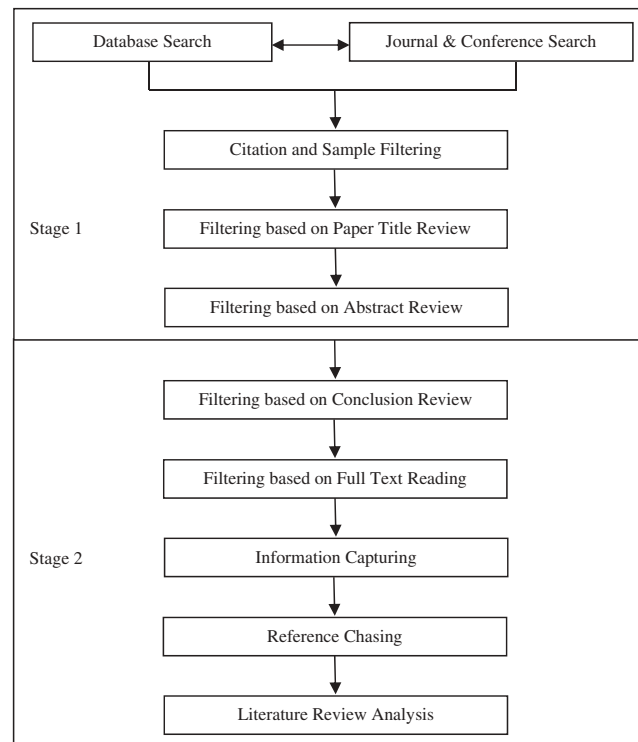


Figure 1. Literature review methodology.

journals and conferences are shown in Appendix. In the first stage, we searched papers by using several keywords such as 'business process', 'business process modelling', 'business process management', 'model business process', 'process model', 'business and IT', 'alignment', 'BPM challenges', 'secure BPM', 'manage change' and 'customer power'. We filtered the results based on the paper's title, read the abstract of the selected papers and further filtered them to identify the most relevant papers to the topic of business PM challenges. In this stage, we identified 335 journal papers and 233 conference papers that were potentially suitable for inclusion in the literature review.

In the second stage, we read the conclusion of the selected papers and then read the full text of the papers to choose papers that were most relevant to our literature review topic, selecting 74 journal papers and 60 conference papers as being the most relevant to our topic (Tables 4 and 5).

5.1 First challenge: misalignment between business and IT

In this section, we review the existing research on the issue of alignment between business and IT which may have several challenges caused by: (1) misalignment between business strategies and IT strategies; (2) issues in specifying IT development requirements; (3) staff with different skills and backgrounds; (4) a lack of qualified modellers; (5) a lack of qualified business representatives and (6) issues in deriving IT goals from business goals.

An annual study conducted by the Society for Information Management for four years ranked the issue of alignment between IT and business as the primary concern for company executives and IT practitioners (Vaidya and Kumar 2006; Silvius and Smit 2011). For two decades, the alignment between business and IT appeared as a top concern for company executives and IT practitioners (Vargas, Johannesson, and Rusu 2010; Wagner 2008; Sledgianowski, Luftman, and

Table 4. Selected journal papers in the second stage.

Journal name	Years															Total
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
ACM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AJIS	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
BPMJ	0	0	0	0	0	1	1	1	1	0	1	1	1	1	1	9
DS	0	0	0	1	0	1	0	0	1	1	0	0	0	0	0	4
DSS	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
EIS	–	–	–	–	–	–	–	0	1	1	1	1	0	2	0	6
EJIS	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
I&M	1	0	0	0	1	0	1	0	0	1	1	0	0	0	0	5
I&O	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
IEEE	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	3
IJIM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
IJIS	–	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
IJMS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IJOC	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	3
IPM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IS	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
ISEB	–	–	–	0	0	0	0	0	0	1	0	1	0	0	0	2
ISJ	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
ISM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ISR	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
IST	0	0	0	0	0	0	1	2	1	1	1	1	0	0	0	7
IT&M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ITM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
J AIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JEIM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
J IIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JIT	0	0	0	1	2	0	1	2	0	0	0	0	0	0	0	6
JMIS	0	0	0	0	0	0	0	1	1	0	0	2	0	0	0	4
JSIS	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	3
JSS	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	3
MISQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MKTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MS	0	0	0	1	0	1	1	0	1	0	0	0	1	0	0	5
OR	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
RBIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SJIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	2	1	3	5	4	10	9	8	6	7	8	6	3	1	74

Table 5. Selected conference papers in the second stage.

Conference name	Years															Total
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
ACIS	0	0	0	0	0	0	0	1	1	0	0	0	2	0	0	4
AMCIS	0	0	0	0	1	0	2	1	2	2	3	2	2	0	0	15
ECIS	0	0	0	0	0	0	0	1	2	0	0	3	1	0	0	7
HICSS	0	0	0	0	0	0	0	1	1	0	1	3	3	0	0	9
ICIS	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2
PACIS	0	0	0	0	0	0	1	0	0	1	0	2	1	1	0	6
ICBPM	–	–	–	3	1	2	0	1	2	1	3	2	1	0	1	17
Total	0	0	0	3	2	3	3	6	8	4	7	12	10	1	1	60

Reilly 2004; Marrone, Hoffmann, and Kolbe 2010; Yayla and Hu 2009; Cragg, Tagliavini, and Mills 2007; Chang et al. 2009; Silvius, Waal, and Smit 2009).

IT alignment involves making better use of IT resources to meet the corporation's business objectives (Peak, Guynes, and Kroon 2005). Better alignment between IT and business strategy can result in increased company profit, growth in sales, increased productivity, stronger business performance, a more highly perceived value of the role of IT in the organisation and improved IS

strategic planning. For all these reasons, addressing the alignment issue is important (Tallon and Pinsonneault 2011; Chan et al. 1997; Chan, Sabherwal, and Thatcher 2006; Oh and Pinsonneault 2007; Preston and Karahanna 2009).

The misalignment between the IS department and other departments in an organisation has been shown to result in often serious and unsolved problems in today's complex business environment. Misalignment results in a waste of time, confusion, diminished productivity and, ultimately, project failure (Box and Platts 2005). Benbya and McKelvey (2006) propose that alignment between business and IT involves a series of adjustments at three different levels of analysis: (1) the strategic dimension where IS strategy, business strategy and strategic planning align; (2) the operational dimension where the locus of responsibility, decision-making rights, organisational actors' values and the deployment of IS personnel align with the IS structure and (3) the individual dimension where the IS infrastructure aligns with user's expectations and needs.

Research has explored the impact culture has on alignment. Silvius, Smit, and Driessen (2010) aimed to contribute to an understanding of the alignment challenge by exploring the relationship between the organisation's culture and business and IT alignment maturity using Smit et al.'s (2008) organisation culture X-model. Luftman's framework (Luftman 2000) to measure the maturity of business and IT alignment was also used. They conducted a quantitative study using questionnaires to investigate middle-sized logistics service providers. The results indicated a relationship between the organisation's culture and business and IT alignment maturity, especially in relation to governance, skills and partnership variables.

Strategic dimensions and culture have also been explored in the literature. Nickels and Janz (2010) used questionnaires to evaluate the relationship between organisational culture and the alignment of business and IT in the structural and strategic dimensions. The results indicated a significant association between organisational culture and strategic alignment maturity. Thus, if organisations have more congruent cultures, they have higher levels of strategic alignment maturity.

Bradley et al. (2012) found that the successful implementation of effective IT in healthcare was limited by cultural and technical difficulties encountered when organisations' infrastructure was established or upgraded. They extended Ross' (2003) four-stage model of organisational architecture maturity: (1) the business silo stage where the standards and guidelines for the system development are provided; (2) the standardised technology stage where information resources are identified throughout organisation, the systems integrated and data shared; (3) the optimised core stage where long-range planning is facilitated, strategic value is assessed and alignment for competitive advantage is made and (4) the business modularity stage where inter-organisational alignment and strategic agility occur. This model was a valuable resource to help healthcare organisations better align their business and IT strategies.

The researchers used the partial least squares structure equation model (Bradley et al. 2012) to analyse the survey data collected from 164 US hospitals at four different stages of organisational enterprise architecture maturity. The results indicated that this model directly influences the effectiveness of the hospitals' IT resources to achieve their strategic goals while at the same time, this model indirectly influences the effectiveness of the hospitals' IT resources when IT alignment is integrated as the interceding variable.

Silva, Figueroa, and González-Reinhart (2007) studied IS alignment in professional organisations. The study was based on three alignment conceptualisations of IS strategy: emergent, managerial and critical. Examining five different Chilean organisations, four of them being professional and one entrepreneurial (two being private and three being public), data was collected from 32 interviews. The interview questions were addressed to organisational members assigned to IS alignment domains based on their relative decision-making roles. The results indicated that achieving IS alignment for professional organisations is very complicated, especially in public organisations.

Organisations have to integrate IT when the company wants to merge with or acquire another company. This can be a complicated and time-consuming process due to a lack of

understanding of the problems involved. Hence, Wijnhoven et al. (2006) proposed a new IT alignment model which identified three ambition levels in mergers and IT integration: (1) complete integration where ITs are merged, which is useful for small firms; (2) partial integration with the establishment of priorities where the most important BPs are, first, integrated and the others are left for later stages and (3) co-existence integration where the two ITs of the merger partners remain unchanged. The authors used four different methods to complete these three IT integration levels: (1) renewal where all the IT departments in the merger partners are abolished and replaced by a completely new IT department; (2) takeover, where the IT department of one partner is closed down and the IT department of the other partner is used for both partners; (3) standardisation, where the best parts of both IT departments are combined as the new organisation standard and (4) co-existence, where the IT departments of both partners remain as they are. This proposed model was validated in three different hospitals as case studies.

Strategic alignment is a concept for understanding how organisations can translate their IT deployment to increased business performance. Bergeron, Raymond, and Rivard (2004) identify the performance impact of strategic alignment between IT structure, IT strategy and co-alignment patterns. They conducted a mailed survey of 110 small manufacturing and service firms, using cluster analysis to analyse the collected data. They found that low performance firms displayed a disagreement co-alignment pattern of IT structure, IT strategy, business structure and business strategy which differentiated them from other firms.

Cragg, King, and Hussin (2002) measured alignment between business strategy and IT strategy in small UK manufacturing firms, specifically, they examined the link between alignment and business performance. Questionnaires were used to collect data from 250 firms on nine different strategies, such as price, quality products, quality service and product differentiation, and compare the business and IT responses. The results indicated that small firms with a high level of IT alignment had better organisational performance than the firms with low levels of IT alignment.

Gutierrez et al. (2009) studied whether there is any difference in strategic alignment between small, medium and large enterprises. This study examined and compared the relevance of organisational size ((small, medium and large) and their planned integration strategy (independent, simultaneous or sequential). Questionnaires were used to collect data from 104 participants based on several alignment factors: communication, governance, competency/value measurement, partnership, scope and architecture and skills. The results indicated that there were no significant differences between the alignment of small, medium and large organisations. However, there were significant differences between small, medium and large organisations' implementation and their planned integration strategies.

Croteau and Raymond (2004) evaluated the business performance outcomes of alignment between the organisation's IT competencies which included connectivity, technological scanning, and flexibility and strategic competencies which included shared vision, empowerment, cooperation and innovation. They used questionnaires to collect data from the top managers of 104 randomly selected Canadian organisations with more than 250 employees. The structure equation modelling tool was used to analyse the collected data. The results indicated that perceived business performance could be increased by alignment of strategic and IT competencies.

Business analytics systems can possibly create value and provide competitive advantage to organisations. Shanks, Bekmamedova, and Willcocks (2012) argue that business analytics systems can also enable alignment between business strategy and IT strategy and support organisational transformation. They identified several critical factors to the success of the business analytics and to strategic alignment and organisational transformation: (1) the early definition of globally standard metrics and dimensions; (2) a high quality technology infrastructure and high quality data; (3) sustained senior management support together with strong leadership within the business analytics project; (4) effective governance structures that support change management and continual

renewal of business analytics capabilities and (5) hybrid people with a mix of technical, business and strong communication skills.

Cohen and Toleman (2006) used questionnaires to collect data from 167 South African and Australian companies. The study examined the effect of commitment, shared vision and mutual understanding on the contribution of IS to the business performance. The findings suggest that when there is a strong relationship between IS and business, organisations will be more successful in their use of IS. The results also indicated that three factors contribute to increased IS performance: (1) strong loyalty on the part of the business to IS efforts; (2) a higher level of IS understanding of the business and (3) a long-term agreement between the IS and business executives on IS priorities.

Grant (2003) explored the relationship between strategic alignment and the implementation of an enterprise system. As strategic IS alignment is important to organisational success to derive maximum value from IT assets, the author studied how the organisation can align its IT and business strategies and impact its global enterprise system deployment. The authors interviewed 15 senior managers from Canada, the US and Europe. This research results from the case study on the experience of one organisation shows that it is difficult to achieve alignment, as the company experienced difficulties deploying the planned system and there was considerable misalignment between the business operational model and the IT execution model.

Anthony et al. (2006) examined the influence of strategic alignment between IS strategy and business strategy on the payoff of the IT investment using questionnaires. This study also investigated the moderating effects of strategic alignment on the relationship between IT investment and business performance for 344 manufacturing firms in the south of the United States. They investigated different perspectives on strategic alignment, two focusing on alignment between the business and IT planning process (coordination and integration), while two focused on the alignment of business and IT strategy outcomes (matching and moderating). Responses to the questionnaires were received from 84 of 275 manufacturers. The results showed a synergistic coupling between strategic alignment and IT investment with business performance.

Chen (2010) examined the relationship between alignment maturity dimensions and IS strategic alignment. Their collected data was based on strategic alignment maturity model (SAM) developed by Luftman (2000) which contained six maturity factors: competency, communication, governance, technology scope, partnership and skills. They collected data from 130 business and IT executives from 22 companies in China, 11 of these companies being multinationals operating in China. Their results showed that alignment between business and IT strategies can improve organisations' competitive edge, thus achieving strategic alignment can be considered a major concern for business executives.

Avison et al. (2004) validated the strategic alignment model (SAM) proposed by (Henderson and Venkatramen 1989b) in a financial services firm. They applied data collected from completed projects to the model in order to determine whether the SAM is a useful model as a management tool to assess, create and sustain business and IT strategic alignment. The results indicated that the SAM has practical and conceptual value.

Newkirk, Lederer, and Johnson (2008) tested the impact of IT and business change on strategic IS planning and IS and business strategy alignment planning. The study used a questionnaire to collect data from 161 IS executives. The structure equation modelling was used to analyse the collected data. Newkirk et al. found that practitioners have to be more careful in setting their planning in response to IT and business changes and that practitioners may not have to shorten their planning in a rapidly changing business environment.

Willcoxson and Chatham (2004) investigated perceptions of the relationship between IT and business held by 653 IT managers and staff and 503 business managers and staff using surveys, collecting data over a 3-year period. The results indicated that there are significant differences in the perceptions of IT managers and business managers, particularly in relation to issues on IT systems and communication efficacy. Both groups agreed on the importance of seeing IT as the

driver of business activities and the responses to the issues related to alignment between IT, business strategy and communication efficacy.

In Burn and Szeto (2000), the authors investigated whether there are any significant differences in business and IT managers' perspectives to identify the factors that contribute to successful strategic alignment by using Henderson and Venkatraman's (1999) strategic alignment model framework (Henderson and Venkatraman 1989a). Responses to questionnaires were received from 93 of 400 business and IT managers in different industries in Hong Kong to develop an effective alignment model between business and IT strategies to achieve a competitive advantage. The results indicated that there were no significant differences between business and IT managers' perspectives with regard to strategic alignment. Both groups indicated that business strategy is the driver for strategic alignment and the role of IS management was to provide executive leadership to ensure the IT functions achieve the strategic goals and objectives of the organisation. However, the detailed case studies on the container terminal operators suggested that successful IT alignment required different perspectives of business and IT managers.

Wang et al. (2013) studied a firm's IT capabilities influencing by the IT department hard and soft skills and how these IT capabilities affect the alignment between business and IT. This study was focused on IT adaptability, IT innovation and IT-user collaboration. They collected their data from 120 IT directors and the results indicated that IT-user collaboration and IT adaptability have a positive impact on the alignment between business and IT.

Leonard (2007) compared the perceptions of IS and business managers in achieving alignment between IS and business. Previously, we defined the organisational position and understanding of the business of the IS managers, as well as the IS business partnerships, as important factors in achieving IS alignment. However, the author identified another three concepts: (1) the extent to which IS and business managers have to share the vision of the IS alignment profile; (2) the extent to which both the business and IS managers have a general understanding of the required time frame in which to attain alignment and (3) the need to teach business managers about possible IS strategy. This study used mixed methods with questionnaires as a quantitative method and interviews as the qualitative method. The questionnaires were constructed based on Preston (2004) and Preston, Karahanna, and Rowe (2006) and 365 responses were received from top IS managers and senior executives in the organisation. Managers from four different organisations participated in the interviews: an electrical supplier in Australia and New Zealand, a company in the Asia Pacific region to represent a global organisation, the distributed arm company in Australia and a public sector organisation in Australia.

The IT service management (ITSM) framework is estimated to be used by over 45% of companies. Marrone and Kolbe (2011) conducted an international survey of 441 firms to examine the benefits provided by the IT Infrastructure Library (ITIL), the de facto ITSM framework for IT organisations. This research focused on the strategic position and operational benefits of IT organisations, particularly those evolving from business and IT alignment maturity. The results indicated that as the adoption of ITIL was enhanced, the level of business and IT alignment maturity increased. Furthermore, the results indicated that the further ITIL was implemented, the higher the operational and strategic benefits to the organisations.

Cumps et al. (2009) inferred business rules between business and information and communication technology alignment. The study appropriated a rule induction algorithm using a set of data consisting of rich alignment information collected from 641 organisations in 7 different European countries. These alignment rules were generated using AntMiner+, the rule induction technique well known for its ability to obtain comprehensible, accurate and intuitive predictive models from data. This article aimed to describe practical guidelines for IT and business managers to obtain better alignment between information and communication technology and business requirements.

On the issue of IT and business strategy alignment, Bleistein et al. (2006b) proposed a business strategy, context and process (B-SCP) requirement engineering framework. This paper extended the framework proposed in Bleistein et al. (2005, 2006a) that enabled modelling the organisational

IT requirements to validate the requirements against the business strategy. For goal modelling, Jackson context diagrams and the RAD were used respectively to represent business strategy, context and process. The Jackson problem diagram framework was used to integrate business strategy and context. This framework was validated using a Seven-Eleven store in Japan as a case study. The proposed B-SCP framework offered better alignment between the organisational IT requirements and the business strategy.

Engelsman et al. (2011) proposed a language, named ARMOR, to model business goals and requirements in the organisation's architecture. The language is focused on alignment between business and IT. In using this language, the high level goals are modelled in stakeholder's terms where the goals are refined into different sets of sub-goals throughout the goal trees. The low-level goals, the requirements, are related to the processes, services and applications implementing the requirements. This language is dependent on the existing requirements modelling languages and is aligned with the enterprise modelling language standard called ArchiMate1 (Lankhorst 2005). However, the authors didn't validate their proposed language.

It is very complicated to create a productive intelligible bridge between a business model and an IT system model in order to mirror, support and automate BPs. Odeh and Kamm (2003) studied the links between the business PM and UML software specification techniques. They argued that the UML alone cannot capture all complex organisational activities. Their approach, in contrast, developed a set of use cases through conducting real life case studies on the administration of a research degree in the Faculty of Computing, Engineering and Mathematical sciences at UWE Bristol to provide the information support to the pre-identified organisational BPs. These use cases were translated from RAD.

Aburub and Almahamid (2010) proposed a new method to derive system models depending on the business PM. This method comprises five steps: (1) using RAD to develop business PM; (2) defining the automatic activities; (3) discovering the early functional system requirements; (4) generating the functional specifications document and (5) developing the DFD depending on the functional specifications document to model the software system. This method was used to develop the system models at an early stage. The authors used the process of cancer registration in Jordan as the case study to validate this method.

In Damij et al. (2008), business PM and improvement were studied to successfully generate a competitive enterprise. The Tabular Application Development (TAD) method, which comprises six phases, was used to achieve this objective. The first phase is BP identification which has three steps: determining the BPs, identifying the work processes and dealing with process table development. The second phase is business PM which has two steps: developing the activity tables and generating the property table. The third phase is BP improvement which has two steps: dealing with process analysis and implementing process simulation. The fourth phase is object model development which has two steps: dealing with the initial object model development and completing the object model by using inheritance in order to identify the hierarchies between classes. The fifth phase is designing the system and preparing it for implementation which has three steps: specifying the object model operations, developing the system model design and writing the required algorithms. The sixth phase is model implementation.

The TAD method is based on the premise that each enterprise has one or more BP where every BP contains a set of work processes which contains a group of activities and procedures. There are four tables used in the TAD method: tables to describe the BP functions, work processes table, procedures table and activities table. The tables are used because they are useful to represent the sequence of events, they are easily corrected and extended and easy to understand. The authors validated their proposed framework through a surgery BP as a case study to show how this framework can be implemented.

5.1.1 Limitations and further research for the first challenge: misalignment between business and IT

To date, the literature shows that the current research on requirement engineering research has not paid much attention to the issue of IT and business strategy alignment. The alignment between business and IT is an unsolved problem although it is considered to be of high importance to researchers and practitioners (Walentowitz 2012; Saat et al. 2011). For example, most of the existing work explores the issues using the qualitative method, such as interview and group discussion, and quantitative methods, such as questionnaires as explained on the previous section. Past researchers studied the relationship between business strategy and IT strategy and between business and IT alignment and business performance.

However, in interpreting the results of these surveys, it is important to remember that most of these studies were conducted only in a small number of companies. It may be that only a small numbers of participants answered the questionnaires or took part in an interview. Furthermore, most of these studies were conducted in special countries. Therefore, the results of these studies cannot be used as a standard and might not be directly transferrable to firms of any size and from different countries. Moreover, the results of these studies may be affected by common method variance as data was collected from participants by using the same survey at the same time.

Furthermore, most of existing alignment research fails to capture the real business environment because of several reasons. For example, when the business strategy is unknown or in process, the alignment is not possible (Chan and Reich 2007).

Literature shows that there are many business PM standards, techniques, languages and tools, such as BPMN, UML, BPEL, etc. However, these techniques have several limitations and drawbacks. For example, they are not easily understood by IT people and thus they cannot completely implement the desired BP. Moreover, it is an important priority to develop the business PM where one BP can carry a set of sub-processes or business goals.

Proposing a business PM approach to model the process priority is one of the possible further research directions (Alotaibi and Liu 2012c). In addition, proposing a business PM framework easily understood by IT people is another of the possible further research directions (Alotaibi and Liu 2013b, 2016). Proposing a business PM framework linking IT and business modelling environments for better alignment where IT goals can be easily derived from business goals could be another possible further research direction.

5.2 Second challenge: security issues in business PM

Security is a serious concept on all information processing activities (Gritzalis and Lambrinoudakis 2004). Hence, the actively mechanisms and tools should be developed by each organisation in order to maintain and ensure information resources security and integrity (Herath and Rao 2009; Stahl, Doherty, and Shaw 2012).

The literature shows that only a few approaches consider security requirements as a primary part of all software development processes. Chung and Nixon (1995), for example, applied the process-oriented approach to represent security requirements as harmonious goals and used them throughout the software system development. This proposed non-functional requirements (NFRs) framework uses security requirements and permits system developers to consider design decisions which are related to the non-functional requirements'. More information can be founded in Alotaibi and Liu (2012a).

In Aburub, Odeh, and Beeson (2007), the authors demonstrated the application method for remodelling BP in order to attain better non-functional processes representation. They were adapted to link the NFRs to the conceptual models. A cancer registration process in Jordan was used as a case study to display the NFR goal operations. In addition, the RAD was used to create BPs NFR model throughout applying the goal evaluation and interaction analysis.

Rohrig and Ag (2002) proposed an approach that reuses the existing BPs descriptions. This approach was used for analysing the security requirements and deriving measure of security requirements. It has four main steps. In the first step, the general security objectives of the BP were identified. In the second step, the constructed security objectives, such as actors were examined. In the third step, these specifications were examined if they were consistent or not. In the last step, for each BP component, a list of important security measures was created.

In Giorgini et al. (2006), the requirements specification model was proposed for separating the delegation and trust relationships. The aim of this model was bridging the gap between the IT system functional and trust requirements and its trust management. A formal modelling language known as Delegation Logics (Li, Grosz, and Feigenbaum 2003) was used for automatic verifying the IS requirements. Moreover, this approach can support the trust management (Ninghui, Mitchell, and Winsborough 2002). A case study of health care process was used for validating.

The requirements engineering approach used for mapping and modelling the IS security goal for better alignment between business and IS at the early stage in the software development process was proposed in Mayer, Dubois, and Rifaut (2007). This technique has five main steps. In the first step, an organisational environment was identified. In the second step, the security goals were derived. In the third step, security requirements were detected from goals. In the fourth step, security requirements and constraints were detected. Lastly, risks were analysed at the architectural level.

In Jürjens (2001), an extension of UML known as UMLsec was proposed for providing security features in the UML model, such as confidentiality and access control. The class, interaction, state chart and deployment diagrams had used in the language. The class diagram was used to guarantee that the exchange of data conforms to the security levels. Furthermore, to guarantee the accuracy of essential security interactions between objects, the interaction diagram was used. In addition, the state chart diagram was used to avoid indirect flow of information. To guarantee meeting the security requirements by the physical layer in communication, the deployment diagram was used. Also, In Lodderstedt, Basin, and Doser (2002), an extension of UML known as SecureUML was proposed for modelling security. The authors used UML to identify the access control-related information in the design of all application.

In Basin et al. (2009), SecureUML, which is an expressive UML-based language, was proposed for constructing the security design model. They combined the security policy and design specifications. In addition, a tool called SecureMOVA has been used for implementation.

BPs have been studied in software engineering and security literatures. For example, Strembeck and Mendling (2011) presented a formal model that integrating the role-based access control (RBAC) models and PMs in order to extend the UML2 activity models. RBAC model includes tasks' duty constraints, role and role hierarchies.

Alghathbar (2007) presented a secured business PM for analysing the UML authorisation requirements. In addition, he advanced the Auth-UML model presented in Alghathbar and Wijesekera (2003) for validating enforcement of separation of duty (SoD) of the requirements engineering.

Understanding security risks is hardly task. The secured online BPs presented in Iyer, D'aubeterre, and Singh (2008) was extended in D'aubeterre, Singh, and Iyer (2008) for integrating security in the BPs analysis and model as a functional requirement and thus they proposed the secure activity resource coordination (SARC) framework. The enriched use case and UML activity diagram were used for evaluating (Siponen, Baskerville, and Heikka 2006).

In Rodríguez et al. (2010), the model-driven development (MDD) approach had proposed for ISs development. They had modelled all BPs and security and had identified all lists of constants for transferring use cases and class diagrams of the secured business PM presented in Rodríguez, Fernández-Medina, and Piattini (2007b).

Mcdermott and Fox (1999) adapted the use cases to present an abuse case model. The abuse case model was used for security requirement analysis. The specification of each interaction between actors and the system were identified in this model.

The systems may not permit some functions and thus the misuse case model has been used to describe them (Sindre and Opdahl 2000, 2005). The security requirements could be specified and elicited using the misuse case model. Also, it is a fundamental concept to create the design of other UML diagrams in order to implement the target system. In addition, if anyone starts the misuse case intentionally or accidentally, the miss-actor concept will be defined.

Literature shows that several researches have been done in the misuse case model in order to present a secured system. For example, an approach for improving the misuse case model quality was proposed by El-Attar (2012a). He validated his approach using online bookstore system as a case study.

Furthermore, El-Attar (2012b) proposed the structured misuse case description (SMCD). He argued that SMCD can guide the misuse case modellers for structurally and syntactically developing the misuse case model. Nevertheless, the reliable domain representation cannot be assured by using the SMCD. Moreover, in order to generate misuse skeletons and the descriptions of use case, he proposed the reverse engineering of misuse case description (REMCD) method. Nevertheless, the order of developing the components of misuse case model cannot be specified by using the REMCD.

In Dardenne, Fickas, and Van Lamsweerde (1991), the obstacle concept was used in the KAOS framework to capture undesirable system properties and to identify and relate security requirements to other system requirements. There are two sets of techniques based on the temporal logic formalisation because of obstacle goal satisfaction and requirements.

5.2.1 Limitations and further research for the second challenge: security issues in business PM

There are many commercial methods available to be used by the IT security officers in every organisation, such as ITBPM, CRAMM, OCTAVE, MEHARI, EBIOS, etc., to implement risk analysis on security problems and identify security solutions (Anderson 2008; Mouratidis and Jurjens 2010). However, most of these approaches were not considered security requirements as a key element of the process of software development and only provide the first stage of the integration between security and software engineering. For example, Jürjens (2001) proposed an approach applicable only through the design stage while McDermott and Fox (1999) proposed an approach used in early requirements analysis stage.

Consequently, proposing a security approach that can cover all software development process stages: early requirement, late requirement, architectural design, details design and implementation stages, is one of the possible further research directions. This approach must limit the conflicts through identify them at the early stage of the system development.

Another limitation of the existing work is that most of the previously mentioned approaches only deal with specific security requirements, goals and constraints. For example, UMLsec proposed by Jürjens (2001) focuses on access control security requirements and integrates this into the model-driven software development process.

Therefore, another possible further research direction is to propose a security approach which considers all security requirements, such as access control, encryption, security goals, such as integrity and secrecy, and security constraints, such as authorised and unauthorised access (Alotaibi and Liu 2014b; Alotaibi 2016).

Table 6 summarises the existing literature on software development process stages and security goals.

5.3 Third challenge: managing customer power

In the current business environment customers have the power. For example, they can specify their demands through identifying their services and product's needs. They have the ability to improve their decision-making for decreasing the price (Piccoli and Lloyd 2010; Rezabakhsh et al. 2006). In

Table 6. Related work on existing software development process stages and security goals

References	Software development process stages					Security goals				
	Early requirement	Late requirement	Architectural design	Detail design	Implementation	Integrity	Confidentiality	Availability	Reliability	Privacy
Mcdermott and Fox (1999)	✓									
Jürjens (2001)			✓				✓	✓		
Liu, Yu, and Mylopoulos (2003)	✓		✓			✓	✓			✓
Rohrig and Ag (2002)	✓					✓	✓	✓		
Lodderstedt, Basin, and Doser (2002)			✓							
Mana et al. (2003)	✓					✓	✓			
Mayer, Dubois, and Rifaut (2007)	✓					✓	✓			
Rodríguez, Fernández-Medina, and Piattini (2007a)			✓			✓	✓			✓
Goluch et al. (2008)			✓					✓		
Mayer et al. (2008)	✓									✓
Matulevicius, Mayer, and Heymans (2008)	✓							✓		✓
Wolter et al. (2009)	✓		✓			✓	✓			
Rodríguez et al. (2011)			✓	✓		✓		✓		✓

addition, the BPs could be reengineered by different organisations in order to develop their cost and efficiency and thus they could be still in the competitive position with other organisations in the marketplace. For example, in the hospital management system, there is some modifications can be implemented to improve the patient waiting time in the emergency care process (Shim and Kumar 2010).

According to the literature, different companies used the strategy of dividing the customers into different groups for services based on the price they paid or time they could wait (Gilland and Warsing 2009). For example, according to Keon and Anandalingam (2005), the highest priority class customers receive immediate services while the lowest priority class customers can have some discount by accepting the delay. In addition, different delivery time options could be offered by the most popular e-commerce companies, such as eBay and Amazon. For example, the highest price is guarantee the fastest delivery time while the lowest price results in a delayed delivery. By using this strategy, companies can provide flexible purchasing services for customers (Alotaibi and Liu 2013c).

There are several options for shipment price proposed by Yao and Zhang (2012). For example, it will be free shipment where there is no charge to the customer as the company subsidises the shipment cost. 'Another option is the company shares some of the shipment cost with customers. Also, the company may use the profit shipment where the company charges customers a shipment fee which is higher than the actual shipment cost to make a profit. For example, Amazon.com uses the free shipment policy with the minimum order amount and ebay.com offers free shipment because it is a competitive strategy. However, CDNow.com uses the profit shipment policy'. More information could be founded in Alotaibi and Liu (2013c).

Conversely, this system is very complicated to be designed, controlled and managed and thus Duran et al. (2008) and Chan, Simchi-Levi, and Swann (2006) have used the delayed production strategy and the tactical inventory strategy to solve these issues.

For example, a single item inventory system was proposed by Tempelmeier (2006) in order to serve two different customer groups. There are three concepts used in this study known as the critical level, order quantity and reorder point (s, q, k) policy. In addition, the queuing inventory system was proposed by Schwarz and Daduna (2006). In this technique, once the customer is served, the inventory will be decreased by one and the customer will left the queue. However, the service can be interrupted if there is no inventory. Furthermore, this technique is limited for only one class of customers. Hence, Zhao and Lian (2011) proposed a queuing system within inventory management for two different classes of customers to the Poisson process.

According to Ryan and Valverde (2005, 2006), customers have to wait for services in different situation. For example, they have to wait for receiving the reminder for password and username. Waiting for replying their service enquiries and checking-out process for complex purchases are others waiting situation. Furthermore, they have to wait for receiving the online transactions and payments confirmation.

In Frank, Zhang, and Duenyas (2003) and Sobel and Zhang (2001), the authors investigated companies providing services for two different customer groups: (1) customers with long-term supply contracts; and (2) customers who request items irregularly. The order of the first group is modelled as a deterministic order as it is known in advance. Thus, their order must be delivered without any delay. On the other hand, the order of the second group is modelled as a stochastic order as it is unknown until it has been received.

Dobson and Sainathan (2011) examined the prioritisation in the service system and analyse whether prioritisation can improve system performance where there are two different classes of customers for service time. The first class is the customers who require urgent services and have a high waiting cost while the second class is the customers who require non-urgent service and have a low waiting cost.

5.3.1 *Limitations and further research for the third challenge: managing customer power*

According to Swink, Narasimhan, and Kim (2005), flexibility is an essential aspect to deal with the rapidly changing business environment. By introducing a new product, process or production technique, the flexibility can be raised by manufacturers. Hence, the flexibility will result in rising the improvement and assessment of BPs (Lepmets, McBride, and Ras 2012).

In order to reach the flexibility, several strategies can be used by companies. For example, one of the best strategies is to divide the company's customers into different priority groups for services. By doing this, companies can assist their customers to receive services according to their accepted time and the amount of payment (Drekic and Stanford 2001). For example, customers in a high priority group would receive immediate services while customers in a lower priority group may need to accept a delay while paying a discounted price. However, literature shows that no research has yet been conducted to classify customers for different levels of services, customer feedbacks and the history of payment. This research will help in the growth of the company's profit and performance as well as raising the level of customers' satisfaction. However, managing this system is a difficult task (Alotaibi and Liu 2014a).

Proposing a requirements engineering-based approach for modelling the BPs in order to support enhancing the organisation performance is one of the possible research directions. Proposing a mathematical model for developing the customer satisfaction based on the delivery of waiting time for different customers' priority classes is another possible research direction.

6. BPM guidelines

There are several guidelines which need to be followed when modelling BPs. For example, business goals and objectives need to be easily identified, and the PM ought to be easily understood. A good business PM project should provide detailed information on the BP to be managed when analysing and developing BPs to establish the best coupling between the organisation's needs and demands (why) and the system functions (what) such as between the business PM and the IS specifications (Nurcan et al. 2005).

Furthermore, the modellers require the least number of elements in the model as possible because when the model has a large number of elements, it will be difficult to understand and hence errors may occur. Modellers also have to minimise the element routing path such as the input and output arcs and only use one start event and one end event in order to avoid errors as well as decomposing models with often more than 50 elements. The model needs to be structured as soundly as possible by matching each split connector with the respective join connector within the same type. The literature suggests using AND and XOR connectors and suggests not using OR routing element because AND and XOR may be less error prone (Mendling et al. 2012).

In addition, business PM is easy to understand if the modellers use verb object activity labels (Mendling, Reijers, and Van-Der-Aalst 2010; Zur-Muehlen, Wisnosky, and Kindrick 2010), using different colours for the PMs to distinguish the different business PM elements types (Reijers et al. 2011). Moreover, they should design syntactically and semantically correct models. When the model follows all business PM notation primitives, it will be syntactically correct (La Rosa et al. 2011). The model requires being completed by the real world satiation and acknowledged by the stockholders.

Successful business PMs should have the ability to ensure better alignment between business and IT staff, provide security protection, manage the rapidly changing business environment and BPs, manage customer power, be flexible for reengineering, ensure IT goals can be easily derived from business goals and therefore an IS can be easily implemented.

7. Conclusion and recommendations

In this article, we have presented an overview of research on the business PM domain. We have presented a review of challenges facing by business PM, such as misalignment between business and IT, difficulty of deriving IT goals from business goals, creating secured business PM, reengineering BPs, managing the rapidly changing BP and business environment and managing customer power. According to the review of existing business PM frameworks, there are several limitations as follows:

- Previous requirement engineering research has not paid much attention to the issue of strategic alignment between business and as most of the existing work explores the issues using a qualitative method, such as interviews and group discussion, and quantitative methods, such as questionnaires.
- The existing literature on alignment is limited because it is almost all mechanistic and fails to capture the real business environment.
- Understanding BP is a complicated task for the IT analysts, and this explains why IT analysts experience difficulties in developing the right IS for BPs.
- Previous secured business PM techniques cannot deal with all security goals and requirements.
- No research has been conducted to separate consumers into priority groups for services according to the accepted time, customer feedbacks and the history of payment. This research will be certainly beneficial to the company's performance as well as its customers' satisfactory level.

A number of recommended further research directions are listed as follows:

- To develop a business PM approach to model the process priority and to implement the process.
- To develop a business PM framework that can be easily understood by IT specialists.
- To develop a business PM framework that can link the business modelling environment and IT modelling environment in a more effective way.
- To develop a business PM framework that can easily drive IT goals from business goals
- To propose a business PM framework which has a positive influence on system implementation according to business expectations
- To propose a business PM framework which has a positive influence on the social and cultural relationship between IT and business staff in the organisation.
- To propose a security mechanism that covers all processes of software development.
- To propose a security technique that fulfils all security requirements and goals.
- To propose a requirement engineering-based approach for business PM to assist businesses improve their performance in such an environment.
- To propose a numerical model to improve customers' satisfactory level in terms of service delivery time according to customers' priority classes.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

- Aburub, F., and S. M. Almahamid. 2010. "A Method for Deriving System Models Based on Business Process Models." *Journal of Information Technology Management* XXI (2): 35–43.
- Aburub, F., M. Odeh, and I. Beeson. 2007. "Modelling Non-Functional Requirements of Business Processes." *Information and Software Technology* 49 (11–12): 1162–1171. doi:[10.1016/j.infsof.2006.12.002](https://doi.org/10.1016/j.infsof.2006.12.002).
- Aguilar-Savén, R. 2004. "Business Process Modelling: Review and Framework." *International Journal of Production Economics* 90 (2): 129–149. doi:[10.1016/S0925-5273\(03\)00102-6](https://doi.org/10.1016/S0925-5273(03)00102-6).
- Aldin, L., and S. De Cesare. 2011. "A Literature Review on Business Process Modelling: New Frontiers of Reusability." *Enterprise Information Systems* 5 (3): 359–383. doi:[10.1080/17517575.2011.557443](https://doi.org/10.1080/17517575.2011.557443).
- Alexandrou, D., and G. Mentzas. 2009. "Research Challenges for Achieving Healthcare Business Process Interoperability." In *International Conference on eHealth, Telemedicine, and Social Medicine (eTELEMED '09)*, February 1–7, 2009, 58–65. Cancun: IEEE.
- Alexopoulos, E., and B. Theodoulidis. 2003. "The Generic Information Business Model." *International Journal of Information Management* 23 (4): 323–336. doi:[10.1016/S0268-4012\(03\)00054-9](https://doi.org/10.1016/S0268-4012(03)00054-9).
- Alghathbar, K. 2007. "Validating the Enforcement of Access Control Policies and Separation of Duty Principle in Requirement Engineering." *Information and Software Technology* 49 (2): 142–157. doi:[10.1016/j.infsof.2006.03.009](https://doi.org/10.1016/j.infsof.2006.03.009).
- Alghathbar, K., and D. Wijesekera. 2003. "Authuml: A Three-Phased Framework to Analyze Access Control Specifications in Use Cases." In *Proceedings of the Workshop on Formal Methods in Security Engineering (FMSE)*, 2003, Washington, DC: ACM Press.
- Alotaibi, Y. 2014. "Business Process Modelling Challenges and Solutions: A Literature Review." *Journal of Intelligent Manufacturing* 1–23. doi:[10.1007/s10845-014-0917-4](https://doi.org/10.1007/s10845-014-0917-4).
- Alotaibi, Y. 2016. "A Secure Business Process Modelling for Better Alignment between Business and IT." In *49th Hawaii International Conference on System Science (HICSS)*, January 5–8, 2016, Kauai, Hawaii, 4793–4802. IEEE. doi:[10.1109/HICSS.2016.595](https://doi.org/10.1109/HICSS.2016.595).
- Alotaibi, Y., and L. Fei. 2012d. "A Novel Framework to Model a Secure Information Systems." *International Conference on Information Computer Applications* 24: 84–89.
- Alotaibi, Y., and F. Liu. 2012a. "A New Framework to Model a Secure E-Commerce System." *International Journal of Social and Human Sciences* 6 (6): 162–168.
- Alotaibi, Y., and F. Liu. 2012b. "How to Model a Secure Information System (IS): A Case Study." *International Journal of Information and Education Technology* 2 (2): 94–102. doi:[10.7763/IJiet.2012.V2.89](https://doi.org/10.7763/IJiet.2012.V2.89).
- Alotaibi, Y., and F. Liu. 2012c. "Business Process Modelling Towards Derivation of Information Technology Goals." In *45th Hawaii International Conference on System Science (HICSS)*, January, 4–7, Maui, Hawaii, US, 4307–4315. IEEE.
- Alotaibi, Y., and F. Liu. 2013a. "Average Waiting Time of Customers in a New Queue System with Different Classes." *Business Process Management Journal* 19 (1): 146–168. doi:[10.1108/14637151311294903](https://doi.org/10.1108/14637151311294903).
- Alotaibi, Y., and F. Liu. 2013b. "Business Process Modelling towards Derive and Implement IT Goals." In *8th IEEE Conference on Industrial Electronics and Applications (ICIEA 2013)*, June 19–21, 2013, Melbourne, Australia, 1739–1744. IEEE.
- Alotaibi, Y., and F. Liu. 2013c. "Queuing System for Different Classes of Customers." *International Journal of Business Information Systems* 13 (4): 418–434. doi:[10.1504/IJBIS.2013.055299](https://doi.org/10.1504/IJBIS.2013.055299).
- Alotaibi, Y., and F. Liu. 2014a. "An Empirical Study of a Novel Managing Customer Power Model and Business Performance in the Mobile Service Industry." *Business Process Management Journal* 20 (6): 816–843. doi:[10.1108/BPMJ-07-2013-0099](https://doi.org/10.1108/BPMJ-07-2013-0099).
- Alotaibi, Y., and F. Liu. 2014b. "A Novel Secure Business Process Modeling Approach and Its Impact on Business Performance." *Information Sciences* 277 (277): 375–395. doi:[10.1016/j.ins.2014.02.088](https://doi.org/10.1016/j.ins.2014.02.088).
- Alotaibi, Y., and F. Liu. 2016. "Business Process Modelling Framework Derive and Implement IT Goals: A Case Study." *International Journal of Industrial and Systems Engineering* 22 (2): 161–190. doi:[10.1504/IJISE.2016.073961](https://doi.org/10.1504/IJISE.2016.073961).
- Amaral, C. S. T., H. Rozenfeld, J. M. H. Costa, M. D. F. D. A. Magon, and Y. M. Mascarenhas. 2011. "Improvement of Radiology Services Based on the Process Management Approach." *European Journal of Radiology* 78 (3): 377–383. doi:[10.1016/j.ejrad.2010.12.025](https://doi.org/10.1016/j.ejrad.2010.12.025).
- Anderson, R. J. 2008. *Security Engineering: A Guide to Building Dependable Distributed Systems*. Wiley Publishing.
- Andrikopoulos, V., S. Benbernou, M. Bitsaki, O. Danylevych, M. S. Hacid, W. J. Van-Den-Heuvel, D. Karastoyanova, et al. 2008. *Survey on Business Process Management*. Zurich: The S-CUBE consortium (the European Network of Excellence in Software Services and Systems).
- Anthony Byrd, T., B. R. Lewis, and R. W. Bryan. 2006. "The Leveraging Influence of Strategic Alignment on IT Investment: An Empirical Examination." *Information & Management* 43 (3): 308–321. doi:[10.1016/j.im.2005.07.002](https://doi.org/10.1016/j.im.2005.07.002).
- Antony, J. 2006. "Six Sigma for Service Processes." *Business Process Management Journal* 12 (2): 234–248. doi:[10.1108/14637150610657558](https://doi.org/10.1108/14637150610657558).
- Arbogast, G., J. Nackashi, A. Rittscher, and B. Thornton. 2008. "Enterprise Resource Planning and Business Process Management – A Marriage Of Convenience?" *Review of Business Information Systems* 12 (3): 1–4.

- Atle Gulla, J., and T. Brasethvik. 2000. "On the Challenges of Business Modeling in Large-Scale Reengineering Projects." In *Proceedings of 4th International Conference on Requirements engineering*, edited by W. van der Aalst, J. Desel, and A. Oberweis, 17–26. Schaumburg, IL: IEEE.
- Avison, D., J. Jones, P. Powell, and D. Wilson. 2004. "Using and Validating the Strategic Alignment Model." *The Journal of Strategic Information Systems* 13 (3): 223–246. doi:10.1016/j.jsis.2004.08.002.
- Backes, M., B. Pfützmann, and M. Waidner. 2003. *Security in Business Process Engineering*. BPM. Berlin, Heidelberg: Springer-Verlag.
- Bandara, W., G. Gable, and M. Rosemann. 2005. "Factors and Measures of Business Process Modelling: Model Building through a Multiple Case Study." *European Journal of Information Systems* 14 (4): 347–360. doi:10.1057/palgrave.ejis.3000546.
- Barjis, J. 2008. "The Importance of Business Process Modeling in Software Systems Design." *Science of Computer Programming* 71 (1): 73–87. doi:10.1016/j.scico.2008.01.002.
- Basin, D., M. Clavel, J. Doser, and M. Egea. 2009. "Automated Analysis of Security-Design Models." *Information and Software Technology* 51 (5): 815–831. doi:10.1016/j.infsof.2008.05.011.
- Becker, J., M. Rosemann, and C. V. Uthmann. 2000. "Guidelines of Business Process Modeling." In *Business Process Management: Models Techniques and Empirical Studies*, edited by W. van der Aalst, J. Desel, and A. Oberweis. Berlin: Springer-Verlag.
- Benbya, H., and B. McKelvey. 2006. "Using Coevolutionary and Complexity Theories to Improve IS Alignment: A Multi-Level Approach." *Journal of Information Technology* 21 (4): 284–298. doi:10.1057/palgrave.jit.2000080.
- Bergeron, F., L. Raymond, and S. Rivard. 2004. "Ideal Patterns of Strategic Alignment and Business Performance." *Information & Management* 41 (8): 1003–1020. doi:10.1016/j.im.2003.10.004.
- Bernhard, E., and J. C. Recker. 2012. "Preliminary Insights from a Multiple Case Study on Process Modelling Impact." In *23rd Australasian Conference on Information Systems*, December, 3–5, 2012, Deakin University, Geelong, VIC.
- Bleistein, S. J., K. Cox, and J. Verner. 2005. "Strategic Alignment in Requirements Analysis for Organizational It: An Integrated Approach." In: *20th ACM Symposium on Applied Computing (SAC'05)*. Santa Fe, NM: ACM.
- Bleistein, S. J., K. Cox, and J. Verner. 2006. "Validating Strategic Alignment of Organizational IT Requirements Using Goal Modeling and Problem Diagrams." *Journal of Systems and Software* 79 (3): 362–378. doi:10.1016/j.jss.2005.04.033.
- Bleistein, S. J., K. Cox, J. Verner, and K. T. Phalp. 2006b. "B-SCP: A Requirements Analysis Framework for Validating Strategic Alignment of Organizational IT Based on Strategy, Context, and Process." *Information and Software Technology* 48 (9): 846–868. doi:10.1016/j.infsof.2005.12.001.
- Box, S., and K. Platts. 2005. "Business Process Management: Establishing and Maintaining Project Alignment." *Business Process Management Journal* 11 (4): 370–387. doi:10.1108/14637150510609408.
- Bradley, R. V., R. M. E. Pratt, T. A. Byrd, C. N. Outlay, and D. E. Wynn Jr. 2012. "Enterprise Architecture, IT Effectiveness and the Mediating Role of IT Alignment in US Hospitals." *Information Systems Journal* 22 (2): 97–127. doi:10.1111/j.1365-2575.2011.00379.x.
- Burn, J. M., and C. Szeto. 2000. "A Comparison of the Views of Business and IT Management on Success Factors for Strategic Alignment." *Information & Management* 37 (4): 197–216. doi:10.1016/S0378-7206(99)00048-8.
- Busch, P., and P. Fettke. 2011. "Business Process Management under the Microscope: The Potential of Social Network Analysis." In *44th Hawaii International Conference on System Sciences (HICSS)*, January, 4–7, 2011, 1–10. IEEE.
- Caetano, A., A. R. Silva, and J. Tribolet. 2005. "Using Roles and Business Objects to Model and Understand Business Processes." In *2005 ACM Symposium on Applied Computing*, 2005, 1308–1313. Santa Fe, NM: ACM.
- Capozucca, A., and N. Guelfi. 2010. "Modelling Dependable Collaborative Time-Constrained Business Processes." *Enterprise Information Systems* 4 (2): 153–214. doi:10.1080/17517571003753266.
- Cauvet, C., and G. Guzelian. 2008. "Business Process Modeling: a Service-Oriented Approach." In *Proceedings of the 41st Annual Hawaii International Conference on System Sciences*, January, 7–10, 98–105. IEEE.
- Chan, L. M. A., D. Simchi-Levi, and J. Swann. 2006. "Pricing, Production, and Inventory Policies for Manufacturing with Stochastic Demand and Discretionary Sales." *Manufacturing & Service Operations Management* 8 (2): 149–168. doi:10.1287/msom.1060.0100.
- Chan, Y. E., S. L. Huff, D. W. Barclay, and D. G. Copeland. 1997. "Business Strategic Orientation, Information Systems Strategic Orientation, and Strategic Alignment." *Information Systems Research* 8 (2): 125–150. doi:10.1287/isre.8.2.125.
- Chan, Y. E., and B. H. Reich. 2007. "IT Alignment: What Have We Learned?" *Journal of Information Technology* 22 (4): 297–315. doi:10.1057/palgrave.jit.2000109.
- Chan, Y. E., R. Sabherwal, and J. B. Thatcher. 2006. "Antecedents and Outcomes of Strategic IS Alignment: An Empirical Investigation." *IEEE Transactions on Engineering Management* 53 (1): 27–47. doi:10.1109/TEM.2005.861804.
- Chang, H.-L., H.-E. Hsiao, Y.-J. Lee, and J. Chang. 2009. "Assessing IT-Business Alignment in Service-Oriented Enterprises." In *Proceedings of Pacific Asia Conference on Information Systems (PACIS)*, July 10–12, 2009, 1–12. Hyderabad: AIS Electronic Library (AISeL).
- Chen, L. 2010. "Business-IT Alignment Maturity of Companies in China." *Information & Management* 47 (1): 9–16. doi:10.1016/j.im.2009.09.003.

- Cheng, M.-Y., M.-H. Tsai, and W. Sutan. 2009. "Benchmarking-Based Process Reengineering for Construction Management." *Automation in Construction* 18 (5): 605–623. doi:[10.1016/j.autcon.2008.12.004](https://doi.org/10.1016/j.autcon.2008.12.004).
- Chung, L., and B. A. Nixon. 1995. "Dealing with Non-Functional Requirements: Three Experimental Studies of a Process-Oriented Approach." In *Proceedings of the 17th International Conference on Software Engineering (ICSE)*, April 23–30, 1995. Seattle, WA: ACM.
- Cohen, J. F., and M. Toleman. 2006. "The IS–Business Relationship and Its Implications for Performance: An Empirical Study of South African and Australian Organisations." *International Journal of Information Management* 26 (6): 457–468. doi:[10.1016/j.jinfomgt.2006.06.002](https://doi.org/10.1016/j.jinfomgt.2006.06.002).
- Cragg, P., M. King, and H. Hussin. 2002. "IT Alignment and Firm Performance in Small Manufacturing Firms." *The Journal of Strategic Information Systems* 11 (2): 109–132. doi:[10.1016/S0963-8687\(02\)00007-0](https://doi.org/10.1016/S0963-8687(02)00007-0).
- Cragg, P., M. Tagliavini, and A. Mills. 2007. "Evaluating the Alignment of IT with Business Processes in SMEs." In *18th Australasian Conference on Information Systems*, December 5–7, 2007, 38–48. Toowoomba: AIS Electronic Library (AISeL).
- Croteau, A.-M., and L. Raymond. 2004. "Performance Outcomes of Strategic and IT Competencies Alignment." *Journal of Information Technology* 19 (3): 178–190. doi:[10.1057/palgrave.jit.2000020](https://doi.org/10.1057/palgrave.jit.2000020).
- Cumberlidge, M. 2007. *Business Process Management with Jboss Jbpm: A Practical Guide for Business Analysts*. Birmingham: Packt Publishing.
- Cumps, B., D. Martens, M. De Backer, R. Haesen, S. Viaene, G. Dedene, B. Baesens, and M. Snoeck. 2009. "Inferring Comprehensible Business/Ict Alignment Rules." *Information & Management* 46 (2): 116–124. doi:[10.1016/j.im.2008.05.005](https://doi.org/10.1016/j.im.2008.05.005).
- Curtis, B., M. I. Kellner, and J. Over. 1992. "Process Modeling." *Communications of the ACM* 35 (9): 75–90. doi:[10.1145/130994.130998](https://doi.org/10.1145/130994.130998).
- D'aubeterre, F., R. Singh, and L. Iyer. 2008. "Secure Activity Resource Coordination: Empirical Evidence of Enhanced Security Awareness in Designing Secure Business Processes." *European Journal of Information Systems* 17 (5): 528–542. doi:[10.1057/ejis.2008.42](https://doi.org/10.1057/ejis.2008.42).
- Daim, T., N. Basoglu, and I. Tanoglu. 2010. "A Critical Assessment of Information Technology Adoption: Technical, Organisational and Personal Perspectives." *International journal of Business Information Systems* 6 (3): 315–335. doi:[10.1504/IJBIS.2010.035048](https://doi.org/10.1504/IJBIS.2010.035048).
- Damij, N. 2007. "Business Process Modelling Using Diagrammatic and Tabular Techniques." *Business Process Management Journal* 13 (1): 70–90. doi:[10.1108/14637150710721131](https://doi.org/10.1108/14637150710721131).
- Damij, N., T. Damij, J. Grad, and F. Jelenc. 2008. "A Methodology for Business Process Improvement and IS Development." *Information and Software Technology* 50 (11): 1127–1141. doi:[10.1016/j.infsof.2007.11.004](https://doi.org/10.1016/j.infsof.2007.11.004).
- Dardenne, A., S. Fickas, and A. Van Lamsweerde. 1991. "Goal-Directed Concept Acquisition in Requirements Elicitation." In *Proceedings of the Sixth International Workshop on Software Specification and Design*, October 25–26, 1991, 14–21. Los Alamitos, CA: IEEE Computer Society Press.
- Davenport, T. H. 1993. *Process Innovation: Reengineering Work through Information Technology*. Boston, MA: Harvard Business School Press.
- Davenport, T. H. 2004. "The E-Process Evolution." *Business Process Management Journal* 10 (1): 12–15.
- Davenport, T. H., and J. E. Short. 1990. *The New Industrial Engineering: Information Technology and Business Process Redesign*. Sloan Management Review.
- De Weerd, J., A. Schupp, A. Vanderloock, and B. Baesens. 2013. "Process Mining for the Multi-Faceted Analysis of Business Processes—A Case Study in a Financial Services Organization." *Computers in Industry* 64 (1): 57–67. doi:[10.1016/j.compind.2012.09.010](https://doi.org/10.1016/j.compind.2012.09.010).
- Dijkman, R. M., M. Dumas, and C. Ouyang. 2008. "Semantics and Analysis of Business Process Models in BPMN." *Information and Software Technology* 50 (12): 1281–1294. doi:[10.1016/j.infsof.2008.02.006](https://doi.org/10.1016/j.infsof.2008.02.006).
- Dobson, G., and A. Sainathan. 2011. "On the Impact of Analyzing Customer Information and Prioritizing in a Service System." *Decision Support Systems* 51 (4): 875–883. doi:[10.1016/j.dss.2011.02.006](https://doi.org/10.1016/j.dss.2011.02.006).
- Doebeli, G., R. Fisher, R. Gapp, and L. Sanzogni. 2011. "Using BPM Governance to Align Systems and Practice." *Business Process Management Journal* 17 (2): 184–202. doi:[10.1108/14637151111122310](https://doi.org/10.1108/14637151111122310).
- Dominic, P. D. D., A. Abdelwhab, G. Kannabiran, and O. M. Foong. 2010. "A New Hybrid Model for the Supplier Selection Decision." *International journal of Business Information Systems* 5 (3): 230–247. doi:[10.1504/IJBIS.2010.031928](https://doi.org/10.1504/IJBIS.2010.031928).
- Dreiling, A., M. Rosemann, W. Van-Der-Aalst, L. Heuser, and K. Schulz. 2006. "Model-Based Software Configuration: Patterns and Languages." *European Journal of Information Systems* 15 (6): 583–600. doi:[10.1057/palgrave.ejis.3000645](https://doi.org/10.1057/palgrave.ejis.3000645).
- Drekic, S., and D. A. Stanford. 2001. "Reducing Delay in Preemptive Repeat Priority Queues." *Operations Research* 49 (1): 145–156. doi:[10.1287/opre.49.1.145.11186](https://doi.org/10.1287/opre.49.1.145.11186).
- Duran, S., T. Liu, D. Simchilevi, and J. Swann. 2008. "Policies Utilizing Tactical Inventory for Service-Differentiated Customers." *Operations Research Letters* 36 (2): 259–264. doi:[10.1016/j.orl.2007.05.013](https://doi.org/10.1016/j.orl.2007.05.013).
- El-Attar, M. 2012a. "A Framework for Improving Quality in Misuse Case Models." *Business Process Management Journal* 18 (2): 168–196. doi:[10.1108/14637151211225162](https://doi.org/10.1108/14637151211225162).

- El-Attar, M. 2012b. "Towards Developing Consistent Misuse Case Models." *Journal of Systems and Software* 85 (2): 323–339. doi:10.1016/j.jss.2011.08.023.
- Engelsman, W., D. Quartel, H. Jonkers, and M. Van Sinderen. 2011. "Extending Enterprise Architecture Modelling with Business Goals and Requirements." *Enterprise Information Systems* 5 (1): 9–36. doi:10.1080/17517575.2010.491871.
- ENV. 1995. "Advanced Manufacturing Technology-Systems Architecture-Constructs for Enterprise Modelling." CEN/CENELEC.
- Eriksson, H.-E., and M. Penker. 2000. *Business Modeling with UML: Business Patterns at Work*. Chichester, New York: John Wiley & Sons.
- Filipowska, A., M. Kaczmarek, M. Kowalkiewicz, X. Zhou, and M. Born. 2009. "Procedure and Guidelines for Evaluation of BPM Methodologies." *Business Process Management Journal* 15 (3): 336–357. doi:10.1108/14637150910960594.
- Frank, K. C., R. Q. Zhang, and I. Duenyas. 2003. "Optimal Policies for Inventory Systems with Priority Demand Classes." *Operations Research* 51 (6): 993–1002. doi:10.1287/opre.51.6.993.24923.
- Fullerton, T., and L. R. Ness. 2010. "Information Technology Flexibility: A Synthesized Model from Existing Literature." *Journal of Information Technology Management* XXI (3): 51–59.
- Gambini, M., M. La Rosa, S. Migliorini, and A. Ter Hofstede. 2011. "Automated Error Correction of Business Process Models". In *Proceedings Of BPM*, Vol. 6896 of LNCS, 148–165. Clermont-Ferrand: Springer.
- Gao, X., L. Xu, X. Wang, Y. Li, M. Yang, and Y. Liu. 2013. "Workflow Process Modelling and Resource Allocation Based on Polychromatic Sets Theory." *Enterprise Information Systems* 7 (2): 198–226. doi:10.1080/17517575.2012.745617.
- Gartner GROUP. 2009. "Meeting the Challenge: The 2009 CIO Agenda." *EXP Premier Report*, January 2009. Gartner, Stamford, CT.
- Gartner GROUP. 2010. "Leading in Times of Transition: The 2010 CIO Agenda." *EXP Premier Report* No January 2010, Gartner, Stamford, CT.
- Georgakopoulos, D., M. Hornick, and A. Sheth. 1995. "An Overview of Workflow Management: From Process Modeling to Workflow Automation Infrastructure." *Distributed and Parallel Databases* 3 (2): 119–153. doi:10.1007/BF01277643.
- Gilland, W. G., and D. P. Warsing. 2009. "The Impact of Revenue-Maximizing Priority Pricing on Customer Delay Costs." *Decision Sciences* 40 (1): 89–120. doi:10.1111/deci.2009.40.issue-1.
- Giorgini, P., F. Massacci, J. Mylopoulos, and N. Zannone. 2006. "Requirements Engineering for Trust Management: Model, Methodology, and Reasoning." *International Journal of Information Security* 5 (4): 257–274. doi:10.1007/s10207-006-0005-7.
- Goldkuhl, G., and M. Lind. 2008. "Coordination and Transformation in Business Processes: Towards an Integrated View." *Business Process Management Journal* 14 (6): 761–777. doi:10.1108/14637150810915964.
- Goluch, G., A. Ekelhart, S. Fenz, S. Jakoubi, S. Tjoa, and T. Muck. 2008. "Integration of an Ontological Information Security Concept in Risk-Aware Business Process Management." In *Proceedings of the 41st Annual Hawaii International Conference on System Sciences*, January 7–10, 2008, 377–377.
- Grant, G. G. 2003. "Strategic Alignment and Enterprise Systems Implementation: The Case of Metalco." *Journal of Information Technology* 18 (3): 159–175. doi:10.1080/0268396032000122132.
- Green, P., and M. Rosemann. 2000. "Integrated Process Modeling: An Ontological Evaluation." *Information Systems* 25 (2): 73–87. doi:10.1016/S0306-4379(00)00010-7.
- Gritzalis, D., and C. Lambrinoudakis. 2004. "A Security Architecture for Interconnecting Health Information Systems." *International Journal of Medical Informatics* 73 (3): 305–309. doi:10.1016/j.ijmedinf.2003.12.011.
- Gruhn, V., and R. Laue. 2007. "What Business Process Modelers Can Learn from Programmers." *Science of Computer Programming* 65 (1): 4–13. doi:10.1016/j.scico.2006.08.003.
- Guha, S., V. Grover, W. J. Kettinger, and J. T. C. Teng. 1997. "Business Process Change and Organizational Performance: Exploring an Antecedent Model." *Journal of Management Information Systems* 14 (1): 119–154. doi:10.1080/07421222.1997.11518156.
- Gutierrez, A., C. Mylonadis, J. Orozco, and A. Serrano. 2008. "Business-IS Alignment: Assessment Process to Align IT Projects With Business Strategy." In *Fourteenth Americas Conference on Information Systems (AMCIS)*, August 14–17, 2008. Toronto, ON, Canada.
- Gutierrez, A., J. Orozco, A. Serrano, and Y. K. Dwivedi. 2009. "Factors Affecting IT and Business Alignment: A Comparative Study in Smes and Large Organisations." *Journal of Enterprise Information Management* 22 (1–2): 197–211. doi:10.1108/17410390910932830.
- Haley, C. B., J. D. Moffett, R. Laney, and B. Nuseibeh. 2006. "A Framework for Security Requirements Engineering." In *Proceedings of the 2006 International Workshop on Software Engineering for Secure Systems*. Shanghai: ACM, 35–42.
- Hammer, M. 1990. "Reengineering Work: Don't Automate, Obliterate." *Harvard Business Review* 68 (4):104–112.
- Hammer, M., and J. Champy. 1993. *Reengineering the Corporation a Manifesto for Business Revolution*. New York: Harper Business.
- Havey, M. 2005. *Essential Business Process Modeling*. Sebastopol, CA: O'Reilly Media.
- Henderson, J., and N. Venkatramen. 1989b. "Strategic Alignment: A Model for Organisational Transformation." In 1992 *Transforming Organisations*, edited by T. Kochan and M. Unseem. New York: OUP.
- Henderson, J. C., and H. Venkatraman. 1999. "Strategic Alignment: Leveraging Information Technology for Transforming Organizations." *IBM Systems Journal* 38 (3): 472–484. doi:10.1147/SJ.1999.5387096.

- Henderson, J. C., and N. Venkatraman. 1989a. "Strategic Alignment: A Framework for Strategic Information Technology Management." *Centre for Information System Research*, CISR Working Paper no. 190, Massachusetts Institute of Technology, Cambridge, MA.
- Herath, T., and H. R. Rao. 2009. "Protection Motivation and Deterrence: A Framework for Security Policy Compliance in Organisations." *European Journal of Information Systems* 18 (2): 106–125. doi:10.1057/ejis.2009.6.
- Herzog, N. V., S. Tonchia, and A. Polajnar. 2009. "Linkages between Manufacturing Strategy, Benchmarking, Performance Measurement and Business Process Reengineering." *Computers & Industrial Engineering* 57 (3): 963–975. doi:10.1016/j.cie.2009.03.015.
- Hill, J. B., M. Cantara, E. Deitert, and M. Kerremans. 2007. "Magic Quadrant for Business Process Management Suites." ID Number: G001252906. *Gartner Research*.
- Hill, J. B., M. Kerremans, and T. Bell. 2007. "Cool Vendors in Business Process Management." *Gartner Research*.
- Hill, J. B., J. Sinur, D. Flint, and M. J. Melenovsky. 2006. "Gartner's Position on Business Process Management." *Business Issues*. Gartner.
- Houy, C., P. Fettke, and P. Loos. 2010. "Empirical Research in Business Process Management – Analysis of an Emerging Field of Research." *Business Process Management Journal* 16 (4): 619–661. doi:10.1108/14637151011065946.
- Hull, R., J. Su, and R. Vaculin. 2013. "Data Management Perspectives on Business Process Management: Tutorial Overview." In *SIGMOD Conference 2013*, 943–948. New York, NY: ACM.
- Hung, R.-Y.-Y. 2006. "Business Process Management as Competitive Advantage: A Review and Empirical Study." *Total Quality Management & Business Excellence* 17 (1): 21–40. doi:10.1080/14783360500249836.
- Hvolby, -H.-H., and J. H. Trienekens. 2010. "Challenges in Business Systems Integration." *Computers in Industry* 61 (9): 808–812. doi:10.1016/j.compind.2010.07.006.
- Hwang, S.-Y., and W.-S. Yang. 2002. "On the Discovery of Process Models from Their Instances." *Decision Support Systems* 34 (1): 41–57. doi:10.1016/S0167-9236(02)00008-8.
- Indulska, M., P. F. Green, J. Recker, and M. Rosemann. 2009. "Business Process Modeling: Perceived Benefits." In *International Conference on Conceptual Modeling (ER 2009)*. Heidelberg: Springer.
- Indulska, M., J. Recker, M. Rosemann, and P. F. Green. 2009. "Process Modeling: Current Issues and Future Challenges." In *Lecture Notes in Computer Science, Conference on Advanced Information Systems Engineering (CAISE 2009)*, 501–514. Amsterdam: Springer.
- Iyer, L., F. D'aubeterre, and R. Singh. 2008. "A Semantic Approach to Secure Collaborative Inter-Organizational Ebusiness Processes (SSCIOBP)." *Journal of the Association for Information Systems* 9 (3): 233–269.
- Jacobson, I. 1995. *The Object Advantage*. New York, NY: Addison-Wesley.
- Jürjens, J. 2001. "Towards Development of Secure Systems Using UMLsec Fundamental Approaches to Software Engineering." In *Proceedings of 4th International Conference Joint European Conferences on Theory and Practice of Software (ETAPS 2001)*, April 2–6, 2001. Genova, Italy: 187–200.
- Kang, D., S. Lee, K. Kim, and J. Y. Lee. 2009. "An OWL-Based Semantic Business Process Monitoring Framework." *Expert Systems with Applications* 36 (4): 7576–7580. doi:10.1016/j.eswa.2008.09.027.
- Keon, N., and G. A. Anandalingam. 2005. "A New Pricing Model for Competitive Telecommunications Services Using Congestion Discounts." *INFORMS Journal on Computing* 17 (2): 248–262. doi:10.1287/ijoc.1030.0062.
- Kesari, M., S. Chang, and P. B. Seddon. 2003. "A Content-Analytic Study of the Advantages and Disadvantages of Process Modelling." In *14th Australasian Conference on Information Systems (ACIS)*. Perth: AIS Electronic Library (AISeL).
- Khaiata, M., and I. A. Zualkernan. 2009. "A Simple Instrument to Measure IT-Business Alignment Maturity." *Information Systems Management* 26 (2): 138–152. doi:10.1080/10580530902797524.
- Kim, Y.-G. 1995. "Process Modeling for BPR: Event-Process Chain Approach." In *16th International Conference on Information Systems (ICIS)*. Amsterdam: AIS Electronic Library (AISeL).
- Ko, R. K. L., S. S. G. Lee, and E. W. Lee. 2009. "Business Process Management (BPM) Standards: A Survey." *Business Process Management Journal* 15 (5): 744–791. doi:10.1108/14637150910987937.
- Kokolakis, S. A., A. J. Demopoulos, and E. A. Kiountouzis. 2000. "The Use of Business Process Modelling in Information Systems Security Analysis and Design." *Information Management & Computer Security* 8 (3): 107–116. doi:10.1108/09685220010339192.
- Koliadis, G., A. Vranesovic, M. Bhuiyan, A. Krishna, and A. Ghose. 2006. "Combined Approach for Supporting the Business Process Model Lifecycle." In *Proceedings of the Tenth Pacific Asia Conference on Information Systems (PACIS)*, July 6–9, 1305–1319. Kuala Lumpur: AIS Electronic Library (AISeL).
- La Rosa, M., A. H. M. Ter Hofstede, P. Wohed, H. A. Reijers, J. Mendling, and W. M. P. Van Der Aalst. 2011. "Managing Process Model Complexity via Concrete Syntax Modifications." *IEEE Transactions on Industrial Informatics* 7 (2): 255–265. doi:10.1109/TII.2011.2124467.
- Lankhorst, M. 2005. *Enterprise Architecture at Work: Modelling, Communication and Analysis*. New York: Springer.
- Larsen, M. H., and R. Klischewski. 2004. "Process Ownership Challenges in IT-Enabled Transformation of Interorganizational Business Processes." In *Proceedings of the 37th Annual Hawaii International Conference on System Sciences*, January 5–8, 2004, 1–11.

- Lee, G., and W. Xia. 2005. "The Ability of Information Systems Development Project Teams to Respond to Business and Technology Changes: A Study of Flexibility Measures." *European Journal of Information Systems* 14 (1): 75–92. doi:10.1057/palgrave.ejis.3000523.
- Leonard, J. 2007. "Sharing a Vision: Comparing Business and IS Managers' Perceptions of Strategic Alignment Issues." *Australasian Journal of Information Systems* 15 (1): 95–112. doi:10.3127/ajis.v15i1.299.
- Leopold, H., S. Smirnov, and J. Mendling. 2012. "On the Refactoring of Activity Labels in Business Process Models." *Information Systems* 37 (5): 443–459. doi:10.1016/j.is.2012.01.004.
- Lepmets, M., T. McBride, and E. Ras. 2012. "Goal Alignment in Process Improvement." *Journal of Systems and Software* 85 (6): 1440–1452. doi:10.1016/j.jss.2012.01.038.
- Li, N., B. N. Grosz, and J. Feigenbaum. 2003. "Delegation Logic: A Logic-Based Approach to Distributed Authorization." *ACM Transactions of Information and Security System* 6 (1): 128–171. doi:10.1145/605434.
- Lind, M., and U. Seigerroth. 2010. "Multi-Layered Process Modeling for Business and IT Alignment." In *43rd Hawaii International Conference on System Sciences (HICSS)*, January 5–8, 2010, 1–10.
- Lindsay, A., D. Downs, and K. Lunn. 2003. "Business Processes-Attempts to Find a Definition." *Information and Software Technology* 45 (15): 1015–1019. doi:10.1016/S0950-5849(03)00129-0.
- Liu, L., E. Yu, and J. Mylopoulos. 2003. "Security and Privacy Requirements Analysis within a Social Setting." In *Proceedings of 11th IEEE International Requirements Engineering Conference*, September 8–12, 2003: 151–161. Washington, DC: IEEE Computer Society.
- Liu, R., F. Y. Wu, F. Pinel, and Z. Shan. 2012. "A Two-Tier Data-Centric Framework for Flexible Business Process Management." In *Proc. AMCIS* 12: 2012.
- Lodderstedt, T., D. Basin, and J. Doser. 2002. "SecureUML: A UML-Based Modeling Language for Model-Driven Security." In *Proceedings of the 5th International Conference on the Unified Modeling Language*, 2002, 426–441. Dresden: Springer-Verlag.
- Lodhi, A., V. Koppen, and G. Saake. 2011. *Business Process Modeling: Active Research Areas and Challenges*. Dekanat: Otto-von-Guericke-Universität Magdeburg, Fakultät Für Informatik.
- Luftman, J. 2000. "Assessing Business-IT Alignment Maturity." *Communications of the Association for Information Systems* 4 (14): 1–50.
- Luftman, J. 2003. "Assessing It/Business Alignment." *Information Systems Management* 20 (4): 9–15. doi:10.1201/1078/43647.20.4.20030901/77287.2.
- Luftman, J., R. Kampaiah, and E. Nash. 2005. "Key Issues for IT Executives 2005." *MIS Quarterly Executive* 5 (2): 81–101.
- Luo, W., and Y. A. Tung. 1999. "A Framework for Selecting Business Process Modeling Methods." *Industrial Management & Data Systems* 99 (7): 312–319. doi:10.1108/02635579910262535.
- Ma, C., Q. Xu, and J. W. Sanders. 2009. "A Survey of Business Process Execution Language (BPEL)." UNU-IIST Report No. 425, 1–25.
- Mana, A., J. A. Montenegro, C. Rudolph, and J. L. Vivas. 2003. "A Business Process-Driven Approach to Security Engineering." In *Proceedings of 14th International Workshop on Database and Expert Systems Applications*, September 1–5 2003, 477–481.
- Marrone, M., L. Hoffmann, and L. M. Kolbe. 2010. "IT Executives' Perception of CobiT: Satisfaction, Business-IT Alignment and Benefits." In *Proceedings of the Sixteenth Americas Conference on Information Systems (AMCIS)*, August 12–15, 2010. Lima, Peru, 1–10.
- Marrone, M., and L. M. Kolbe. 2011. "Uncovering ITIL Claims: IT Executives' Perception on Benefits and Business-IT Alignment." *Information Systems and E-Business Management* 9 (3): 363–380. doi:10.1007/s10257-010-0131-7.
- Matulevicius, R., N. Mayer, and P. Heymans. 2008. "Alignment of Misuse Cases with Security Risk Management." In *Proceedings of the Third International Conference on Availability, Reliability and Security (ARES 08)*, March 4–7, 2008, 1397–1404. Barcelona: IEEE.
- Mayer, N., E. Dubois, R. Matulevicius, and P. Heymans. 2008. "Towards a Measurement Framework for Security Risk Management." In *Modeling Security Workshop (MODSEC'08), in conjunction with the 11th International Conference on Model Driven Engineering Languages and Systems (MODELS'08)*. Toulouse: IEEE.
- Mayer, N., E. Dubois, and A. Rifaut. 2007. *Requirements Engineering for Improving Business/IT Alignment in Security Risk Management Methods Enterprise Interoperability II*. London: Springer.
- McDermott, J., and C. Fox. 1999. "Using Abuse Case Models for Security Requirements Analysis." In *Proceedings of the 15th Annual Computer Security Applications Conference*, 55–64. Phoenix, AZ: IEEE Computer Society.
- McKeen, J. D., and H. A. Smith. 2003. *Making IT Happen: Critical Issues in IT Management*. Chichester, Hoboken, NJ: John Wiley Series in Information Systems.
- Melao, N., and M. Pidd. 2000. "A Conceptual Framework for Understanding Business Processes and Business Process Modelling." *Information Systems Journal* 10: 105–129. doi:10.1046/j.1365-2575.2000.00075.x.
- Mendling, J., H. A. Reijers, and W. M. P. Van-Der-Aalst. 2010. "Seven Process Modeling Guidelines (7PMG)." *Information and Software Technology* 52 (2): 127–136. doi:10.1016/j.infsof.2009.08.004.
- Mendling, J., L. Sánchez-González, F. García, and M. La Rosa. 2012. "Thresholds for Error Probability Measures of Business Process Models." *Journal of Systems and Software* 85 (5): 1188–1197. doi:10.1016/j.jss.2012.01.017.

- Mili, H., G. B. Jaoude, É. Lefebvre, G. Tremblay, A. Petrenko, and G. E. Boussaidi. 2010. "Business Process Modeling Languages: Sorting Through the Alphabet Soup." *ACM Computing Surveys* 43 (1): 4–56. doi:10.1145/1824795.1824799.
- Mouratidis, H., and J. Jurjens. 2010. "From Goal-Driven Security Requirements Engineering to Secure Design." *International Journal of Intelligent Systems* 25 (8): 813–840. doi:10.1002/int.v25:8.
- Neubauer, T. 2009. "An Empirical Study about the Status of Business Process Management." *Business Process Management Journal* 15 (2): 166–183. doi:10.1108/14637150910949434.
- Newkirk, H. E., A. L. Lederer, and A. M. Johnson. 2008. "Rapid Business and IT Change: Drivers for Strategic Information Systems Planning?" *European Journal of Information Systems* 17 (3): 198–218. doi:10.1057/ejis.2008.16.
- Nickels, D. W., and B. D. Janz. 2010. "Organizational Culture: Another Piece of the IT-Business Alignment Puzzle." *Journal of Information Technology Management XXI* (3): 1–14.
- Ninghui, L., J. C. Mitchell, and W. H. Winsborough. 2002. "Design of a Role-Based Trust-Management Framework." In *Proceedings of IEEE Symposium on Security and Privacy*, 2002, 114–130. Oakland, CA: IEEE Press.
- Nurcan, S., A. Etien, R. Kaabi, I. Zoukar, C. Rolland, and I. Bider. 2005. "A Strategy Driven Business Process Modelling Approach." *Business Process Management Journal* 11 (6): 628–649. doi:10.1108/14637150510630828.
- O'Neill, P., and A. S. Sohal. 1999. Business Process Reengineering: A Review of Recent Literature. *Technovation* 19 (9): 571–581. doi:10.1016/S0166-4972(99)00059-0.
- Odeh, M., and R. Kamm. 2003. "Bridging the Gap between Business Models and System Models." *Information and Software Technology* 45 (15): 1053–1060. doi:10.1016/S0950-5849(03)00133-2.
- Oh, W., and A. Pinsonneault. 2007. "On the Assessment of the Strategic Value of Information Technologies: Conceptual and Analytical Approaches." *MIS Quarterly* 31 (2): 239–265.
- Olalla, M. F. 1999. "Information Technology in Business Process Reengineering." In *The Forty-Seventh International Atlantic Economic Conference*. Vienna: IAEC.
- Onita, C., and J. Dhaliwal. 2011. "Alignment within the Corporate IT Unit: An Analysis of Software Testing and Development." *European Journal of Information Systems* 20 (1): 48–68. doi:10.1057/ejis.2010.52.
- Overby, E., A. Bharadwaj, and V. Sambamurthy. 2006. "Enterprise Agility and the Enabling Role of Information Technology." *European Journal of Information Systems* 15 (2): 120–131. doi:10.1057/palgrave.ejis.3000600.
- Ozcelik, Y. 2010. "Do Business Process Reengineering Projects Payoff? Evidence from the United States." *International Journal of Project Management* 28 (1): 7–13. doi:10.1016/j.ijproman.2009.03.004.
- Papazoglou, M. P., and F. Leymann. 2008. "Business Process Management." *IEEE Encyclopedia of Software Engineering*.
- Peak, D., C. S. Guynes, and V. Kroon. 2005. "Information Technology Alignment Planning—A Case Study." *Information & Management* 42 (4): 619–633. doi:10.1016/S0378-7206(04)00077-1.
- Peppard, J. 2001. "Bridging the Gap between the IS Organization and the Rest of the Business: Plotting a Route." *Information Systems Journal* 11 (3): 249–270. doi:10.1046/j.1365-2575.2001.00105.x.
- Petrozzo, D. P., and J. C. Stepper. 1994. *Successful Reengineering*. New York: Van Nostrand Reinhold.
- Phalp, K., and M. Shepperd. 2000. "Quantitative Analysis of Static Models of Processes." *The Journal of Systems and Software* 52: 105–112. doi:10.1016/S0164-1212(99)00136-3.
- Piccoli, G., and R. Lloyd. 2010. "Strategic Impacts of IT-Enabled Consumer Power: Insight from Internet Distribution in the U.S. Lodging Industry." *Information & Management* 47 (7–8): 333–340. doi:10.1016/j.im.2010.07.002.
- Preston, D. 2004. "Shared Mental Models between the Chief Information Officer and Top Management Team: Towards Information Systems Strategic Alignment." PhD, University of Georgia, 178.
- Preston, D. S., and E. Karahanna. 2009. "Antecedents of IS Strategic Alignment: A Nomological Network." *Information Systems Research* 20 (2): 159–179. doi:10.1287/isre.1070.0159.
- Preston, D. S., E. Karahanna, and F. Rowe. 2006. "Development of Shared Understanding between the Chief Information Officer and Top Management Team in U.S. and French Organizations: A Cross-Cultural Comparison." *IEEE Transactions on Engineering Management* 53 (2): 191–206. doi:10.1109/TEM.2006.872244.
- Rafael, A., and L. Andreas. 2012. "Automatic Information Flow Analysis of Business Process Models." In *Business Process Management – 10th International Conference, BPM 2012, Volume 7481 of Lecture Notes in Computer Science*, edited by A. P. Barros, A. Gal, and E. Kindler, 172–187. Tallinn: Springer.
- Raghu, T. S., and A. Vinze. 2007. "A Business Process Context for Knowledge Management." *Decision Support Systems* 43 (3): 1062–1079. doi:10.1016/j.dss.2005.05.031.
- Rajabi, B. A., and L. Sai Peck. 2009. "Change Management in Business Process Modeling Survey." In *International Conference on Information Management and Engineering (ICIME '09)*, April 3–5, 2009, 37–41.
- Ramirez, R., N. Melville, and E. Lawler. 2010. "Information Technology Infrastructure, Organizational Process Redesign, and Business Value: An Empirical Analysis." *Decision Support Systems* 49 (4): 417–429. doi:10.1016/j.dss.2010.05.003.
- Rao, L., G. Mansingh, and K.-M. Osei-Bryson. 2012. "Building Ontology Based Knowledge Maps to Assist Business Process Re-Engineering." *Decision Support Systems* 52 (3): 577–589. doi:10.1016/j.dss.2011.10.014.
- Ravesteyn, P., and J. Versendaal. 2009. "Constructing a Situation Sensitive Methodology for Business Process Management Systems Implementation." *Proceedings of Pacific Asia Conference on Information Systems (PACIS)*, July 10–July 12, 2009. Hyderabad, India, 1–12.
- Recker, J., M. Indulska, M. Rosemann, and P. Green. 2009. "Business Process Modeling – A Comparative Analysis." *Journal of the Association for Information Systems* 10 (4): 333–363.

- Recker, J., M. Indulska, M. Rosemann, and P. Green. 2010. "The Ontological Deficiencies of Process Modeling in Practice." *European Journal of Information Systems* 19 (5): 501–525. doi:10.1057/ejis.2010.38.
- Recker, J., N. Safrudin, and M. Rosemann. 2012. "How Novices Design Business Processes." *Information Systems* 37 (6): 557–573. doi:10.1016/j.is.2011.07.001.
- Reijers, H., S. Van Wijk, B. Mutschler, and M. Leurs. 2010. "BPM in Practice: Who Is Doing What?" *Business Process Management, Proceedings of 8th International Conference, BPM 2010, September 13–16*, 10: 45–60. Hoboken, NJ: Springer.
- Reijers, H. A., T. Freytag, J. Mendling, and A. Eckleder. 2011. "Syntax Highlighting in Business Process Models." *Decision Support Systems* 51 (3): 339–349. doi:10.1016/j.dss.2010.12.013.
- Reijers, H. A., and J. Mendling. 2011. "A Study Into the Factors That Influence the Understandability of Business Process Models." *IEEE Transactions on Systems, Man and Cybernetics, Part A: Systems and Humans* 41 (3): 449–462. doi:10.1109/TSMCA.2010.2087017.
- Rezabakhsh, B., D. Bornemann, U. Hansen, and U. Schrader. 2006. "Consumer Power: A Comparison of the Old Economy and the Internet Economy." *Journal of Consumer Policy* 29 (1): 3–36. doi:10.1007/s10603-005-3307-7.
- Rito Silva, A., and M. Rosemann. 2012. "Processpedia: An Ecological Environment for BPM Stakeholders' Collaboration." *Business Process Management Journal* 18 (1): 20–42. doi:10.1108/14637151211214993.
- Rodríguez, A., E. Fernández-Medina, J. Trujillo, and M. Piattini. 2011. "Secure Business Process Model Specification through a UML 2.0 Activity Diagram Profile." *Decision Support Systems* 51 (3): 446–465. doi:10.1016/j.dss.2011.01.018.
- Rodríguez, A., E. Fernández-Medina, and M. Piattini. 2007a. "A BPMN Extension for the Modeling of Security Requirements in Business Processes." *IEICE Transactions on Information and Systems* 90 (4): 745–752. doi:10.1093/ietisy/e90-d.4.745.
- Rodríguez, A., E. Fernández-Medina, and M. Piattini. 2007b. "M-Bpsec: A Method for Security Requirement Elicitation from a UML 2.0 Business Process Specification." In *Proceedings of the 2007 Conference on Advances in Conceptual Modeling: Foundations and Applications*. Auckland, New Zealand: Springer-Verlag.
- Rodríguez, A., I. G.-R. D. Guzmán, E. Fernández-Medina, and M. Piattini. 2010. "Semi-Formal Transformation of Secure Business Processes into Analysis Class and Use Case Models: An MDA Approach." *Information and Software Technology* 52 (9): 945–971. doi:10.1016/j.infsof.2010.03.015.
- Rohloff, M. 2009. "Case Study and Maturity Model for Business Process Management Implementation." *LNCS* 5701: 128–142.
- Rohrig, S., and S. S. Ag. 2002. "Using Process Models to Analyze Health Care Security Requirements." In *International Conference Advances in Infrastructure for e-Business, e-Education, e-Science, and e-Medicine on the Internet*. Italy: CiteSeerX.
- Rosemann, M. 2006. "Potential Pitfalls of Process Modeling: Part A." *Business Process Management Journal* 12 (2): 249–254. doi:10.1108/14637150610657567.
- Ross, J. W. 2003. "Creating a Strategic IT Architecture Competency: Learning in Stages." *MIS Quarterly Executive* 2 (1): 31–43.
- Ryan, G., and M. Valverde. 2005. "Waiting for Service on the Internet: Defining the Phenomenon and Identifying the Situations." *Internet Research: Electronic Networking Applications and Policy* 15 (2): 220–240. doi:10.1108/10662240510590379.
- Ryan, G., and M. Valverde. 2006. "Waiting in Line for Online Services: A Qualitative Study of the User's Perspective." *Information Systems Journal* 16 (2): 181–211. doi:10.1111/ij.2006.16.issue-2.
- Saat, J., R. Winter, U. Franke, R. Lagerstrom, and M. Ekstedt. 2011. "Analysis of IT/Business Alignment Situations as a Precondition for the Design and Engineering of Situated IT/Business Alignment Solutions." In *44th Hawaii International Conference on System Sciences (HICSS)*, January 4–7, 2011, 1–9.
- Sabherwal, R., and G. S. Kearns. 2007. "Strategic Alignment Between Business and Information Technology: A Knowledge-Based View of Behaviors, Outcome, and Consequences." *Journal of Management Information Systems* 23 (3): 129–162. doi:10.2753/MIS0742-1222230306.
- Schuh, G., W. Boos, and K. Kuhlmann. 2010. "Modelling Business Processes for Limited-Lot Producers with Aixperanto." In *International Conference on Management and Service Science (MASS)*, August 24–26, 2010, 1–4.
- Schwarz, M., and H. Daduna. 2006. "Queueing Systems with Inventory Management with Random Lead Times and with Backordering." *Mathematical Methods of Operations Research* 64 (3): 383–414. doi:10.1007/s00186-006-0085-1.
- Sentanin, O. F., F. C. A. Santos, and C. J. C. Jabbour. 2008. "Business Process Management in a Brazilian Public Research Centre." *Business Process Management Journal* 14 (4): 483–496. doi:10.1108/14637150810888037.
- Shanks, G., N. Bekmamedova, and L. Willcocks. 2012. "Business Analytics: Enabling Strategic Alignment and Organisational Transformation." *ECIS 2012 Proceedings*. Paper 18.
- Shim, S. J., and A. Kumar. 2010. "Simulation for Emergency Care Process Reengineering in Hospitals." *Business Process Management Journal* 16 (5): 795–805. doi:10.1108/14637151011076476.
- Shin, N., and D. F. Jemella. 2002. "Business Process Reengineering and Performance Improvement: The Case of Chase Manhattan Bank." *Business Process Management Journal* 8 (4): 351–363. doi:10.1108/14637150210435008.
- Silva, E., and Y. Chaix. 2008. "Business and IT Governance Alignment Simulation Essay on a Business Process and IT Service Model." In *Proceedings of the 41st Annual Hawaii International Conference on System Sciences*, January 7–10, 2008, 434–434. Waikoloa, Big Island, HI: IEEE Computer Society.

- Silva, L., E. Figueroa, and J. González-Reinhart. 2007. "Interpreting IS Alignment: A Multiple Case Study in Professional Organizations." *Information and Organization* 17 (4): 232–265. doi:10.1016/j.infoandorg.2007.08.001.
- Silvius, A. J. 2007. "Aligning IT Strategy to Business Strategy in a Multi-Business Company." In *Americas Conference on Information Systems (AMCIS)*. Keystone, CO: AIS Electronic Library (AISeL).
- Silvius, A. J. G., and J. Smit. 2011. "Maturing Business and IT Alignment Capability; the Practitioner's View." In *44th Hawaii International Conference on System Sciences (HICSS)*, January 4–7, 2011, 1–10. Kauai, HI: IEEE Computer Society.
- Silvius, A. J. G., B. D. Waal, and J. Smit. 2009. "Business and IT Alignment; Answers and Remaining Questions." In *Proceedings of Pacific Asia Conference on Information Systems (PACIS)*, July 10–July 12, 2009. Hyderabad, India, 1–15. Paper 44.
- Silvius, G., J. Smit, and H. Driessen. 2010. "The Relationship between Organizational Culture and the Alignment of Business and IT." In *Proceedings of the Sixteenth Americas Conference on Information Systems (AMCIS)*, August 12–15, 2010, Lima, Peru, 1–14. Paper 186.
- Simatupang, T. M., A. C. Wright, and R. Sridharan. 2002. "The Knowledge of Coordination for Supply Chain Integration." *Business Process Management Journal* 8 (3): 289–308. doi:10.1108/14637150210428989.
- Simchi-Levi, D., P. Kaminsky, and E. Simchi-Levi. 2000. *Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies*. Hill/Irwin: McGraw.
- Sindre, G., and A. L. Opdahl. 2000. "Eliciting Security Requirements by Misuse Cases." In *Proceedings 37th International Conference on Technology of Object-Oriented Languages and Systems (TOOLS-Pacific 2000)*, 120–131. Sydney: IEEE Computer Society.
- Sindre, G., and A. L. Opdahl. 2005. "Eliciting Security Requirements with Misuse Cases." *Requirements Engineering* 10 (1): 34–44. doi:10.1007/s00766-004-0194-4.
- Siponen, M., R. Baskerville, and J. Heikka. 2006. "A Design Theory for Secure Information Systems Design Methods." *Journal of the Association for Information Systems* 7 (8): 568–592.
- Sledgianowski, D., J. Luftman, and R. Reilly. 2004. "Identification of IT-Business Strategic Alignment Maturity Factors: an Exploratory Study." In *Proceedings of the Americas Conference on Information Systems*, August 2004, 3717–3725. New York, NY: AIS Electronic Library (AISeL).
- Smit, J., J. Ludik, and S. Forster. 2008. "Organizational Culture in the South African Context: The X Model." *The International Journal of Knowledge, Culture & Change Management* 7 (10): 73–86.
- Sobel, M. J., and R. Q. Zhang. 2001. "Inventory Policies for Systems with Stochastic and Deterministic Demand." *Operations Research* 49 (1): 157–162. doi:10.1287/opre.49.1.157.11197.
- Stahl, B. C., N. F. Doherty, and M. Shaw. 2012. "Information Security Policies in the UK Healthcare Sector: A Critical Evaluation." *Information Systems Journal* 22 (1): 77–94. doi:10.1111/isj.2012.22.issue-1.
- STANDISH GROUP. 2001. "The Chaos Report." *The Standish Group*.
- Strembeck, M., and J. Mendling. 2011. "Modeling Process-Related RBAC Models with Extended UML Activity Models." *Information and Software Technology* 53 (5): 456–483. doi:10.1016/j.infsof.2010.11.015.
- Sun, Y., J. Su, B. Wu, and J. Yang. 2014. "Modeling Data for Business Processes." *ICDE* 2014: 1048–1059.
- Sun, Y., J. Su, and J. Yang. 2014. "Separating Execution and Data Management: A Key to Business-Process-as-a-Service (BPaaS)." *BPM* 2014: 374–382.
- Swink, M., R. Narasimhan, and S. W. Kim. 2005. "Manufacturing Practices and Strategy Integration: Effects on Cost Efficiency, Flexibility, and Market-Based Performance." *Decision Sciences* 36 (3): 427–457. doi:10.1111/deci.2005.36.issue-3.
- SYNSTAR. 2004. "The Pressure Point Index: V." *Synstar*.
- Tallon, P. P., and A. Pinsonneault. 2011. "Competing Perspectives on the Link between Strategic Information Technology Alignment and Organizational Agility: Insights from a Mediation Model." *MIS Quarterly* 35 (2): 463–486.
- Talwar, R. 1993. "Business Re-Engineering—A Strategy-Driven Approach." *Long Range Planning* 26 (6): 22–40. doi:10.1016/0024-6301(93)90204-S.
- Tan, W., W. Xu, F. Yang, L. Xu, and C. Jiang. 2013. "A Framework for Service Enterprise Workflow Simulation with Multi-Agents Cooperation." *Enterprise Information Systems* 7 (4): 523–542. doi:10.1080/17517575.2012.660503.
- Taylor, A. 2000. "IT Projects: Sink or Swim." *Computer Bulletin*, January. 10.1093/combul/42.1.24
- Tempelmeier, H. 2006. "Supply Chain Inventory Optimization with Two Customer Classes in Discrete Time." *European Journal of Operational Research* 174 (1): 600–621. doi:10.1016/j.ejor.2005.01.044.
- Tosic, V. 2006. "The 5 C Challenges of Business-Driven IT Management and the 5 A Approaches to Addressing Them." In *The First IEEE/IFIP International Workshop on Business-Driven IT Management, BDIM '06*. 07 April 2006, 11–18. IEEE. doi:10.1109/BDIM.2006.1649206.
- Trkman, P. 2010. "The Critical Success Factors of Business Process Management." *International Journal of Information Management* 30 (2): 125–134. doi:10.1016/j.ijinfomgt.2009.07.003.
- Tsalgaidou, A., and S. Junginger. 1995. "Modelling in the Re-Engineering Process." *SIGOIS Bull.* 16 (1): 17–24. doi:10.1145/209891.
- Turetken, O., and O. Demirs. 2011. "Plural: A Decentralized Business Process Modeling Method." *Information & Management* 48 (6): 235–247. doi:10.1016/j.im.2011.06.001.
- Vaidya, O. S., and S. Kumar. 2006. "Analytic Hierarchy Process: An Overview of Applications." *European Journal of Operational Research* 169 (1): 1–29. doi:10.1016/j.ejor.2004.04.028.

- Van Den Hooff, B., and M. De Winter. 2011. "Us and Them: A Social Capital Perspective on the Relationship between the Business and IT Departments." *European Journal of Information Systems* 20 (3): 255–266. doi:10.1057/ejis.2011.4.
- Van Der Aalst, W. M. P., H. A. Reijers, A. J. M. M. Weijters, B. F. Van Dongen, A. K. Alves De Medeiros, M. Song, and H. M. W. Verbeek. 2007. "Business Process Mining: An Industrial Application." *Information Systems* 32 (5): 713–732. doi:10.1016/j.is.2006.05.003.
- Van-Der-Aalst, W., B. Benatallah, F. Casati, F. Curbera, and H. Verbeek. 2007. "Business Process Management: Where Business Processes and Web Services Meet." *Data & Knowledge Engineering* 61 (1): 1–5. doi:10.1016/j.datak.2006.04.005.
- Van-Der-Aalst, W. M. P. 2003. "Don't Go with the Flow: Web Services Composition Standards Exposed." *IEEE Intelligent Systems* 18 (1): 72–76.
- Van-Der-Aalst, W. M. P. 2004. "Business Process Management: A Personal View." *Business Process Management Journal* 10 (2): 5. doi:10.1108/bpmj.2004.15710baa.001.
- Van-Der-Aalst, W. M. P., A. H. M. Ter-Hofstede, and M. Weske. 2003. "Business Process Management: a Survey." In *International Conference on Business Process Management (BPM)*, June 26–27, 2003. Eindhoven: Springer Berlin Heidelberg.
- Vargas, N., P. Johannesson, and L. Rusu. 2010. "A Unified Strategic Business and IT Alignment Model: A Study in the Public Universities of Nicaragua." In *Proceedings of the Sixteenth Americas Conference on Information Systems*, August 12–15, 2010, 1–12. Lima: AIS Electronic Library (AISeL).
- Vidgen, R., and X. Wang. 2006. "From Business Process Management to Business Process Ecosystem." *Journal of Information Technology* 21 (4): 262–271. doi:10.1057/palgrave.jit.2000076.
- Viriyasitavat, W., X. Li Da, and A. Martin. 2012. "SWSpec: The Requirements Specification Language in Service Workflow Environments." *IEEE Transactions on Industrial Informatics* 8 (3): 631–638. doi:10.1109/TII.2011.2182519.
- Wagner, H.-T. 2008. "The Development of IT Business Alignment and Usage Patterns Over Time in SME: a Longitudinal Case Study." In *Proceedings of the Fourteenth Americas Conference on Information Systems*, August 14–17, 1–10. Toronto, ON: AIS Electronic Library (AISeL).
- Walentowitz, K. 2012. "Aligning Multiple Definitions of Alignment – A Literature Review." In *45th Hawaii International Conference on System Sciences*, January 4–7, 4962–4971. Maui, HI: IEEE Computer Society.
- Wang, E. T. G., C. H. Chiu, C. H. Chen, K. X. 2013. "Effect of IT Skills on IT Capabilities and IT-Business Alignment." *PACIS 2013 Proceedings*. Paper 113.
- Wang, Y., J. Yang, W. Zhao, and J. Su. 2012. "Change Impact Analysis in Service-Based Business Processes." *Service Oriented Computing and Applications* 6 (2): 131–149. doi:10.1007/s11761-011-0093-8.
- Weske, M., W. M. P. Van-Der-Aalst, and H. M. W. Verbeek. 2004. "Advances in Business Process Management." *Data & Knowledge Engineering* 50 (1): 1–8. doi:10.1016/j.datak.2004.01.001.
- Wijesekera, H., and J. Sykes. 2003. "An ORM based Meta-Schema to Model Business Processes." In *Proceedings of 7th Pacific Asia Conference on Information Systems (PACIS)*, July 10–13, 2003. Adelaide, South Australia: 1175–1191.
- Wijnhoven, F., T. Spil, R. Stegwee, and R. T. A. Fa. 2006. "Post-Merger IT Integration Strategies: An IT Alignment Perspective." *The Journal of Strategic Information Systems* 15 (1): 5–28. doi:10.1016/j.jsis.2005.07.002.
- Willcoxson, L., and R. Chatham. 2004. "Progress in the IT/Business Relationship: A Longitudinal Assessment." *Journal of Information Technology* 19 (1): 71–80. doi:10.1057/palgrave.jit.2000004.
- Wim Van, G., H. Steven De, and B. Hilde Van. 2007. "Prioritising and Linking Business and IT Goals in the Financial Sector." In *40th Annual Hawaii International Conference on System Sciences, (HICSS)*, January 2007, 235–245. Waikoloa, Big Island, HI: IEEE Computer Society.
- WINMARK & SOFTWARE, B. M. C. 2004. "The Communication Gap: The Barrier to Aligning Business and IT."
- Wolter, C., M. Menzel, A. Schaad, P. Miseldine, and C. Meinel. 2009. "Model-Driven Business Process Security Requirement Specification." *Journal of Systems Architecture* 55 (4): 211–223. doi:10.1016/j.sysarc.2008.10.002.
- Wu, I.-L. 2003. "Understanding Senior Management's Behavior in Promoting the Strategic Role of IT in Process Reengineering: Use of the Theory of Reasoned Action." *Information & Management* 41 (1): 1–11. doi:10.1016/S0378-7206(02)00115-5.
- Xu, L., H. Liu, S. Wang, and K. Wang. 2009. "Modelling and Analysis Techniques for Cross-Organizational Workflow Systems." *Systems Research and Behavioral Science* 26 (3): 367–389. doi:10.1002/sres.v26:3.
- Xu, L., W. Tan, H. Zhen, and W. Shen. 2008. "An Approach to Enterprise Process Dynamic Modeling Supporting Enterprise Process Evolution." *Information Systems Frontiers* 10 (5): 611–624. doi:10.1007/s10796-008-9114-3.
- Yao, Y., and J. Zhang. 2012. "Pricing for Shipping Services of Online Retailers: Analytical and Empirical Approaches." *Decision Support Systems* 53 (2): 368–380. doi:10.1016/j.dss.2012.01.014.
- Yayla, A. A., and Q. Hu. 2009. "The Impact of IT-Business Strategic Alignment on Firm Performance: The Role of Environmental Uncertainty and Business Strategy." In *Proceedings of the Fifteenth Americas Conference on Information Systems*, August 6–9, 2009, 1–9. San Francisco, CA: AIS Electronic Library (AISeL).
- Yu, E. S. K., J. Mylopoulos, and Y. Lesperance. 1996. "Modelling the Organization: New Concepts and Tools for Re-Engineering." *IEEE Expert* 16–23. doi:10.1109/64.511773.
- Zhao, N., and Z. Lian. 2011. "A Queueing-Inventory System with Two Classes of Customers." *International Journal of Production Economics* 129 (1): 225–231. doi:10.1016/j.ijpe.2010.10.011.
- Zur-Muehlen, M., D. E. Wisnosky, and J. Kindrick. 2010. "Primitives: Design Guidelines and Architecture for BPMN Models." In *21st Australasian Conference on Information Systems*, December 1–3, 2010. Brisbane, 1–11.

Appendix

(A) List of journal names for Table 4.

Journal name	
ACM Database	ACM
Australasian Journal of Information Systems	AJIS
Business Process Management Journal	BPMJ
Decision Sciences	DS
Decision Support Systems	DSS
Enterprise Information Systems	EIS
European Journal of Information Systems	EJIS
Information and Management	I&M
Information and Organisation	I&O
IEEE Database	IEEE
International Journal of Information Management	IJIM
International Journal of Information Security	IJIS
International Journal of Management and Systems	IJMS
INFORMS Journal on Computing	IJOC
Information Processing and Management	IPM
Information Systems	IS
Information Systems and e-Business Management	ISEB
Information Systems Journal	ISJ
Information Systems Management	ISM
Information Systems Research	ISR
Information and Software Technology	IST
Information Technology and Management	IT&M
Information Technology Management	ITM
Journal of the Association for Information Systems	JAIS
Journal of Enterprise Information Management	JEIM
Journal of Intelligent Information Systems	JIIS
Journal of Information Systems	JIS
Journal of Information Technology	JIT
Journal of Management Information Systems	JMIS
Journal of Strategic Information Systems	JSIS
Journal of Systems and Software	JSS
Management Science	MS
Marketing Science	MKTS
MIS Quarterly	MISQ
Operations Research	OR
Review of Business Information Systems	RBIS
Scandinavian Journal of Information Systems	SJIS

(B) List of conference names for Table 5.

Conference name	
Australasian Conference on Information Systems	ACIS
Americas Conference on Information Systems	AMCIS
European Conference on Information Systems	ECIS
Hawaii International Conference on System Sciences	HICSS
International Conference in Business Process Management	ICBPM
International Conference on Information Systems	ICIS
Pacific Asia Conference on Information Systems	PACIS

Properties that influence business process management maturity and its effect on organizational performance

Remco Dijkman¹ · Sander Vincent Lammers¹ · Ad de Jong²

Published online: 28 April 2015

© The Author(s) 2015. This article is published with open access at Springerlink.com

Abstract BPM maturity is a measure to evaluate how professionally an organization manages its business processes. Previous research provides evidence that higher BPM maturity leads to better performance of processes and of the organization as a whole. It also claims that different organizations should strive for different levels of maturity, depending on their properties. This paper presents an empirical investigation of these claims, based on a sample of 120 organizations and looking at a selection of organizational properties. Our results reveal that higher BPM maturity contributes to better performance, but only up to a point. Interestingly, it contradicts the popular belief that higher innovativeness is associated with lower BPM maturity, rather showing that higher innovativeness is associated with higher BPM maturity. In addition, the paper shows that companies in different regions have a different level of BPM maturity. These findings can be used as a benchmark and a motivation for organizations to increase their BPM maturity.

Keywords Business process · Business process management · Maturity · Innovativeness · Performance

1 Introduction

Business Process Management (BPM) is a contemporary management technique that focuses on managing an organization's operations in terms of 'business processes'. Business processes are structured, measured sets of activities designed to produce a specific output for a particular customer or market (Davenport 1993). BPM delivers the methods, tools and techniques to identify, analyse, execute, monitor and change these business processes, resulting in a cycle of continuous improvement (Davenport 1993). It is often contrasted with the more traditional function-based management, in that emphasizes customers and relations between activities and, by doing so, aims to achieve higher customer satisfaction and better collaboration between individual business functions (Dumas et al. 2013).

When engaging in business process management, organizations will at some stage ask themselves how capable they are in doing so, and to what extent they reap the benefits. Maturity models have emerged as a measure to evaluate the capabilities of an organization in a certain discipline (De Bruin et al. 2005a). They became popular with the Capability Maturity Model (CMM) (Paulk 1993). The CMM and other maturity models operate as a tool that enables organizations to rank specific processes according to how structured they are described, managed, measured and optimized. Processes that have a higher rank - also called a higher level of maturity - are claimed to be associated with better performance of those processes and in particular with better quality output. This claim is supported by a large number of studies (e.g.: Jiang et al. 2004; Herbsleb and Zubrow 1997; Herbsleb and Goldenson 1996; Krishnan and Kellner 1999; Krishnan and Kriebel 2000), an overview

✉ Remco Dijkman
r.m.dijkman@tue.nl

¹ Eindhoven University of Technology, Den Dolech 2, 5612 AZ, Eindhoven, The Netherlands

² Aston Business School, Aston Triangle, Birmingham, B4 7ET UK

of which will be presented in Section 3. However, these studies focus on the maturity and performance of a single process or set of processes for performing a particular business function (such as software development or purchasing), while BPM studies show how the entire collection of business processes in the organization is managed in general. There are some studies that provide initial evidence to support the claim that organizations with a higher general BPM maturity perform better as a whole (McCormack 2001; Škrinjar et al. 2008), investigating different aspects of organizational performance, such as financial performance and employee satisfaction. However, these studies were conducted for a maturity-related construct called ‘Business Process Orientation’ (McCormack et al. 2009), which measures whether an organization works in a process oriented manner, rather than how an organization implements its BPM capability. This motivates our investigation into a more direct relation between BPM maturity and organizational performance. The value of showing this relation lies therein, that it can serve as a means to convince higher management of the use of BPM maturity and as a strong business case for engaging in a project to reach higher levels of BPM maturity. Therefore, the first research question of this paper is:

RQ1 *Do high levels of BPM maturity lead to improved organizational performance?*

Since BPM maturity is defined on an ordinal scale, the idea easily arises that a higher level of maturity always leads to better performance. However, there is an increasing awareness that, whether a higher level of maturity leads to better performance, may depend on certain properties of that organization (Niehaves et al. 2014); for some organizations the optimal level of maturity may not necessarily be the highest level of maturity. In particular, there is a strong belief among researchers and practitioners that maturity models make organizations rigid and bureaucratic (Adler et al. 2005; Antoniol et al. 2004; Nawrocki et al. 2002) and, therefore, negatively affect innovativeness (Herbsleb and Zubrow 1997). This belief is based on the idea that higher BPM maturity implies more strictly defined processes, which negatively influence an organization’s potential for finding creative solutions to technical problems. Therefore, organizations that are more innovative, can be expected to strive for less strictly defined processes and therefore have a lower level of BPM maturity. For these reasons, the second research question of this paper is:

RQ2 *Which organizational properties influence the attainment of BPM maturity levels?*

To answer the research questions, this paper reports on an empirical investigation into the relation between an organization’s innovativeness, BPM maturity level and performance. Company size, age and geographic location are

used as additional properties to explain both the maturity level and the performance of the organization. These properties do not represent an exhaustive enumeration of the properties that an organization should take into account when determining its ideal level of BPM maturity, as will also be shown by the analysis of the data further on in the paper. Rather, this paper investigates some of the properties that are commonly considered to determine whether an organization’s BPM maturity is properly tuned to its properties. The empirical investigation involves a survey among 120 organizations in different sectors in both Germany and The Netherlands. In answering the research questions, the paper makes an important contribution to understanding the effect of improving the BPM capability and properties that influence the level of BPM maturity that can be achieved or is desirable to achieve for an organization. In particular, it shows that developing the BPM capability pays off, but up to a point. Also, it disproves popular belief that more innovative companies should strive for a lower level of BPM maturity, in fact showing that the opposite is considered to be true in practice.

The rest of this paper is organized as follows. Section 2 presents a more detailed discussion of BPM Maturity, Section 3 the research model, Section 4 the research method and Section 5 the approach to data collection and the analysis. Section 6 discusses the results. Section 7 presents the conclusions, limitations and future work.

2 BPM maturity

Maturity models find their origin in the work of Crosby (1979) and Nolan (1973). Since these initial papers the work on maturity models has proliferated. A large number of new maturity models has been developed (34 new maturity models were developed in 2009 and 2010 alone (Wendler 2012)). The similarities and differences between maturity models are well studied in a number of surveys, that compare various aspects of the maturity models, including aspects of the models themselves (Wangenheim et al. 2010; Mettler et al. 2010) and the research methods that lead to their development (Van Looy et al. 2013; Wendler 2012; De Bruin and Rosemann 2005b; Becker et al. 2009). These surveys show that, while maturity models may differ along a large number of dimensions, the properties that they share and that identify them as maturity models, are that they present a number of stages of maturity and a set of capabilities that can be measured to determine the stage of maturity (Wendler 2012).

With respect to the capabilities that are evaluated by the maturity models, two types of models can be distinguished (De Bruin and Rosemann 2010). First, there are maturity models that evaluate a particular business process or set

of business processes. Second, there are maturity models that evaluate the capability of an organization to manage their business processes in general. In the first category, there exist maturity models for widely varying business processes, including processes for software development (Paulk 1993), acquisition (Software Engineering Institute 2010a), service delivery (Software Engineering Institute 2010b), software product lines (Ahmed and Capretz 2011), e-government (Andersen and Henriksen 2006), project management (Ibbs and Kwak 2000), and procurement (Batenburg and Versendaal 2008). The focus of this paper is on the second category of maturity models, which are also called Business Process Management (BPM) maturity models. There are notably fewer of these models and even fewer are being applied in practice (Rohloff 2009), exceptions are the BPM maturity models proposed by the OMG (Object Management Group 2008), De Bruin et al. (2005a, 2005b), Rohloff (2009), and Hammer (2007). The difference between measuring the maturity of a single process and measuring the maturity of the Business Process Management capability of an organization is subtle, but leads to widely different measurement models. Maturity models that focus on a particular business process, include indicators that are specific to ‘mature’ ways of performing that process. For example, the CMMI maturity model for software development (Paulk 1993), has indicators as to whether requirements engineering and testing are done in a structured manner. In contrast, BPM maturity has indicators that are not specific to a particular process. Instead, BPM maturity has indicators that can apply to any process, such as whether the process is documented or whether performance criteria are identified for the process. In addition, BPM maturity models are more likely to apply to the management of multiple different processes at the same time. For example, there may be an indicator to assess whether the company has a process management department that takes care of documenting the processes in the company.

This paper takes the Business Process Maturity Model (BPMM) proposed by the OMG (Object Management Group 2008) as a starting point, because it is defined as an international standard. BPMM distinguishes five maturity levels as illustrated in Fig. 1. The five levels explain an organization how it can gradually improve its BPM capability. For example, to get from level 1 to level 2, repeatable work practices have to be introduced. The BPMM standard specifies in detail which areas of business process management have to be improved to reach a certain level and which specific goals have to be achieved in each of these areas to reach that level. For example, in order to reach level 2, an organization has to work on the process area ‘process and product assurance’ and one of the specific goals that must be met is that the organization tracks, communicates and resolves non-conformance issues. Specific practices must be implemented to reach the specific goals, such as the specific practice that the results of assurance evaluations are reviewed with responsible parties on a regular basis. For a company to prove that it indeed is at a certain level of maturity, it needs to demonstrate that it has implemented the specific practices. This is normally done by an external organization during an ‘appraisal’ that involves collecting proof in the form of documents, data and interview transcripts that the company implements the specific practices.

There are a large number of previous studies that show a relation between maturity and some aspect of organization performance. Many of these are case studies (e.g.: Harter et al. 2000; McGarry and Decker 2002; Pitterman 2000; Diaz and Sligo 1997; Diaz and King 2002; Humphrey et al. 1991; Rooijmans et al. 1996; Dion 1992, 1993; Oldham et al. 1999; Urioste 2004; Bowers 2002; Wohlwend and Rosenbaum 1993; Porter and Detoma 1999; Hammer 2007), which report on results that are achieved in single organizations, although about half of them do involve multiple units of analysis (e.g.: multiple projects within the same

Fig. 1 Definition of maturity levels in BPMM

Level 5 Innovating	Processes are continuously improved.
Level 4 Predictable	Processes are managed quantitatively to establish predictable results.
Level 3 Standardized	Standardized processes are established throughout the organization.
Level 2 Managed	Management ensures that work within work-units can be performed in a repeatable manner.
Level 1 Initial	Work is performed in inconsistent and ad-hoc ways.

organizations). The studies focus on software process maturity, with one exception (Hammer 2007) that studies general BPM maturity. Most of the case studies show a positive relation between the maturity level of a specific group of processes (typically software development processes) and an improvement in the performance and the quality of the output of those processes as well as a reduction in the costs of running them. Additional improvements that are shown by some studies, are an increase in the number of business opportunities, an improved capability to produce an accurate planning as well as improved staff morale, customer satisfaction, control and communication. One study explicitly reported improved overall organizational performance (McGarry and Decker 2002). There are a number of papers that generalize from both case studies in literature and additional case studies, to aggregate overall statistics, such as average return on investment (Gibson et al. 2006; Solingen 2004; Goldenson et al. 1999; Krasner 2001). However, these papers recognize that case studies in particular suffer from a selection bias, as most case studies tend to be success stories (Gibson et al. 2006). In addition to case studies there exists other empirical studies, which show a relation between maturity and organization performance using multiple units of analysis. Table 1 summarizes these studies. For each study, it shows the type of research conducted, the used maturity model and the relations with organization performance that were confirmed by the study. Most of the studies are conducted by means of a survey, but in two cases the study was conducted by investigating data about the cases that was available in some form. Most of the studies focus on CMM or its successor CMMI (CMMI Institute 2011). Three studies investigated the relation between the CMMI maturity level and organizational performance, while three other studies investigated whether the presence of certain CMMI specific practices in an organization affect organizational performance. The other studies introduce their own notions of maturity to investigate the performance of other processes: new product development, supply chain management, purchasing, and order fulfillment. Three of these notions were developed specifically to determine the maturity of the business function that is studied. The others were general maturity notions. Two studies show a relation between the level of ‘business process orientation’ (which is a concept that is related to and derived from BPM maturity (McCormack et al. 2009)) and overall performance of an organization. Based on this careful inspection of related work, we conclude that little is known today about the effect of engaging in an organization-wide effort to improve the BPM capability. At the same time, generalizing from existing work in specific areas of process maturity, there is ample evidence to support the assumption that improving on the BPM capability in general improves the performance of the organization.

3 Research model

The first goal of this paper is to determine whether higher overall BPM maturity level leads to better performance of the organization as a whole (RQ1). The goal of the paper is to study the organization as a whole. Consequently, we look at the performance of the organization as a whole and also the overall maturity level of the processes of the organization. This affects our choice of the way in which the concepts under study are operationalized as well as the people that we target with the survey, as will be explained further on in the paper.

The second goal of this paper is to investigate which organizational properties influence the attainment of BPM maturity (RQ2). While a large number of properties are of interest, we do not aim to give an exhaustive account of the properties that determine the optimal level of BPM maturity of an organization. Rather, we primarily focus on the innovativeness of an organization. Our motivation for that is that the relation between innovativeness and BPM maturity is controversial and can answer an important question for innovative organizations: should our organization strive for higher BPM maturity, or would a higher BPM maturity limit our innovative capability? As additional properties, we study age, size and geographical location of the organization, because they can be considered important descriptive characteristics of an organization (Mintzberg 1979). We acknowledge that there are other properties that influence BPM maturity, such as the type of product and the business model. These properties can be studied in future work.

Against this background, Fig. 2 summarizes the concepts and the relations between these concepts that we aim to study. In the remainder of this section, we discuss these relations based on related work.

Concerning the relation between innovativeness and maturity, one of the most common criticisms of CMMI is that it leads to rigid and bureaucratic organizations (Adler et al. 2005; Antoniol et al. 2004; Nawrocki et al. 2002; Herbsleb and Zubrow 1997), because it imposes strictly defined processes. (Although research has also shown that organizations, in which CMMI was implemented, disagreed with that claim (Herbsleb and Zubrow 1997).) The increased bureaucracy of the organization, can in particular be considered to negatively impact the organization’s ability to find creative solutions to technical problems (Herbsleb and Zubrow 1997) and, consequently, hamper the innovative ability of the organization. It has also been argued that each organization should allow for an amount of ‘entropy’ in its processes that is appropriate for the environment in which it operates. This includes allowing for the ‘entropy’ that is related to an external pressure to deliver innovative products (Trienekens et al. 2008). These

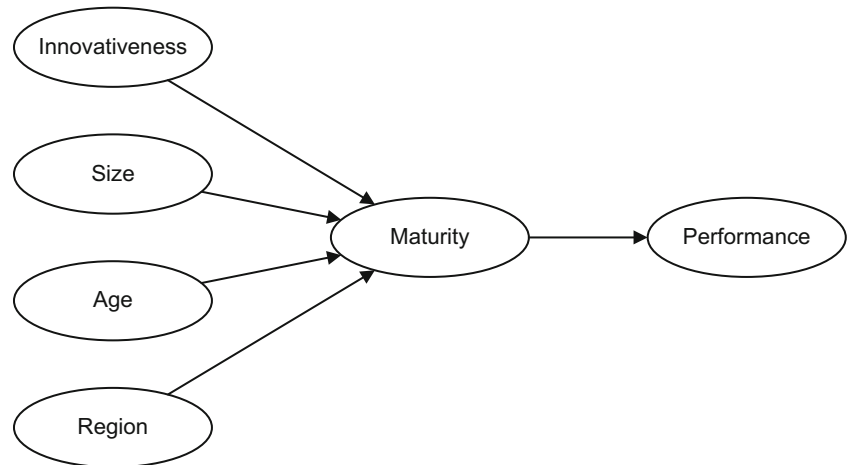
Table 1 Empirical studies into the relation between maturity and organizational performance using multiple units of analysis

Study	Research method	Maturity model	Confirmed relations
Michlmayr (2005)	Secondary data (80 units)	Presence of Specific Quality Practices	Open source project success
Jiang et al. (2004)	Survey (154 respondents)	CMM	Improved learning Improved control Improved product quality and productivity Improved communication Improved flexibility
Herbsleb and Zubrow (1997), Herbsleb and Goldenson (1996)	Secondary data (138 respondents)	CMM	Improved product quality and productivity Improved ability to meet schedule and budget Improved customer satisfaction Improved staff morale
Krishnan and Kellner (1999), Krishnan and Kriebel (2000)	Secondary data (43 units)	Presence of CMM Specific Practices	Improved product quality and productivity
Dooley et al. (2001)	Survey (39 respondents)	NPD Maturity	Improved overall performance of the new product development (NPD) function
Lockamy III and McCormack (2004)	Survey (523 respondents)	SCM Maturity	Improved overall performance of the supply chain management (SCM) function
Raschke and Ingraham (2010)	Survey (356 respondents)	BPMM	Improved overall performance of the purchasing and order fulfillment functions
Batenburg and Versendaal (2008)	Survey (117 respondents)	Purchasing Maturity	Improved overall performance of the purchasing function
Hofmann and Reiner (2006)	Survey (60 respondents)	Process Maturity	Improved overall performance of the supply chain management function
Škrinjar et al. (2008)	Survey (405 respondents)	Business Process Orientation	Improved overall organizational performance
McCormack (2001)	Survey (110 respondents)	Business Process Orientation	Improved overall organizational performance Improved staff morale Improved interdepartmental connectedness Decreased interdepartmental conflict
Deephouse et al. (1995)	Survey (87 respondents)	Presence of CMM Specific Practices	Improved product quality Improved ability to meet schedule and budget and budget
Jung and Goldenson (2003)	Secondary data (752 units)	CMM	Improved ability to meet schedule and budget
Filbeck et al. (2013)	Secondary data (348 units)	CMM	Improved stock performance

findings point towards a possible negative relation between innovativeness and BPM maturity, with more innovative

organizations striving for lower levels of BPM maturity. The causality of the relation can also be reversed, because

Fig. 2 Organization properties, BPM maturity and performance



quality management is part of the organization's infrastructure; it facilitates and controls other processes, including innovation processes (for example through the stage gate process (Cooper 1990)). Therefore, quality is a tool that is tuned to the processes that it facilitates and, consequently, causally follows those processes. Indeed in previous research the relation between innovativeness and financial performance has been found to be mediated by quality (Cho and Pucik 2005).

Considering the relation between organizational size and BPM maturity, we argue that larger organizations have more resources to assign to develop a BPM function than smaller organizations. Furthermore, we argue that larger organizations have a more urgent need for better described and more structured processes, because they may otherwise become unmanageable due to their size. We would therefore expect that larger organizations document their business processes more rigorously than smaller equivalents and that larger organizations have more standardized processes across the organization.

Concerning the relation between geographical region and maturity, clearly different geographical regions and in particular different countries have different cultures. This is formalized in the model of cultural dimensions by Hofstede (1980). We expect regional culture to influence the way in which an organization deals with BPM maturity. One particular property of the model of cultural dimensions that is of interest in this context is the uncertainty avoidance index, which quantifies a culture's tolerance for uncertainty and ambiguity. Uncertainty avoiding cultures tend to minimize the possibility of uncertain situations by strict laws and rules, safety and security measures. We argue that organizations in regions that score high on this index, have a higher BPM maturity, because by documenting and formally managing their processes, these organizations can reduce risk and uncertainty. This argument is supported by Humphrey, Snyder and Willis (Humphrey et al. 1991), who

state that risk and uncertainty are reduced, as BPM maturity increases. Along the same lines, various studies show relations between aspects of company culture and levels in which certain aspects of a company are structured (Ali and Green 2012; Andoh-Baidoo et al. 2012). Consequently, we would expect that there is a positive relation between the uncertainty avoidance index of the country of an organization and the BPM maturity level. Due to the low number of countries involved in this study, it is not possible to show this relation in its general form.

Concerning the relation between the age of an organization and maturity, numerous theories - often labeled 'life cycle theories' - exist about the way organizations develop as they exist longer. Quinn and Cameron (1983) were among the first to compare several of these life cycle models. Based on this comparison they defined a general model that comprises of the common characteristics of other life cycle models. Their model identifies four stages in the life cycle of a organization. The first two stages are mainly characterized by "lots of ideas", "little planning and coordination", an "informal communication structure" and "high innovation", while the latter stages are characterized by the "formalization of rules", "stable structures", "emphasis on efficiency and maintenance", "conservatism" and "institutionalized procedures". Clearly, the characteristics of the latter stages bear a strong resemblance to the higher levels of BPM maturity. Other scholars have presented life cycle models that have a similar relation to BPM maturity models (Miller and Friesen 1984; Kimberly 1979; Scott 1971). These studies motivate a possible positive relation between the age of an organization and its BPM maturity.

4 Research method

To investigate the relations between the concepts introduced in the previous section, we conducted a survey. The

survey consisted of questions that operationalized the constructs of ‘BPM maturity’, ‘performance’, ‘innovativeness’, ‘size’, ‘region’, and ‘age’. These questions are presented in Appendix A.

For BPM maturity, we had to define our own measurement instrument. For the other constructs, we took measurement instruments from related work. The measures that we took to ensure construct and content validity are based on the heuristics for ensuring validity in IS research that are proposed by Straub et al. (2004). In particular, for each of the constructs, we ensured:

content validity, by aligning the questions with existing measurement instruments from literature, as described in more detail below, and by having the questions checked for content validity by an expert panel of 12 senior professionals.

construct validity, by analyzing factorial validity, using collinearity and cross-loading analysis, and by analysing common method bias, using Harman’s single factor test, of which the results are described in Section 5.

reliability, by analysing the internal consistency of the constructs, using AVE, CR, and Cronbach’s Alpha, of which the results are also described in Section 5.

BPM maturity assessment in practice is done with detailed questionnaires, interviews and document analysis. The case studies that are mentioned in Section 3 also use such detailed forms of data collection. For case studies, which study a single case in depth, such detailed forms of analyses are feasible. However, for a broad study, in which many cases are investigated, this is not feasible. Therefore, broad studies, like ours, use less detailed questionnaires. There are several broad studies that have been executed before and that operationalize BPM maturity (see Section 3 and in particular Table 1). However, most of these questionnaires operationalize the construct for a particular group of processes, most notably software development processes, while this paper considers maturity to business processes in general. Two prior studies (Raschke and Ingraham 2010; Škrinjar et al. 2008) also target business process in general. However, the first of these studies (Škrinjar et al. 2008) is based on a construct called ‘Business Process Orientation’ (McCormack et al. 2009) that is related to, but not the same as, BPM maturity. The second of these studies (Raschke and Ingraham 2010) is close to research reported on in this paper. However, they operationalize the construct with one question per level, while we preferred to have multiple questions per maturity level, because this would allow us to do factor analysis for each maturity level and, therewith, provide us with a more accurately validated measurement instrument. Therefore, we decided to develop our own measurement scale, based on the BPMM (Object Management Group 2008). By carefully studying each of the

maturity levels that are defined in detail in this specification, we developed three questions per maturity level. The questions were tested in a pilot survey, in which 12 senior professionals filled out the questions and were asked to give feedback on them. The results of the pilot survey were used to fine-tune the questions.

While there exist many different instruments for measuring organizational performance, we chose an operationalization that was used before when researching the relation between maturity and organizational performance. Our operationalization of performance follows the one used by Lockamy III & McCormack (2004) to rate supply chain management performance. We made only slight adaptations to the questions in that operationalization, to make them specific for an organization as a whole rather than just the supply chain management function of the organization.

As operationalization of innovativeness, we used the one that was proposed by Moorman (1995). We added a fifth (control) question to the four that Moorman already proposes.

To operationalize the construct of organization size, we rely on the definition of organization size that is given by the European Commission (2003) and widely used in Europe. The European Commission classifies organizations as micro, small, medium and large, based on the number of employees, turnover and balance sheet total. Table 2 provides an overview of the definitions of each of these different classes.

We obtain the country in which the organization is based through the contact details that we used to contact respondents. Therefore, it is not necessary to explicitly add a question to the survey about the country in which the organization is based. We added a dummy variable that is 1 when the organization is German and 0 when it is Dutch.

The age of the organization is operationalized by the simple question “How long does your organization exist?”.

The survey was sent to quality managers and process managers from 2708 German and Dutch organizations that were on commercially available contact lists (esp.: Kompass and Werzumwem). Quality managers and process managers were targeted, because they can be assumed to have good knowledge of the concepts related to BPM in general and

Table 2 Organization size class definitions

Class	Headcount	Turnover	Balance sheet total
Medium	< 250	≤ € 50 million	≤ € 43 million
Small	< 50	≤ € 10 million	≤ € 10 million
Micro	< 10	≤ € 2 million	≤ € 2 million

BPM maturity specifically. Initial response was low at 56 responses after three weeks. After sending out a reminder, this was increased to 164. Finally, we randomly selected 200 organizations, which we called by phone to ask them to fill out the survey, which led to a total of 176 responses (6,5 %).

From the 176 received questionnaires, 120 were filled out till the last question. For many of the 56 partially completed questionnaires, a considerable percentage of more than 75 % of the data was missing, such that missing data imputation methods, like mean replacement would significantly bias the results. In such cases the recommendation is to include only complete cases in the analysis (Hair et al. 2010). Therefore, we continued the analysis with the 120 questionnaires that were filled out till the last question.

Concerning internal and external validity of the results, the first thing to notice is the relatively low response rate and high number of incompletely filled-out questionnaires. We attribute the relatively low response rate to the fact that we used an on-line survey, which typically has a lower response rate than a survey via phone or physical mail. In addition, we did not have an e-mail address of an individual for each contact, in which case we addressed the survey to ‘the quality manager’ and sent it to a general e-mail address. This may have caused the survey to get lost in some organizations. Although the response rate is low at 6.5 %, such a low response rate is not uncommon among Internet surveys nowadays. In a meta-analysis of Internet surveys (Shih and Fan 2009), 4 out of 35 surveys had the same or a lower response rate as our survey. In addition, more important than the response rate, is the question whether the opinion of the respondents is also representative for the non-respondents. A common way to test this, is to test the early response bias (Armstrong and Overton 1977). We tested the early response bias by comparing the demographics (organization size, age, country and industry) of early respondents to those of late respondents, using t-tests. We did not find any significant differences. Therefore, we conclude that there is no early response bias in our data. The relatively high number of incomplete questionnaires indicates a threat to the internal validity of the questionnaire; it is possible that the respondents did not understand the questionnaire and therefore did not complete it, which also raises doubts as to whether the respondents that did complete the questionnaire understood it. However, our expert panel encountered no serious problems with understanding the questionnaire. In addition, we sent the questionnaire to quality and process managers, who can be assumed to be familiar with the concepts that are addressed by the questionnaire. To check whether the questionnaires were indeed filled out by quality and process managers, we used the contact details of the respondents to obtain that information at a later moment, because we did not ask the respondents for that

information through the questionnaire. As not all respondents provided their contact details, we did not retrieve the functions of all respondents, but for a set of 30 respondents. Of these respondents, 6 were quality managers and 24 were managers in general, as shown in Table 3. While none of the respondents were ‘process manager’, they were all managers and can therefore be assumed to have a general understanding of business process management.

5 Results

Table 3 presents general descriptive statistics about the received responses, showing the size of the organization in terms of the number of employees, the age of the organization, the country in which the organization is based and the industry sector in which the organization operates. The table shows that the organizations that responded are slightly skewed towards smaller and older organizations

Table 3 General information about respondents

Size (employees)	1–10	26
	10–50	38
	50–250	30
	250–750	8
	750–	18
Age (years)	0–5	3
	5–10	12
	10–20	35
	20–40	29
	40–	41
Country	Germany	72
	Netherlands	48
Industry	Mechanics	43
	Electronics	17
	R&D	7
	Life Science	2
	Chemicals	11
	Construction	2
	Food processing	3
	Solar	7
	Automotive	12
	Services	9
	Unclassified	7
Function	Quality Manager	6
	Manager	24
	Process Manager	0

organizations. It also shows that the majority of the respondents were from the area of mechanics. Most importantly, it shows that the respondents were only from Germany and The Netherlands. These demographics indicate a possible threat to the external validity of the results, in particular with respect to the focus on two countries. Nonetheless, the results can be considered to be representative for these two countries and to a lesser extent for countries with similar organizational cultures (as measured using Hofstede's cultural dimensions (Hofstede 1980)), such as the United States.

Before we started the analysis, we recoded the answers to questions M11, M12 and M13, because these variables are negatively formulated: scoring high on these questions implies low BPM maturity, whereas for the other Mxx questions scoring high implies high BPM maturity. At level 1 we did for instance not ask “there are formal procedures for the execution of tasks in our organizations”, but rather the opposite: “formal procedures for the execution of processes do not exist in our organization”. We recoded the answers of M11, M12 and M13 as 6 - Mxx (1 becomes 5, 2 becomes 4, ...).

We used a partial least squares (PLS) approach to test our relations, using the tool SmartPLS (Ringle et al. 2005). PLS does not place strong requirements on the (normal) distribution of the answers (Chin 1998). However, it does place requirements on the sample size and the collinearity of the variables. We analyzed requirements on the sample size by doing a power analysis, using the G*Power tool. When requiring a medium effect size (of 0.15), an alpha error probability of 0.05, a power of 0.80 and 4 predictor variables, a sample size of 85 is required. Doing a post-hoc analysis with 120 respondents we obtain high statistical power at 0.93.

To test for collinearity, we use the Variance Inflation Factor (VIF) criterion. The collinearity tests show collinearity between the maturity levels. In particular, levels 2, 3, 4 and 5 had a VIF above 3 (at 3.25, 4.51, 4.03, and 3.10 respectively). To remove collinearity, we removed the constructs for levels 3 and 4, which had the highest VIF. Table 4 shows

the VIF and tolerance (1/VIF) for each of our constructs after we removed these constructs. It shows that none of the constructs have a VIF larger than 3. Therefore, we conclude that after removing the constructs for maturity level 3 and 4 from the analysis, there is no more collinearity. Unfortunately, this also means that we cannot study maturity level 3 and 4 any further.

For the remaining constructs, we did a confirmatory factor analysis, by first analyzing the factor loadings. Based on this analysis, we eliminated M11, P2, and P6 because their factor loadings were below the recommended threshold value of 0.7. After removing these indicators, all factor loadings exceeded this value, as shown in Table 5. All factor loadings are significant at $p < 0.001$. We determined the reliability of the constructs using AVE, composite reliability (CR), and Cronbach's alpha. As shown in Table 5, typical recommended threshold values of 0.5 for AVE, 0.7 for composite reliability, and 0.7 for Cronbach's alpha are exceeded by all constructs. Table 6 shows the descriptive statistics for the constructs. Appendix B also shows the cross-loadings of all variables. The appendix shows that there is substantial cross-loading of variables belonging to maturity levels 2, 3, 4 and 5 onto other factors. This is expected, as we also identified collinearity between these the related factors, for which reason we removed the factors for maturity levels 3 and 4 from our analysis.

To test for common method bias, we performed Harman's single factor test. The test showed a single factor that explained 24 % of the variance. This is well below the 50 % threshold, such that we can assume that common method bias is not a problem for our data.

Finally, the relations were tested using PLS, performing bootstrapping with resampling to 1000 cases. Figure 3 shows the results of the data analysis. For readability, only significant relations are shown in the figure. For completeness, Appendix C shows all path coefficients. We tested the model for nonlinear effects, moderators and mediators, but did not find any.

6 Discussion

Below, we discuss the results in detail. First discussing the relation between maturity and performance. Second, discussing the relation between innovativeness and maturity. Third, discussing the relations between the other properties - age, size and region - and maturity, and finally discussing additional relations that can be found in the data.

6.1 BPM maturity and performance

The figure shows a positive relation between BPM maturity level 2 and performance at the 0.05 level. This is in line

Table 4 Collinearity statistics

Construct	VIF	(1/VIF)
Maturity level 1	1.28	0.78
Maturity level 2	2.19	0.46
Maturity level 5	2.46	0.41
Age	1.22	0.82
Innovativeness	1.55	0.65
Performance	1.31	0.77
Region	1.09	0.92
Size	1.18	0.85

Table 5 Factor analysis of constructs

Construct	Variable	Factor loadings						AVE	CR	alpha
		Mat1	Mat2	Mat3	Per	Inn	Size			
Maturity level 1 (Mat1)	M12 recoded	0.95*						0.80	0.89	0.77
	M13 recoded	0.84*								
Maturity level 2 (Mat2)	M21		0.93*					0.82	0.93	0.89
	M22		0.90*							
	M23		0.88*							
Maturity level 5 (Mat5)	M51			0.79*				0.64	0.84	0.73
	M52			0.84*						
	M53			0.77*						
Performance (Per)	P1				0.75*			0.57	0.87	0.80
	P3				0.78*					
	P4				0.84*					
	P5				0.85*					
Innovativeness (Inn)	I1					0.76*		0.61	0.89	0.84
	I2					0.76*				
	I3					0.84*				
	I4					0.72*				
	I5					0.81*				
Size	S1						0.88*	0.83	0.93	0.94
	S2						0.85*			
	S3						0.99*			

* All loadings are significant at $p < 0.001$

with results that were presented in previous studies. However, this study shows a relation between BPM maturity and the performance of the organization as a whole, where previous studies show the relation between BPM maturity and the performance of the process that is improved. In this way, this paper presents a scientific contribution that has important practical implications as well, because these results provide convincing evidence that can be used to get the support of higher management to engage in a project to improve BPM maturity.

Interestingly there is no evidence that level 5 has a further positive impact. Due to problems with collinearity with respect to levels 3 and 4, nothing conclusive can be said for those levels. We conclude that there is evidence that it pays off to develop the BPM capability of an organization and to improve the level of maturity to at least level 2.

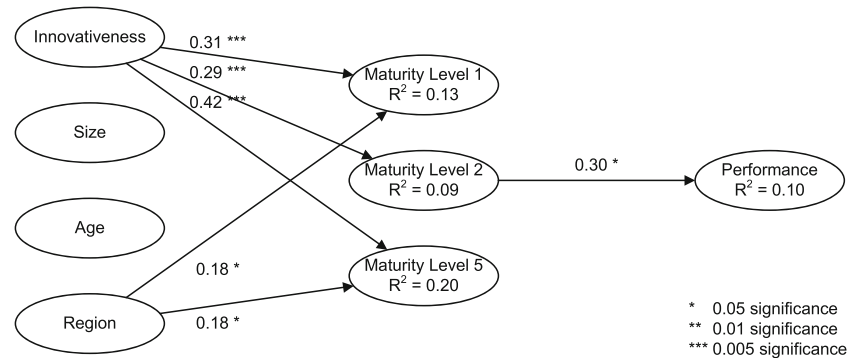
The figure shows that 10 % of the variance in performance can be explained by BPM maturity. The fact that this number is relatively low, can easily be explained, because clearly BPM maturity is not the only property to contribute

to organizational performance. Many other properties affect organizational performance, including properties that can be influenced, such as employee motivation, strategic decisions and marketing expenses, and properties that cannot be influenced, such as investment climate and other macroeconomic conditions. Indeed, if we relate innovativeness, size, age and region to performance, the R^2 already becomes 0.24.

Table 6 Descriptive statistics of constructs

Construct	Mean	Std. deviation	Median	Skewness	Kurtosis
Maturity level 1	4.0	1.1	4.0	−1.0	0.0
Maturity level 2	3.7	1.2	4.0	−0.7	−0.4
Maturity level 5	3.5	1.2	4.0	−0.6	−0.6
Performance	3.5	0.8	4.0	−0.3	0.0
Innovativeness	3.5	1.0	4.0	−0.4	−0.4
Size	2.5	1.1	2.0	0.4	−0.4
Age	3.8	1.1	4.0	−0.5	−0.7

Fig. 3 PLS results (only significant relations shown)



6.2 Innovativeness and BPM maturity

The figure shows positive relations between innovativeness and all levels of BPM maturity at the 0.005 level. This result is difficult to interpret, as it means that organizations that are more innovative are more at *all* levels of maturity. This can be explained, because, theoretically a level of maturity also includes all properties of the lower levels (Object Management Group 2008), i.e.: if an organization is at level 5 it does everything that it needs to do at level 5, but also everything that it needs to do at level 1, 2, 3 and 4. Therefore, we interpret the result as: organizations that are more innovative are more at maturity level 5.

This contradicts popular belief, as made explicit in literature, that more mature organizations have more rigid processes that hamper their ability to be innovative. Rather, it provides evidence to the contrary: there is a positive relation between an organization's innovativeness and its BPM maturity level. This relation finds support from Nelson (1991), who emphasizes the role of organizational and procedural capabilities in generating innovations. According to Nelson, organizations with a superior organization of internal processes are more successful in generating innovations and subsequently profiting from those innovations. Since, a higher BPM maturity level is directly linked to a superior organization of processes, this implies that having a higher maturity level means more innovation. Considering that this motivates a relation from BPM maturity to innovation (rather than from innovation to BPM maturity), it is also interesting to test this relation empirically. Looking at the empirical data, there indeed is a positive relation (of 0.37) at the 0.005 level between maturity level 5 and innovativeness, meaning that organizations that are at level 5 are more innovative. This finding is consistent with a similar analysis by Benner and Tushman (2002) who found that increased routinization associated with process management leads to increased innovation. It is also possible that BPM maturity is a precondition for successfully transforming ideas into profit, such that innovative organizations are successful by adopting

processes for introducing their innovations into the market. Innovative organizations that do not adopt processes for exploiting their innovations would then either be less successful in terms of performance, or even go bankrupt, in which case they would not appear in the dataset. Reasoning this way, there is a relation between innovation, via BPM maturity, with performance. When inspecting the data, we see that this is indeed the case. There is a positive relation between innovativeness and performance (of 0.37) at the 0.001 level. So, the data shows that innovativeness of an organization and BPM maturity influence each other positively, while both also have a positive effect on the performance of an organization as a whole. However, how exactly this mechanism of mutual positive influence works, remains as a topic for future study.

Another possible explanation for this unexpected result is that the relation is moderated by the type of innovation. In related work, Sethi and Iqbal (2008) show that while structured (stage-gate) processes for innovation have a positive effect on the performance of incremental innovations, but that they have a negative effect on the performance of radical innovations. This would explain why organizations that work on radical innovations strive to have a lower BPM maturity, while organizations that work on incremental innovations strive to have a higher BPM maturity.

6.3 Other properties and BPM maturity

Of the other properties - age, size and region - that we expect to influence BPM maturity, we only found a relation between region and level of maturity. Thus we can say that there is a relation between the country of origin of an organization and its BPM maturity level.

That there was no relation between organization size and BPM maturity was surprising to us, because larger organization have more resources to engage in process innovation projects and, in addition, larger organizations have a more pressing need to manage their processes more strictly. We did not find a satisfactory explanation for this result. Therefore, this remains as a topic for future study.

That we did not find a relation between age of an organization and BPM maturity is less surprising, because we made the explicit assumption that organizations that are older are also in the later stages of organizational development, while there is no guarantee that this is indeed the case. Consequently, a better claim to investigate would have been that organizations that are in the later stages of organizational development have higher levels of maturity. This remains as a topic for future work.

For each of the levels of maturity only 20 % or less of the variance can be explained by innovativeness, size, age and region. This is not surprising. We expect many other properties to influence the desire and ability of organizations to increase their BPM maturity and some of these properties, such as for example management style, are likely to have a stronger effect on BPM maturity than the properties that we studied. Indeed, rather than presenting an exhaustive collection of the properties that influence BPM maturity, it was the goal of this paper to investigate properties that can be used by an organization for benchmarking, such that it is possible for organizations to check what the maturity level is of organizations that are similar to them. For this purpose, the chosen properties represent an interesting subset.

6.4 Additional findings

We investigated the data for further interesting relations that can be used for further study. We found two interesting relations. First, we found a relation (of 0.34) at the 0.001 level between age and size of an organization, leading to the unsurprising result that organizations tend to grow as they exist longer. Second, we found a negative relation (of -0.20) at the 0.05 level between age and innovativeness, meaning that as organizations exist longer, they tend to become less innovative. Though more surprising, this finding is supported at least to an extent by a previous more in-depth study about the relation between innovativeness and age. This study finds that older organizations tend to create more innovative products, but in younger organizations innovative products have more impact on the turnover of the organization (Avermaete et al. 2003).

7 Conclusions

Through an empirical study this paper answered two research questions: how BPM maturity affects overall business performance; and which properties of an organization determine what the best level of BPM maturity for an organization is, in particular focusing on size, age, region and innovativeness of the organization. These research questions were answered through an survey that was conducted among 120 organizations in Germany and The Netherlands.

7.1 Findings

The study showed that there is a significant positive relation between BPM maturity level 2 and organizational performance, such that organizations that operate at that level of BPM maturity can be expected to perform better. This finding has important practical implications, because basically it means that it pays off to develop the BPM capability of an organization. Relations between BPM maturity levels 3 and 4 and BPM maturity could not be studied, due to problems with collinearity of the data. Therefore, cannot determine whether reaching those levels pays off further. No relation was found between BPM maturity level 5 and organizational performance, leading to doubts as to whether it pays off to reach that level.

The study investigated whether the region, age, size and innovativeness of an organization influence the level of maturity that that organization has. This result can be used as a benchmark, because for organizations of different origin, size, age and product type, a different BPM maturity level may be appropriate. With respect to these properties, we found a relation between innovativeness and maturity level, meaning that more innovative organizations typically have a higher maturity level. In addition, we found a relation between region and maturity level. There is no evidence to suggest that organizations have, or should have, a very different attitude towards BPM maturity, depending on their size or age. However, innovative organizations do appear to strive for higher BPM maturity.

Interestingly, this last finding contradicts popular belief that higher levels of maturity are associated with more rigid processes that hamper, rather than stimulate, innovativeness. We did not find strong evidence in the literature that this should be otherwise. However, looking in more detail at the results from this study, there is strong support for the observation that innovativeness and BPM maturity have a positive influence on each other and that both have a positive influence on organizational performance.

While the study focused on the innovativeness, region, size and age, we acknowledge that other properties influence BPM maturity as well. This is also illustrated by the R^2 in the analysis, which is far below 1.0, showing that the variance in BPM maturity is not completely explained by the properties that were chosen. Consequently, in future work, other properties that may influence maturity can be studied as well.

7.2 Limitations and future work

Although the number of organizations that responded to the survey was sufficiently large to perform a reliable statistical (PLS) analysis, the response rate was low at 6.5 %.

This may lead to a participation bias in the results. We attribute the relatively low response rate to the fact that we used an on-line survey, which typically has a lower response rate than a survey via phone or physical mail. This may have caused the survey to get lost in some organizations.

The study focuses on innovativeness, region, size and age as properties that determine the level of maturity that an organization should be on to achieve optimal performance. However, the maturity and performance of an organization are not exclusively determined by these properties. It was also not the aim of this study to exhaustively investigate the properties that influence maturity and performance. Rather, the study focused on commonly used properties (age, size and region) and controversial properties (innovativeness). Other properties can be studied in future work.

The performance of organizations was measured in a qualitative manner. An alternative would have been to measure performance using absolute measures, such as turnover and profit. However, this has the drawback that it makes it harder to compare organizations between sectors, because a turnover of 1 million in a sector where organizations are typically large may mean something completely different than the same turnover in a sector where organizations are typically small. In addition, it is not uncommon to determine organizational performance in a questionnaire by means of qualitative questions. The questions that we used were even derived from another study. To increase the practical impact of the study, a relation can be investigated between maturity level, financial performance and cost, to enable organizations to make a trade-off of whether or not to develop the BPM capability of an organization.

With respect to practical impact of the study, the question remains of how much the organization will benefit exactly from an increase in maturity level and whether the investment, that has to be made to increase the maturity level, pays off. Fourth, the measurement model that was developed for measuring BPM maturity was imperfect. In particular, it showed collinearity and cross loadings for maturity levels 3 and 4, which we had to remove for that reason. This made it impossible to conduct an analysis for maturity levels 3 and 4. In addition to that a measurement model for BPM maturity has merit in itself, as it can be used in future survey-based research into BPM maturity. However, because of the validity problems, the measurement instrument for BPM maturity that resulted from this research is unfortunately incomplete. Therefore, the measurement instrument for BPM maturity that was developed in this research should be refined, using a more thorough methodology like the one used by Recker and Rosemann (2010).

The study shows a relation between innovativeness, BPM maturity and performance. However, it remains unclear exactly how these three properties influence each other. There is evidence to suggest that innovativeness leads to higher performance, provided that there are processes in place to enable organizations to cash in on their innovativeness. This relation can be investigated in more depth in future work.

7.3 Implications

The implications of the findings of this paper are that organizations should strive to reach at least BPM maturity level 2. While this may seem like a trivial conclusion for researchers, many of the organizations that were surveyed showed evidence that they operated at level 1, in that they gave level 1 indicators high scores (agree or strongly agree). This is not surprising when we consider that reaching a higher level of maturity, even if it is only level 2, requires a lot of effort, of which the benefits may not always be obvious. However, this study shows that there is evidence that even for small companies this effort is likely to pay off.

The findings also imply that organizations that have a high innovativeness, should strive for high BPM maturity. The reason for this is likely to be, that highly innovative organization that do not have the processes in place to exploit their innovations, cannot obtain the performance increase that is promised by these innovations.

Open Access This article is distributed under the terms of the Creative Commons Attribution License which permits any use, distribution, and reproduction in any medium, provided the original author(s) and the source are credited.

Appendix A: Construct questions

Business process maturity

Questions are answered on a 1–5 Likert scale. Level 1 (Initial):

- M11** Formal procedures for the execution of processes do not exist in our organization
- M12** If procedures are defined, they are rarely followed
- M13** Everybody executes tasks in its own way, in other words: everybody has its own methods

Level 2 (Managed):

- M21** At the beginning of a project, we make agreements about which methods and technology we will use.

- M22** If we make agreements about work methods, they will be documented such that they can be executed in the same way at another time.
- M23** We use planning and management procedures to control our individual projects

Level 3 (Standardized):

- M31** Procedures are standardized for the whole organization
- M32** Work procedures and objectives are well documented in our whole organization
- M33** Processes are defined such that they will be in the same way by different work groups

Level 4 (Predictable):

- M41** Performance is managed statistically (e.g. by measuring KPIs) to understand performance and to control variation
- M42** Processes/tasks are managed in such a way that they meet agreed-upon performance and quality goals
- M43** If processes do not perform according to predefined standards, they are corrected to meet the quantitative goals

Level 5 (Innovating):

- M51** Our organization understands its critical business issues and areas of concern by using feedback from performance measurements
- M52** Our organization sets quantitative improvement goals to constantly reorganize processes when perceived necessary
- M53** We constantly pilot with new ideas and new technologies to improve our processes

Innovativeness

Questions are answered on a 1–5 Likert scale.

- I1** We are more innovative than our competitors in deciding what methods to use in achieving our targets and objectives
- I2** We are more innovative than our competitors in initiating new products and systems
- I3** We are more innovative than our competitors in developing new ways of achieving our targets and objectives
- I4** We are more innovative than our competitors in

initiating changes in the job contents and work methods of our staff

- I5** Do you consider your company as: a. very conservative, b. somewhat conservative, c. not conservative and not innovative, d. somewhat innovative, e. very innovative

Performance

- P1** How would you evaluate the overall performance of your organization over the previous year 2011?
Rate 1–5 (1 = very bad, 5 = very good)
- P2** Rate the overall performance of your business (unit) in the past year
Rate 1–5 (1 = very bad, 5 = very good)
- P3** Rate the overall performance of your business (unit) in the past year relative to your competitors
Rate 1–5 (1 = much worse, 5 = much better)
- P4** Rate the overall profitability compared to your competitors
Rate 1–5 (1 = much worse, 5 = much better)
- P5** Compared to your competitors, you met your overall goals
Rate 1–5 (1 = much worse, 5 = much better)
- P6** Compared to your competitors, the quality of the process output is
Rate 1–5 (1 = much worse, 5 = much better)

Size

- S1** How many employees does your organization count?
a. 1–10, b. 10–50, c. 50–250, d. 250–750, e. more than 750
- S2** How large was the turnover in the previous year (2011, in euro's)?
a. less than 2 million, b. 2–10 million, c. 10–50 million, d. more than 50 million
- S3** What definition fits your company best?
a. very small (micro), b. small, c. medium-sized, d. large, e. very large

Age

- A1** How long does your organization exist?

Appendix B: Variable Cross Loadings

Variable	Mat1	Mat2	Mat3	Mat4	Mat5	Per	Inn	Size	Age	Region
M11 recoded	0.41	0.25	0.34	0.38	0.32	−0.10	−0.01	0.16	−0.08	0.04
M12 recoded	0.95	0.30	0.33	0.39	0.38	0.19	0.31	0.06	0.11	0.11
M13 recoded	0.84	0.31	0.28	0.36	0.34	0.09	0.13	0.02	0.08	0.16
M21	0.29	0.93	0.72	0.65	0.68	0.31	0.27	0.05	0.05	0.01
M22	0.30	0.90	0.72	0.58	0.57	0.23	0.18	−0.11	0.01	0.01
M23	0.32	0.88	0.71	0.68	0.65	0.19	0.26	0.06	0.02	0.03
M31	0.30	0.68	0.88	0.66	0.64	0.10	0.23	0.02	0.07	−0.15
M32	0.35	0.73	0.92	0.80	0.66	0.19	0.32	0.10	0.10	0.01
M33	0.26	0.70	0.88	0.70	0.65	0.20	0.27	0.09	−0.02	−0.06
M41	0.32	0.65	0.73	0.91	0.68	0.15	0.30	0.30	0.06	−0.01
M42	0.39	0.60	0.72	0.92	0.69	0.02	0.31	0.04	−0.05	0.10
M43	0.43	0.64	0.75	0.85	0.68	0.15	0.21	0.02	0.05	0.13
M51	0.36	0.69	0.74	0.80	0.79	0.07	0.15	0.07	0.08	0.23
M52	0.36	0.57	0.63	0.75	0.84	0.12	0.30	0.14	0.05	0.10
M53	0.27	0.49	0.45	0.37	0.77	0.19	0.40	0.02	0.00	−0.01
P1	0.15	0.27	0.17	0.07	0.10	0.75	0.27	0.05	0.02	−0.08
P2	0.05	−0.02	0.02	0.03	0.08	0.40	0.19	−0.07	0.08	−0.05
P3	0.05	0.11	0.04	−0.01	−0.01	0.78	0.30	0.25	0.11	−0.15
P4	0.11	0.19	0.17	0.10	0.10	0.84	0.26	0.09	0.20	−0.01
P5	0.13	0.25	0.21	0.13	0.13	0.85	0.35	0.08	0.06	−0.06
P6	0.22	0.18	0.13	0.15	0.20	0.52	0.27	−0.16	−0.06	0.19
I1	0.06	0.19	0.18	0.10	0.30	0.27	0.76	−0.04	−0.22	−0.11
I2	0.14	0.12	0.15	0.08	0.15	0.32	0.76	0.00	−0.14	−0.18
I3	0.29	0.13	0.22	0.22	0.21	0.34	0.84	−0.12	−0.14	−0.12
I4	0.28	0.23	0.32	0.39	0.34	0.22	0.72	−0.12	−0.01	−0.05
I5	0.20	0.31	0.28	0.29	0.38	0.36	0.81	−0.02	−0.24	−0.07
S1	0.08	−0.03	0.00	0.12	0.01	0.07	−0.10	0.88	0.32	0.01
S2	0.05	−0.05	0.04	0.11	0.02	0.15	−0.07	0.85	0.33	−0.01
S3	0.04	0.05	0.13	0.18	0.15	0.07	−0.08	0.99	0.31	0.11
A1	0.11	0.03	0.06	0.02	0.04	0.09	−0.19	0.34	1.00	0.05
R	0.14	0.02	−0.07	0.07	0.11	−0.04	−0.12	−0.06	0.05	1.00

All cross loadings (in boldface) are significant at $p < 0.001$

Appendix C: PLS Path Coefficients

Path	Coefficient (Significance)
Age → Maturity Level 1	0.15
Age → Maturity Level 2	0.07
Age → Maturity Level 5	0.07
Innovativeness → Maturity Level 1	0.31 ***
Innovativeness → Maturity Level 2	0.29 ***
Innovativeness → Maturity Level 5	0.42 ***
Maturity Level 1 → Performance	0.03
Maturity Level 2 → Performance	0.30 *
Maturity Level 5 → Performance	−0.25
Region → Maturity Level 1	0.18 *
Region → Maturity Level 2	0.05
Region → Maturity Level 5	0.18 *
Size → Maturity Level 1	0.04
Size → Maturity Level 2	0.04
Size → Maturity Level 5	0.15

* 0.05 significance

** 0.01 significance

*** 0.005 significance

References

- Adler, P., McGarry, F., Irion-Talbot, W., & Binney, D. (2005). Enabling process discipline: lessons from the journey to CMM Level 5. *MISQ Executive*, 4(1), 215–227.
- Ahmed, F., & Capretz, L.F. (2011). A business maturity model of software product line engineering. *Information Systems Frontiers*, 13, 543–560.
- Ali, S., & Green, P. (2012). Effective information technology (IT) governance mechanisms: An IT outsourcing perspective. *Information Systems Frontiers*, 14, 179–193.
- Andersen, K.V., & Henriksen, H.Z. (2006). E-government maturity models: Extension of the Layne and Lee model. *Government Information Quarterly*, 23(2), 236–248.
- Andoh-Baidoo, F.K., Osei-Bryson, K.-M., & Amoako-Gyampah, K. (2012). Effects of firm and IT characteristics on the value of e-commerce initiatives: An inductive theoretical framework. *Information Systems Frontiers*, 14, 237–259.
- Antoniol, G., Gradara, S., & Venturi, G. (2004). Methodological issues in a CMM Level 4 implementation. *Software Process: Improvement and Practice*, 9(1), 33–50.
- Armstrong, J.S., & Overton, T.S. (1977). Estimating nonresponse bias in mail surveys. *Journal of Marketing Research*, 14, 396–402.
- Avermaete, T., Viaene, J., Morgan, E.J., & Crawford, N. (2003). Determinants of innovation in small food firms. *European Journal of Innovation Management*, 6(1), 8–17.
- Batenburg, R., & Versendaal, J. (2008). Maturity matters: Performance determinants of the procurement business function. In *Proceedings of the 16th european conference on information systems* (Vol. 1 pp. 563–574). Ireland: Galway.
- Becker, J., Knackstedt, R., & Pöppelbuß, J. (2009). Developing maturity models for it management. *Business & Information Systems Engineering*, 1(3), 213–222.
- Benner, M., & Tushman, M. (2002). Process management and technological innovation: a longitudinal study of the photography and paint industries. *Administrative Science Quarterly*, 47, 676–706.
- Bowers, P. (2002). The F/A-18 advanced weapons lab successfully delivers a \$ 120-million software block upgrade. *CrossTalk*, 15(1), 10–11.
- Chin, W. (1998). The partial least squares approach to structural equation modeling. In *Modern methods for business research* (pp. 295–336). New Jersey: Lawrence Erlbaum Associates.
- Cho, H.J., & Pucik, V. (2005). Relationship between innovativeness, quality, growth, profitability, and market value. *Strategic Management Journal*, 26(6), 555–575.
- CMMI Institute (2011). CMMI Version 1.3 Information Center. Retrieved 23 July 2013 from: <http://cmmiinstitute.com/>.
- Cooper, R.G. (1990). Stage-gate system: a new tool for managing new products. *Business Horizons*, 44–54.
- Crosby, P. (1979). *Quality is free*. New York: McGraw-Hill.
- Davenport, T. (1993). *Process innovation: reengineering work through information technology*. Boston: Harvard Business School Press.
- De Bruin, T., Rosemann, M., Freeze, R., & Kulkarni, U. (2005a). Understanding the main phases of developing a maturity assessment model. In *Australasian Conference on Information Systems* (pp. 8–19). Australasian chapter of the association for information systems.
- De Bruin, T., & Rosemann, M. (2005b). Towards a business process management maturity model. In *Proceedings of the 13th european conference on information systems*. Germany: Regensburg.
- De Bruin, T., & Rosemann, M. (2010). Using the Delphi technique to identify BPM capability areas. In *Australasian Conference on Information Systems* (pp. 642–653). Australasian chapter of the association for information systems.
- Deephhouse, C., Goldenson, D., Kellner, M., & Mukhopahyay, T. (1995). The effects of software processes on meeting targets and quality. In *Proceedings of the 28th annual Hawaii international conference on system sciences* (pp. 710–719). Maui: Hawaii, USA.
- Diaz, M., & King, J. (2002). How CMM impacts quality, productivity, rework, and the bottom line. *CrossTalk*, 15(3), 9–14.
- Diaz, M., & Sligo, J. (1997). How software process improvement helped Motorola. *IEEE Software*, 14(5), 75–81.
- Dion, R. (1992). Elements of a process-improvement program. *Software*, IEEE, 9(4), 83–85.
- Dion, R. (1993). Process improvement and the corporate balance sheet. *Software*, IEEE, 10(4), 28–35.
- Dooley, K., Subra, A., & Anderson, J. (2001). Maturity and its impact on new product development project performance. *Research in Engineering Design*, 13(1), 23–29.
- Dumas, M., La Rosa, M., Mendling, J., & Reijers, H.A. (2013). *Fundamentals of business process management*. Berlin-Heidelberg: Springer.
- European Commission (2003). Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises. Tech. rep., European Commission Document Number C(2003) 1422.
- Filbeck, G., Swinarski, M., & Zhao, X. (2013). Shareholder reaction to firm investments in the capability maturity model: an event study. *European Journal of Information Systems*, 22(2), 170–190.
- Gibson, D.L., Goldenson, D.R., & Kost, K. (2006). Performance Results of CMMI -Based Process Improvement. Tech. Rep. August, Software Engineering Institute.
- Goldenson, D.R., El Emam, K., Herbsleb, J., & Deephouse, C. (1999). Empirical Studies of Software Process Assessment Methods. In *Elements of software process assessment and improvement* (Vol. 47). Los Alamitos, CA: IEEE Computer Society Press.

- Hair, J., Black, W., Babin, B., & Anderson, R. (2010). *Multivariate data analysis; a global perspective*. London: Pearson.
- Hammer, M. (2007). The Process Audit. *Harvard business review*.
- Harter, D.E., Krishnan, M.S., & Slaughter, S.A. (2000). Effects of process maturity on quality, cycle time, and effort in software product development. *Management Science*, 46(4), 451–466.
- Herbsleb, J., & Goldenson, D. (1996). A systematic survey of CMM experience and results. In *Proceedings of IEEE 18th International Conference on Software Engineering* (pp. 323–330). Los Alamitos: IEEE Computer Society Press.
- Herbsleb, J., & Zubrow, D. (1997). Software Quality and the capability maturity model. *Communications of the ACM*, 40(6), 30–40.
- Hofmann, P., & Reiner, G. (2006). Drivers for improving supply chain performance: an empirical study. *International Journal of Integrated Supply Management*, 2(3), 214–230.
- Hofstede, G. (1980). *Culture's consequences: International differences in work-related values*. Thousand Oaks: Sage Publications.
- Humphrey, W.S., Snyder, T.R., & Willis, R.R. (1991). Software process improvement at Hughes aircraft. *IEEE Software*, 8(4), 11–23.
- Ibbs, C.W., & Kwak, Y.H. (2000). Assessing project management maturity. *Project Management Journal*, 31, 32–4.
- Jiang, J.J., Klein, G., Hwang, H.G., Huang, J., & Hung, S.Y. (2004). An exploration of the relationship between software development process maturity and project performance. *Information & Management*, 41(3), 279–288.
- Jung, H.w., & Goldenson, D.R. (2003). CMM-Based Process Improvement and Schedule Deviation in Software Maintenance. Tech. Rep. July. Software Engineering Institute.
- Kimberly, J. (1979). Issues in the creation of organizations: Initiation, innovation, and institutionalization. *Academy of Management Journal*, 22(3), 437–457.
- Krasner, H. (2001). Accumulating the body of evidence for the payoff of software process improvement. In *Software process improvement* (pp. 519–539). Los Alamitos: IEEE Computer Society Press.
- Krishnan, M., & Kellner, M. (1999). Measuring process consistency: implications for reducing software defects. *IEEE Transactions on Software Engineering*, 25(6), 800–815.
- Krishnan, M., & Kriebel, C. (2000). An empirical analysis of productivity and quality in software products. *Management Science*, 46(6), 745–759.
- Lockamy III, A., & McCormack, K. (2004). The development of a supply chain management process maturity model using the concepts of business process orientation. *Supply Chain Management: An International Journal*, 9(4), 272–278.
- McCormack, K. (2001). Business process orientation: Do you have it? *Quality Progress*, 34(1), 51–58.
- McCormack, K., Willems, J., Bergh, J.V.D., Deschoolmeester, D., Willaert, P., Štemberger, M.I., Škrinjar, R., Trkman, P., Ladeira, M.B., Oliveira, M.P.V.D., Vuksic, V.B., & Vlahovic, N. (2009). A global investigation of key turning points in business process maturity. *Business Process Management Journal*, 15(5), 792–815.
- McGarry, F., & Decker, B. (2002). Attaining level 5 in CMM process maturity. *IEEE Software*, 19(6), 87–96.
- Mettler, T., Rohner, P., & Winter, R. (2010). Towards a classification of maturity models in information systems. In A. D'Atri, M. De Marco, A.M. Braccini, & F. Cabiddu (Eds.) *Management of the interconnected world SE - 39* (pp. 333–340). Physica-Verlag HD.
- Michlmayr, M. (2005). Software process maturity and the success of free software projects. In *Proceedings of the 2005 conference on software engineering: evolution and emerging technologies* (pp. 3–14). Amsterdam, The Netherlands: IOS Press.
- Miller, D., & Friesen, P.H. (1984). A longitudinal study of the corporate life cycle. *Management Science*, 30(10), 1161–1183.
- Mintzberg, H. (1979). *The structuring of organizations*. New Jersey: Prentice-Hall Inc.
- Moorman, C. (1995). Organizational market information processes: cultural antecedents and new product outcomes. *Journal of Marketing Research*, 32(3), 318–335.
- Nawrocki, J.R., Walter, B., & Wojciechowski, A. (2002). Comparison of CMM Level 2 and eXtreme Programming. In *ECSQ 2002, LNCS* (pp. 288–297). New York: Springer.
- Nelson, R. (1991). Why do firms differ, and how does it matter? *Strategic Management Journal*, 12, 61–74.
- Niehaves, B., Poepelbuss, J., Plattfaut, R., & Becker, J. (2014). BPM capability development - a matter of contingencies. *Business Process Management Journal*, 20(1), 90–106.
- Nolan, R. (1973). Managing the crisis in data processing. *Harvard Business Review*, 57(2), 115–126.
- Object Management Group (2008). Business Process Maturity Model (BPMM). Tech. Rep. June. Object Management Group.
- Oldham, L.G., Putman, D.B., Peterson, M., Rudd, B., & Tjoland, K. (1999). Benefits realized from climbing the CMM ladder. *CrossTalk*, 12(5), 7–10.
- Paulk, M. (1993). *Capability maturity model for software*. New York: Wiley.
- Pitterman, B. (2000). Telcordia technologies: the journey to high maturity. *IEEE Software*, 17(4), 89–96.
- Porter, R.E., & Detoma, D.A. (1999). A multi-site software process framework. *CrossTalk*, 12(10), 19–22.
- Quinn, R., & Cameron, K. (1983). Organizational life cycle and shifting criteria of effectiveness: some preliminary evidence. *Management Science*, 29(1), 33–51.
- Raschke, R.L., & Ingraham, L.R. (2010). Business process maturity's effect on performance. In *AMCIS 2010 Proceedings* (p. Paper 402).
- Recker, J., & Rosemann, M. (2010). A measurement instrument for process modeling research: development, test and procedural model. *Scandinavian Journal of Information Systems*, 22(2), 3–30.
- Ringle, C.M., Wende, S., & Will, A. (2005). SmartPLS 2.0 (beta). www.smartpls.de.
- Rohloff, M. (2009). Case study and maturity model for business process management implementation. In *International conference on BPM* (pp. 128–142). Berlin-Heidelberg: Springer.
- Rooijmans, J., Aerts, H., & Genuchten, M.V. (1996). Software quality in consumer electronics products. *IEEE Software*, 13(1), 55–64.
- Scott, B. (1971). Stages of Corporate Development. Tech. rep., Working Paper. Harvard Business School 14-371-294; BP993.
- Sethi, R., & Iqbal, Z. (2008). Stage-gate controls. *Learning Failure, and Adverse Effect on Novel New Products*, 72(1), 118–134.
- Shih, T.H., & Fan, X. (2009). Comparing response rates in e-mail and paper surveys: A meta-analysis. *Educational Research Review*, 4(1), 26–40.
- Škrinjar, R., Bosilj-Vukšić, V., & Indihar-Štemberger, M. (2008). The impact of business process orientation on financial and non-financial performance. *Business Process Management Journal*, 14(5), 738–754.
- Software Engineering Institute (2010). CMMI for Acquisition. Tech. Rep. November, Software Engineering Institute.
- Software Engineering Institute (2010). CMMI for Services. Tech. Rep. November, Software Engineering Institute.
- Solingen, R.V. (2004). Measuring the ROI of software process improvement. *IEEE Software*, 21(3), 32–38.
- Straub, D.W., Boudreau, M.-C., & Gefen, D. (2004). Validation guidelines for is positivist research. *Communications of the Association for Information Systems*, 13(24), 380–427.
- Trienekens, J.J.M., Kusters, R., Kriek, D., & Siemons, P. (2008). Entropy based software processes improvement. *Software Quality Journal*, 17(3), 231–243.

- Urioste, M. (2004). Tomahawk cruise missile control : providing the right tools to the Warfighter. *CrossTalk*, 17(9), 8–10.
- Van Looy, A., De Backer, M., Poels, G., & Snoeck, M. (2013). Choosing the right business process maturity model. *Information & Management*, 50(7), 466–488.
- Wangenheim, C.G.V., Carlo, J.H.R., Salviano, C.F., & Wangenheim, A.V. (2010). Systematic literature review of software process capability / maturity models. In *International conference on software process improvement and capability determination*.
- Wendler, R. (2012). The maturity of maturity model research: a systematic mapping study. *Information and Software Technology*, 54(12), 1317–1339.
- Wohlwend, H., & Rosenbaum, S. (1993). Software improvements in an international company. In *Proceedings of 1993 15th international conference on software engineering* (pp. 212–220). Baltimore, MD: IEEE Computer Society Press.

Remco Dijkman is associate professor in Information Systems at Eindhoven University of Technology. His research interests include Business Process Management and Service Oriented Computing. Remco has published over 70 papers in scientific journals, conferences and workshops. His work appeared in Information Systems, Computers in Industry and Transactions on Software Engineering and Methodology. He has worked as a researcher in a number of national and international research projects, including the SPICE European project; and the SHOPPS, NLI, ArCo, and A-MUSE national projects. Currently, Remco is project leader of the DAIPEX Dinalog project and the GET Service European project.

Sander Vincent Lammers holds a Bachelor and Master of Science degree in Industrial Engineering from Eindhoven University of Technology and a Master in Economics from Tilburg University. He currently works at Kempen & Co, a Dutch Merchant Bank providing financial services in asset management, securities broking and corporate finance.

Ad (“Addy”) de Jong is a Professor of Marketing at Aston Business School, Aston University, Birmingham, UK. His research focuses on how sales and service employees can improve their competences for selling and serving innovative products and services. Ad de Jong has published in several academic journals in management and marketing, including: Management Science, the Journal of Marketing, the Journal of Management, the Journal of Retailing, the International Journal of Research in Marketing, the Journal of the Academy of Marketing Science the Journal of Service Research, the Journal of Management Studies, the Journal of Product Innovation Management, Decision Sciences, Marketing Letters, and the Journal of Service Research. Ad de Jong recently served as a co-editor of a special issue on Sales & Innovation for the Journal of Product Innovation Management. He is also a member of editorial board of the Journal of Service Research.

Business Process Re-Engineering in Public Administration of Kingdom of Saudi Arabia

Arwa S. Bokhari and Rizwan J. Qureshi

Faculty of Computing and Information Technology, King Abdulaziz University, Saudi Arabia
E-mail: arwabokhari@hotmail.com, rmuhammd@kau.edu.sa

Abstract—The government of Saudi Arabia is in the phase of transformation. Business process reengineering (BPR) can play a vital role in assessing this conversion. BPR methodologies provide ways to optimize the use of resources while maintaining high-quality services. The aim of this paper is to investigate the introduction of BPR in Saudi Arabia public sector. A framework is proposed to transform change using a knowledge based. The proposed solution is validated through survey. The results of the survey show that Saudi Governmental Agencies acquire the power to implement the BPR successfully especially if it is implemented with knowledge management and the BPR movement started at small scale.

Index Terms—BPR, Saudi public administration, t-government, knowledge management.

I. INTRODUCTION

Public administration in Saudi Arabia dates back many decades. It was built in a hierarchal fashion and central management. The public services they offer are highly bureaucratic. Bureaucracy affects the quality of services in terms of the delay and performance. Public sector organizations especially those in developing countries are having enhancement problems due to bureaucracy, lack of duty focuses, and depravity [1]. The Saudi government has started using the e-government to provide better quality of services. However, the operations in the e-government are merely a reflection of the actual bureaucratic operations. Therefore, government agencies should radically re-engineer their processes to realize a marked improvement in their performance. Business process re-engineering (BPR) provides an excellent opportunity to improve process performance, provide better customer service and preferable administration of resources[2]. BPR principles are valuable in transforming government operations; that has made BPR profoundly related to transformational e-Government implementation. Transformational government t-government is seen as the next phase of e-government, and [2]. Transformational e-government is expected to provide a citizen-centric relationship with a reactive government which will increase citizen satisfaction and trust in the government [3].

BPR was defined as “the fundamental rethink and radical redesign of business processes to generate

dramatic improvements in critical performance measures such as cost, quality, service and speed”[4]. It has frequently been used since it was firstly introduced in the United States in the 1990s. The BPR activity requires identifying and analyzing the current business processes and then redesigning these processes in a more efficient manner. It might also require organizational restructuring [5]. BPR success has proven to be difficult in the private sector, and even more difficult in the public sector [6]. It depends on the BPR techniques and tools [7]. BPR movement is driven by visions, customer satisfaction, expenses cuts and efficient use of resources. BPR activities start at the bottom of the organization, from the clients and workers to the top management [4]. BPR ultimate goal is to optimize the entire productivity of the organization. Developing countries are taking the initiative to implement BPR in public administration. UAE started the BPR in its public sector, and it results in better performance, cost saving, and customer satisfaction [8].

This paper investigates the introduction of BPR integrated with knowledge management to the public administration in the Kingdom of Saudi Arabia. The rest of the paper is organized as follows. Section II, the related work is discussed. Section III, the problem statement is stated. Section IV, the proposed solution is illustrated. Section V, the proposed solution is validated to conclude the results.

II. RELATED WORK

Weerakkody et al. [2] aimed to utilize the findings of Business process Reengineering (BPR) movement in e-government to apply them in the public sector. Two case studies were conducted to evaluate the authenticity of the findings. One of the case studies was conducted in a large scale government department of London and the second case study was arranged in a large municipality of Netherland. The results of case studies showed that t-Government can benefit from BPR movement. While considering some different aspects such as bottom-up participation, plans for radical changes and incremental progress. The findings of Weerakkody et al. [2] research can be used to start the development of BPR approach for t-Government. However, the research investigated only two case studies, and the results cannot be generalized.

In [9], a BPR case study was conducted in a the way which the civil service agency used to implement the

human resource information management system at the personal board of Jefferson County Alabama. Implementation of the human resource information management system through BPR was considered a critical way to perform the required change. The BPR process gone through the following five phases: scoping and planning, visioning, design, construction and implementation. The study provided valuable lessons on how to guarantee a smoother implementation of the human resource information management system to public sector organizations. Nevertheless, the study did not give any performance or quality measurements.

Cheng et al. [10] combined knowledge management and business process reengineering to develop a knowledge management oriented BPR. The model analyzed the knowledge that was obtained from the process daily operational routine and used it as a knowledge base to the business process reengineering. The model was performed on a real process in a construction firm. There was an improvement in the process performance and the service efficiency in the firm after the model was implemented. The model did not provide any insights on how it would be carried out in public sector. Moreover, the model needed to be investigated through practical applications.

A model was proposed for re-engineering the election process to the union general elections in India [11]. The proposed system could have a positive impact on the governmental sector as well as on the citizens. However, the samples were collected from the registered candidate, and the study was based on a non-experimental survey.

Rinaldi et al. [12] proposed a public administration BPR approach in Italy. A simulation model was added to the BPR approach, which was used for performance evaluation. There was an improvement in the levels of efficiency in the public administration, according to the findings of the study. However, the results could not be generalized as the study was conducted only to a specific public administration.

Another approach was aligning enterprise resource planning with BPR [13]. The integrated approach provided a significant improvement in terms of profitability and sustainability. The proposed approach was validated through an Indian Capital Goods industry. The case study showed that synergizing BPR with enterprise resource planning during the planning and execution phase was tough. However, synergizing BPR with enterprise resource planning with the objectives of business transformation was the best way to do. Still, there were not much work done in that approach, and further investigation should be done to validate the approach.

An attempt to re-engineer the open government was proposed [14]. The research started by breaking down the three top pillars of the open government into its core component. Then the open government was reengineered into these four main dimensions: transparency, accountability, collaboration, and empowerment. The proposed model was validated through an empirical test. The results of the test indicated that these dimensions

were suitable, and the regression analysis predicted that the Jordanian government is willing to use e-government website by a coefficient of determination equals to 0.409 which is acceptable. However, the sampling process was not entirely random, and the validating methodology was based on a survey and statistical inferences.

Fragoso [15] presented a study on the findings from the implementation of BPR in two Mexican ports. The study confirmed that BPR is a good technique to be used in improving the management of public agencies. The study also showed that BPR implementation will vary from one organization and the other and cannot be transformed. However, the study did not provide risk analysis or failure mitigation strategies.

A case study of BPR in the public sector was presented for the California welfare agency [16]. The findings of the study were that the reengineering process required intensive work from the personals and reduced autonomy. Moreover, the customers experienced decreasing in service quality. The negative study outcomes were because public sector is under budgetary pressure. A limitation of the study was identified that there were no interviews with the managers to understand how they acted in terms of prioritizing, quantitative, efficiency, and service quality.

Dubey et al. [17] developed a conceptual model by identifying the critical success factors for the implementation of BPR in government manufacturing unit. The research studied the interrelations among critical success factors to BPRs. The result of the empirical analysis showed that there was a positive impact of the critical success factors to the overall performance of the government units. There was inconsistency in the critical success factors implementation due to the obstacles in which the government agency run. The study did not use any quantities analysis methods.

SAP methodology was applied to the local administration project in [18]. The introduced methodology required implementing the SAP Business One to run all the operation of the local government before it was used and applied. This method allows adding or altering a new business process due to its flexibility. The approach did not define how it can be implemented to e-government.

An application of the RFID-enabled BPR was developed in [19] for a hospital in Singapore. The re-engineering conceptual models were developed and analyzed to minimize the risk of RFID implementation. The model was applied using ARENA simulation to a case study. The findings of the study were positives and showed improvement in the process flow. A limitation of the study was that the assumptions about the way the process was run in the case study were slightly different from the actual way it was run.

Public Sector Undertakings was investigated in [20]. The study identified 12 factors that may affect the performance of the Public Sector Undertakings. The research was done by analyzing the performance of the case study for over 12 years and estimating the

performance improvement measurements. The estimated possible average performance improvement was found to be 57.55% of the 12 factors. Nevertheless, the research

result was estimated, and it needed to be measured after the implantation of the BPR for more realistic results.

Table 1. Summary of the related work

Paper Title	Limitation
Transformational change and business process reengineering (BPR): Lessons from the British and Dutch public sector [1].	The findings of the study cannot be generalized as the research only investigates two case studies.
Implementation of an HRIMS at the Personnel Board of Jefferson County, Alabama A Case Study in Process Reengineering [2].	The study did not provide any performance and quality measurements
KM-oriented business process reengineering for construction firms [3].	The model did not provide any insights on how it would be implemented in public sector.
Reengineering Government Process of Elections by Introducing Unemployed Ad Hoc Work Force Registered through Employment Exchanges in India [4].	The model was based on a non-experimental survey.
Improving the efficiency of public administrations through business process reengineering and simulation A case study [5].	The result of the study can't be generalized as the study was conducted only to a specific public administration.
Synergizing Business Process Reengineering with Enterprise Resource Planning System in Capital Goods Industry [6].	There were not much work done in that approach and further investigation should be done to validate the approach.
Reengineering the open government concept: An empirical support for a proposed model [7].	• The sampling process was not totally random. • The validating methodology was based on a survey and statistical inferences. • The concept of the open government was not fully investigated.
Business Process Reengineering in Government Agencies: Lessons from an Experience in Mexico [8].	The study did not provide risk analysis or failure mitigation strategies
Customer-driven management models for choiceless clientele? Business process reengineering in a California welfare agency [9].	The study is that there were no interviews with the managers to understand how they acted in terms of prioritizing quantitative efficiency and service quality.
Critical Success Factors in Implementing BPR in a Government Manufacturing Unit—An Empirical Study [10].	The study did not use any quantities analysis methods.
Local Governments-specific BPR mini-project with SAP applications [11].	The approach did not define how it can be applied to e-government.
RFID-enabled process reengineering of closed-loop supply chains in the healthcare industry of Singapore [12].	The assumptions of the way that process was run in the case study were slightly different than the actual way they were run.
Scope of Business Process Reengineering in Public Sector Undertakings [13].	The research results were estimated based on the analysis of the performance of the case study and it needed to be measured after the actual implantation of the BPR.
A Review of Success Factors and Challenges of Public Sector BPR Implementations [14].	The research did not cover all the existing literature. The research was of a qualitative nature as the classification used to construct success factors and the resulted challenges were based on the subjective judgment.
E-Governance in Developing World: Design of BPR Model for Makkah Municipality eServices [15].	The proposed system is not entirely automated as some process was done manually.

Jurisch et al. [21] studied the literature of BPR success in both the private and public sectors. Therefore, relevant success factors were identified. It was found that there were similarities between BPR success factors in both private and public sectors. The study specified the requirements and characteristics of the implantation of BPR in public sector. The research did not cover all the existing literature. Moreover, it was of a qualitative nature as the classification used to construct success factors, and the resulted challenges were based on the judgments of the authors.

A re-engineering of a legacy system was presented in [22]. A reengineered centralized system was implemented

by Makkah municipality's eLicencing services. The proposed model resulted in reducing the data redundancy and producing a normalized data model. Moreover, the importance of re-engineering of legacy systems is emphasized in developing countries. However, the proposed system was not entirely automated as some processes were done manually. Table 1 shows summery of the related work.

III. PROBLEM STATEMENT

Public administration in Saudi Arabia is merely traditional as it is hierarchal and functional. The public

services offered to the public in a highly bureaucratic fashion. The government of Saudi Arabia has adopted the e-government movement. However, e-government usually reflects the real government. It is more like using national web portals without changing the organizational operations or the back office processes. As a developing country, Kingdom of Saudi Arabia should move to the next phase of e-government which is the t-government. Saudi public agencies should take the initiative to perform a radical change and incremental improvement [2]. The aim of this research is to investigate how BPR can be utilized in Saudi public administration to improve citizen satisfaction, efficiency, accountability, quality of service and reduce waste of resources. This research would shed some light on these research questions which rose from the literature review.

- Would public agencies initiate the BPR efforts?
- Would using knowledge management oriented process reengineering have a positive impact on the implementation of BPR in public administration [10]?

IV. THE PROPOSED SOLUTION

The BPR movement is moved by clients and should be evaluated from a client point of view. Early BPR project had a high failure rate, as they were taking a radical approach. In order to succeed, BPR should be integrated with another aspect of management [2]. Knowledge management can be integrated with BPR in public and private sectors [10]. Knowledge management provides a knowledge base that would keep the BPR exercise to design vision, mission, and objectives of organizations.

A. Goal 1- Ascertain the willingness of public agencies to establish the BPR efforts

Public agencies are not profitability organizations and as government agencies, they are under budgetary pressures. Moreover, their clients are choiceless citizens who do not have another service provider [9]. There are a great resistant to change from both employees and management. Management also has limited jurisdiction than in private sector [23]. However, implementing BPR in public agencies can transform its hierarchical, bureaucratic model into customer-oriented process model [5].

B. Goal 2 - Introduction of BPR in public agencies

It was found that public sector organizations can improve their process performance if

- It has the necessary BPR resources and skills.
- It has employed BPR with sufficient depth and breadth.
- It has provided pre-BPR requirements set of skills, systems, and technologies.
- It has successfully mitigated the impact of BPR implementation problems [23].

C. Goal 3 - Implementing BPR integrated with knowledge management

In contrast to the private sector, public sector organizations are likely to be willing to share their experience and knowledge, as they are not competing, and they are all serving under the same central management [21]. Organizational processes vary based on organizational and geographical culture, which makes it even more necessary to incorporate knowledge management in the BPR [24].

The BPR implementation goes through two phases: Knowledge management phase and process re-engineering phase and they are overlapping.

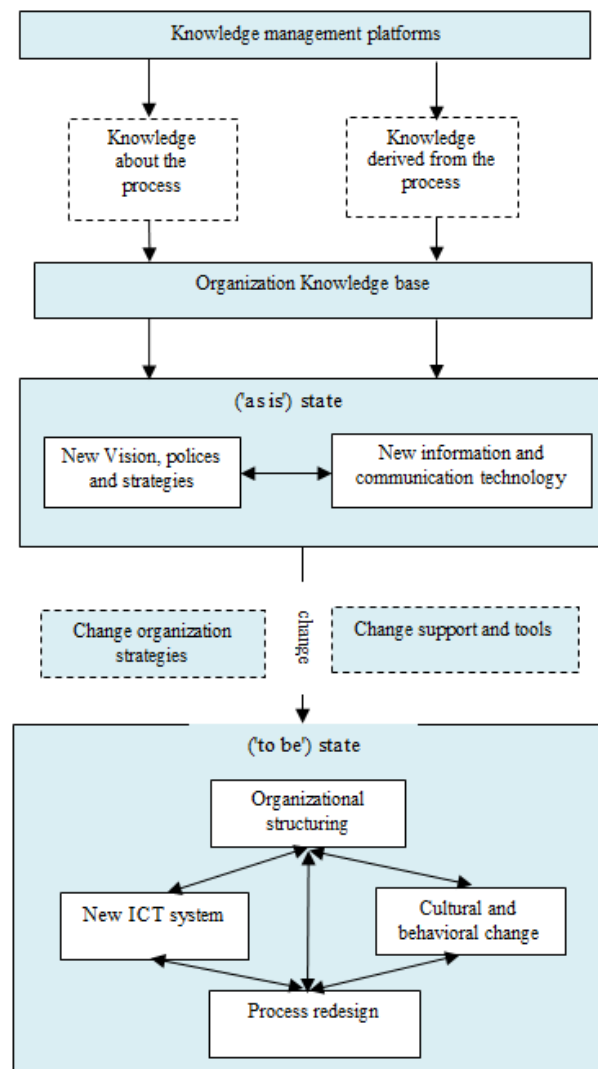


Fig.1. Knowledge based process transformational change.

Knowledge management is important to public agencies because of these features:

- *Globalization of business* governmental organizations is global-multisite.
- *Leaner organizations* governmental organization are limited resources and must make the best use of them.

- *Corporate amnesia* when an employee leaves the organization, his/her experience and knowledge will be available in the organization knowledge base [25].

Organization knowledge base provides better feedback and expertise related to business processes, which can be recalled by the organization decision makers [10]. Using knowledge management platform to collect and gather information, documentaries, and feedback from stakeholders, users and customers. Knowledge can also be collected from other organizations who successfully implemented BPR, in order to benefit from their experience [21]. Transformational change is driven by the new technologies and from visions, policies and strategies, which are derived from the knowledge base.

Process re-engineering means transforming the process from the current state (which is the state that needs improvement) to the new state (which is the reengineered state) [2]. These two states are called in BPR terminology 'as is' and 'to be' situations [26]. The re-engineered state must provide a breakthrough regarding performance and radical change in the organization.

V. VALIDATION

The proposed solution is validated through a public survey. The survey targeted subjects from three categories. The first category is computer sciences and information technology professionals. The second category is governmental employees. The third category is Saudi citizens. The numbers of participants from each category were 43, 36, 36 respectively. Each goal was evaluated using ten questions.

Table 2. Likert scale used to evaluate the questionnaire

Very High	High	Nominal	low	Very low
1	2	3	4	5

A. Cumulative Analysis of Goal 1

Table 3 shows that 40.90% of the total participants are not satisfied with the level of services they are getting from the Saudi public sector, and 34.20% of the total participants are facing a services delay due to bureaucracy or restrict regulations. Moreover, 39.1% of the total participants think that Saudi public agencies need to re-engineer the way they run their process. Furthermore, 43.5% agree on that implementing BPR in Saudi public agencies will improve the level of services and optimize the use of resources and 39.1% think that implementing BPR in Saudi public agencies will reduce the bureaucracy. However, only 25.2% believe that Saudi public agencies will establish the BPR efforts and consider re-engineering processes. This is expected that public organizations are less likely to initiate the BPR efforts. On the other hand, 70.5% agree on that Saudi public agencies have the budgetary power to implement

BPR, and 36.5% think that Saudi decision makers acquire the knowledge about the importance of implementing BPR in public sector. Whereas, only 28.7% believe that Saudi public agencies will apply the BPR. On average 51.9% agree on the need to implement the BPR in the Saudi public agencies and that the Saudi public agencies are willing to establish the BPR. Fig. 2 illustrates a cumulative statistical analysis of goal 1, where each category is represented separately.

Table 3. Cumulative statistical analysis of goal 1

Q. No.	Very High	High	Nominal	low	Very low
1	17.40%	40.90%	28.70%	12.20%	0.90%
2	15.80%	34.20%	18.40%	26.30%	5.30%
3	39.10%	32.20%	14.80%	9.60%	4.30%
4	38.30%	43.50%	11.30%	5.20%	1.70%
5	24.30%	39.10%	20.90%	14.80%	0.90%
6	6.10%	19.10%	31.30%	31.30%	12.20%
7	4.30%	20.90%	20%	36.50%	18.30%
8	32.20%	38.30%	17.40%	11.30%	0.90%
9	13%	23.50%	27.80%	21.70%	13.90%
10	9.60%	19.10%	33.90%	30.40%	7%
Average	20.01%	31.08%	22.45%	19.93%	6.54%

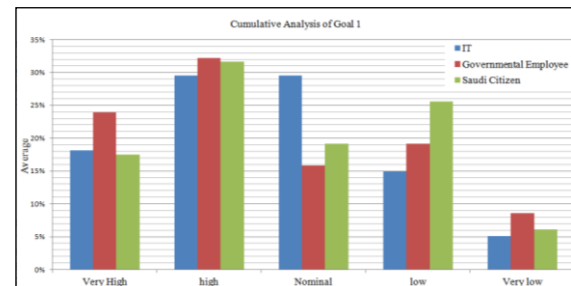


Fig.2. Cumulative statistical analysis of goal 1.

B. Cumulative Analysis of Goal 2

Table 4 shows that 64.1% of the participants are agreed that Saudi governmental agencies acquire the funds of BPR-relevant resources. Whereas, only 25.4% of the participants think that Saudi developers have the BPR needed skills.

However, 37.8% of the respondents are agreed that Saudi governmental agencies have the power to produce a post-BPR complementary set of skills, systems, and technologies and 29.8% of the participants believe that there is a risk of failure when BPR is introduced to the Saudi public sector. Furthermore, 42.5% believe that BPR implementation failure will be because of the lack of BPR resources and skills. However, 52.7% agree on that Saudi public agencies have the ability to successfully mitigate the effects of BPR implementation problems. 81.4% of the total participants agree on that the BPR implementation should be done step by step. In contrast with 41.2% who think that the BPR implementation should be introduced as a radical change in every public

sector. Moreover, 34.2% believe that BPR will be engaged in the public sector with sufficient depth and breadth. Moreover, 35.1% think that Saudi public agencies will have a successful introduction of BPR. 43.72% of the participants agree on that the Saudi public agencies acquire the funds of BPR-relevant resources and skills. Moreover, BPR will be engaged in the sufficient depth and breadth, and Saudi public agencies can produce a post-BPR complementary set of skills, systems, and technologies, and they will successfully mitigate the effects of BPR implementation problems. Fig. 3 illustrates a cumulative statistical analysis of goal 2, where each category is represented separately.

Table 4. Cumulative statistical analysis of goal 2

Q. No.	Very High	High	Nominal	low	Very low
1	21.10%	43%	23.70%	12.30%	0%
2	3.50%	21.90%	32.50%	34.20%	7.90%
3	5.30%	32.50%	21.90%	30.70%	9.60%
4	3.50%	19.30%	29.80%	28.10%	19.30%
5	5.30%	37.20%	20.40%	21.20%	15.90%
6	8.80%	43.90%	24.60%	21.10%	1.80%
7	26.50%	54.90%	13.30%	3.50%	1.80%
8	14.90%	26.30%	26.30%	8.80%	23.70%
9	7.90%	26.30%	29.80%	24.60%	11.40%
10	11.40%	23.70%	42.10%	20.20%	2.60%
Average	10.82%	32.90%	26.44%	20.47%	9.40%

C. Cumulative Analysis of Goal 3

Table 5 shows that 63.7% of the participants are supportive to the goal that Saudi public sector is willing to share its experience and knowledge. Moreover, 46.5% of the participants believe that knowledge management can be integrated with BPR in the Saudi public sector.

Table 5. Cumulative statistical analysis of goal 3

Q. No.	Very High	High	Nominal	low	Very low
1	17.30%	46.40%	19.10%	10%	7.30%
2	11.40%	35.10%	22.80%	18.40%	12.30%
3	13.30%	35.40%	31.90%	16.80%	2.70%
4	18.40%	43.90%	29.80%	6.10%	1.80%
5	15.80%	52.60%	24.60%	6.10%	0.90%
6	25.40%	52.60%	14%	7%	0.90%
7	26.30%	41.20%	22.80%	9.60%	0%
8	14%	38.60%	26.30%	16.70%	4.40%
9	21.20%	38.90%	17.70%	19.50%	2.70%
10	24.60%	32.50%	25.40%	12.30%	5.30%
Average	18.77%	41.72%	23.44%	12.25%	3.83%

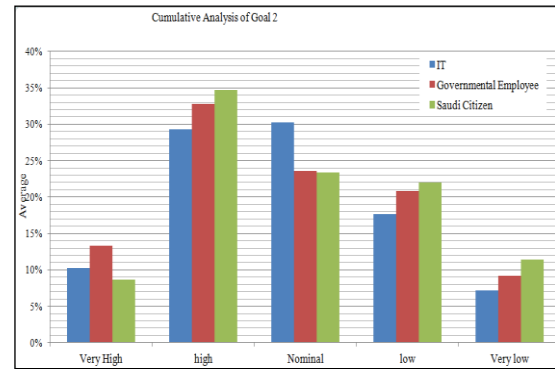


Fig.3. Cumulative statistical analysis of goal 2.

Furthermore, 62.3% of the professionals are agreed that integration of knowledge management with BPR in Saudi public sector will reduce the risk of failure. Moreover, 68.4% of the respondents are agreed that integration of knowledge management with BPR will enhance the way of BPR implementation in the Saudi public sector. Furthermore, 78% of the respondents are agreed that an organization knowledge base will provide better feedback and experience related to business processes. 67.5% of the participants believe that the re-engineered state must provide a breakthrough regarding performance and radical change in the organization. 52.6% of the respondents believe that knowledge management efforts are justified and it will result in a smoother implementation of BPR in Saudi public sector. 60.1% of the respondents are agreed on that transformational change in Saudi public sector is driven by the new technologies, visions, policies and strategies. 57.1% are optimistic about BPR implementation in Saudi Arabian public agencies. 60.49% of the respondents are agreed on that implementing BPR integrated with knowledge management in Saudi public sector. Fig. 4 illustrates a cumulative statistical analysis of goal 3, where each category is represented separately.

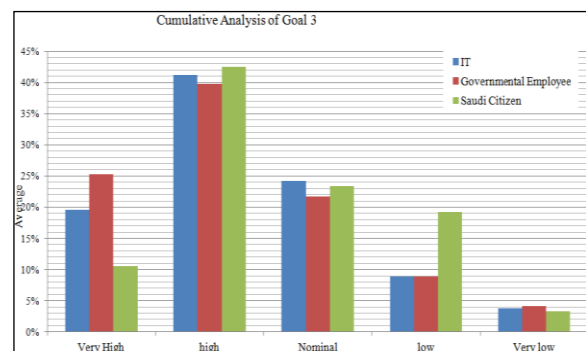


Fig.4. Cumulative statistical analysis of goal 3.

VI. CONCLUSION

Saudi Arabia's new vision requires a radical change in the public sector organizations. This research emphasise on the need of such a radical change. A framework is proposed to use knowledge base to implement the process

transformational change. The proposed solution shows that BPR can be used as a tool to achieve a successful transformation. The results of the study show that the proposed solution will minimize the rate of failure, provide customer-oriented services, and share expertise among the different public organizations. The findings of this study can be applied to other developing countries who share the same culture. The future direction is to validate the proposed solution using a case study.

REFERENCES

- [1] D. R. Reyes, "Public sector reengineering: Practice, problems and prospects," *Philipp J Public Adm*, vol. 42, no. 3–4, 1998.
- [2] V. Weerakkody, M. Janssen, and Y. K. Dwivedi, "Transformational change and business process reengineering (BPR): Lessons from the British and Dutch public sector," *Gov. Inf. Q.*, vol. 28, no. 3, pp. 320–328, Jul. 2011.
- [3] H. M. Park, "Should E-government be Transformational and Participatory? An Essay on E-government in the Utilitarian Mode of Information Technology Use," 2015, pp. 2476–2485.
- [4] "Reengineering the Corporation: A Manifesto for Business Revolution (Collins Business Essentials): Michael Hammer, James Champy, James Champy: 9780060559533: Amazon.com: Books." [Online]. Available: <http://www.amazon.com/Reengineering-Corporation-Manifesto-Revolution-Essentials/dp/0060559535>. [Accessed: 08-Apr-2016].
- [5] New Delhi University, India and R. . Oberoi, "Applying Business Process Re-Engineering to Public Sector as A New Public Management Strategy: Understanding the Contra Views and Limits," *J. Gov. Polit.*, vol. 4, no. 2, pp. 303–316, Aug. 2013.
- [6] M. Helen Fagan, "Exploring city, county and state e - government initiatives: an East Texas perspective," *Bus. Process Manag. J.*, vol. 12, no. 1, pp. 101–112, Jan. 2006.
- [7] P. O'Neill and A. S. Sohal, "Business Process Reengineering A review of recent literature," *Technovation*, vol. 19, no. 9, pp. 571–581, Sep. 1999.
- [8] M. Hesson, "Business process reengineering in UAE public sector: A naturalization and residency case study," *Bus. Process Manag. J.*, vol. 13, no. 5, pp. 707–727, Sep. 2007.
- [9] R. McCullough and R. R. Sims, "Implementation of an HRIMS at the Personnel Board of Jefferson County, Alabama: A Case Study in Process Reengineering," *Public Pers. Manag.*, vol. 41, no. 4, pp. 685–703, Dec. 2012.
- [10] M.-Y. Cheng, H.-S. Peng, C.-M. Huang, and C.-H. Chen, "KM-oriented business process reengineering for construction firms," *Autom. Constr.*, vol. 21, pp. 32–45, Jan. 2012.
- [11] "Reengineering Government Process of Elections by Introducing Unemployed Ad Hoc Work Force Registered through Employment Exchanges in India - ProQuest." [Online]. Available: <http://search.proquest.com/openview/1234c3621ae1af28b4328e0a90e8b68c/1?pq-origsite=gscholar>. [Accessed: 25-Feb-2016].
- [12] M. Rinaldi, R. Montanari, and E. Bottani, "Improving the efficiency of public administrations through business process reengineering and simulation: A case study," *Bus. Process Manag. J.*, vol. 21, no. 2, pp. 419–462, Apr. 2015.
- [13] S. Pattanayak and S. Roy, "Synergizing Business Process Reengineering with Enterprise Resource Planning System in Capital Goods Industry," *Procedia - Soc. Behav. Sci.*, vol. 189, pp. 471–487, May 2015.
- [14] E. A. Abu-Shanab, "Reengineering the open government concept: An empirical support for a proposed model," *Gov. Inf. Q.*, vol. 32, no. 4, pp. 453–463, Oct. 2015.
- [15] J. T. Fragoso, "Business Process Reengineering in Government Agencies: Lessons from an Experience in Mexico," *J. Serv. Sci. Manag.*, vol. 08, no. 03, pp. 382–392, 2015.
- [16] J. Esbenshade, M. Vidal, G. Fascilla, and M. Ono, "Customer-driven management models for choicelless clientele? Business process reengineering in a California welfare agency," *Work Employ. Soc.*, p. 0950017015604109, 2015.
- [17] S. K. Dubey and S. Bansal, "Critical Success Factors in Implementing BPR in a Government Manufacturing Unit – An Empirical Study," *Int. J. Bus. Manag.*, vol. 8, no. 2, Dec. 2012.
- [18] I. Orosz, T. Balázs, T. Orosz, and S. Attila, "Local Governments-specific BPR mini-project with SAP applications," in *Applied Machine Intelligence and Informatics (SAMi)*, 2012 IEEE 10th International Symposium on, 2012, pp. 119–123.
- [19] A. Kumar and S. Rahman, "RFID-enabled process reengineering of closed-loop supply chains in the healthcare industry of Singapore," *J. Clean. Prod.*, vol. 85, pp. 382–394, Dec. 2014.
- [20] G. Mathew, M. M. Sulphrey, and S. Rajasekar, "Scope of Business Process Reengineering in Public Sector Undertakings," *Asian Soc. Sci.*, vol. 11, no. 26, Sep. 2015.
- [21] M. C. Jurisch, C. Ikas, W. Palka, P. Wolf, and H. Krcmar, "A Review of Success Factors and Challenges of Public Sector BPR Implementations," 2012, pp. 2603–2612.
- [22] M. Yamin, I. S. Abdullah, and A. M. Basahel, "E-Governance in Developing World: Design of BPR Model for Makkah Municipality eServices," *Int. J. Comput. Commun. Eng.*, pp. 674–679, 2013.
- [23] A. Kassahun, "The effect of Business Process Reengineering (BPR) on public sector organisation performance in a developing economy context," 2012.
- [24] J. M. Pawlowski and M. Bick, "The global knowledge management framework: Towards a theory for knowledge management in globally distributed settings," *Lead. Issues Knowl. Manag. Vol. Two*, vol. 2, p. 134, 2015.
- [25] "8319_000.indd - 9780262015080_sch_0001.pdf." [Online]. Available: https://mitpress.mit.edu/sites/default/files/titles/content/9780262015080_sch_0001.pdf. [Accessed: 15-Mar-2016].
- [26] D. Thomas, "Process Innovation–Reengineering work through Information Technology," *Harv. Bus. Sch. Press Boston*, p. 5, 1993.

Authors' Profiles



Dr. M. Rizwan Jameel Qureshi received his Ph.D. degree from National College of Business Administration & Economics, Pakistan 2009. He is currently working as an Associate Professor in the Department of IT, King Abdulaziz University, Jeddah, Saudi Arabia. This author is the best researcher awardees from the Department of Information Technology, King Abdulaziz University in 2013

and the Department of Computer Science, COMSATS Institute of Information Technology, Lahore, Pakistan in 2008.

Arwa Shaker Bokhari is a teaching Assistant in the faculty of computers and information technology, Taif University. And she is currently doing master in IT from Faculty of Computing & Information Technology, King Abdulaziz University, Saudi Arabia.

How to cite this paper: Arwa S. Bokhari, Rizwan J. Qureshi, "Business Process Re-Engineering in Public Administration of Kingdom of Saudi Arabia", International Journal of Information Engineering and Electronic Business(IJIEEB), Vol.8, No.4, pp.10-17, 2016. DOI: 10.5815/ijieeb.2016.04.02



BPR implementation process: an analysis of key success and failure factors

BPR
implementation
process
(1999)

87

Majed Al-Mashari and Mohamed Zairi
Bradford University Management Centre, Bradford, UK

Keywords BPR, Implementation, Process management, Success

Abstract *This paper provides a holistic view of the Business Process Re-engineering (BPR) implementation process. It reviews the literature relating to the hard and soft factors that cause success and failure for BPR implementation, classifies these factors into subgroups, and identifies key factors of success and failure. Finally, it explains how these factors influence the process of BPR implementation.*

Introduction

Following the publication of the fundamental concepts of BPR by Hammer (1990) and Davenport and Short (1990), many organisations have reported dramatic benefits gained from the successful implementation of BPR. Companies like Ford Motor Co., CIGNA, and Wal-Mart are all recognised as having successfully implemented BPR.

However, despite the significant growth of the BPR concept, not all organisations embarking on BPR projects achieve their intended result. Hammer and Champy (1993) estimate that as many as 70 percent do not achieve the dramatic results they seek. Having BPR repeatedly at the top of the list of management issues in annual surveys of critical information systems reflects executives' failure to either implement properly or acquire the benefits of BPR (Alter, 1994). This mixture of results makes the issue of BPR implementation very important. BPR has great potential for increasing productivity through reduced process time and cost, improved quality, and greater customer satisfaction, but it often requires a fundamental organisational change. As a result, the implementation process is complex, and needs to be checked against several success/failure factors to ensure successful implementation, as well as to avoid implementation pitfalls.

The following analyses the BPR implementation process by reviewing the relevant literature on both soft and hard factors that cause success and failure of BPR efforts. The factors listed below are distilled from various articles and empirical research on BPR implementation. They were then categorised into a number of subgroups representing various dimensions of change related to BPR implementation. These dimensions are:

- (1) change management;
- (2) management competency and support;
- (3) organisational structure;

- (4) project planning and management; and
- (5) IT infrastructure.

BPR success factors

Factors relating to change management systems and culture

Change management, which involves all human- and social-related changes and cultural adjustment techniques needed by management to facilitate the insertion of newly-designed processes and structures into working practice and to deal effectively with resistance (Carr, 1993), is considered by many researchers to be a crucial component of any BPR efforts (Talwar, 1993; Moad, 1993; Zairi and Sinclair, 1995; Towers, 1996; Cooper and Markus, 1995; Hammer and Stanton, 1995; Bashein *et al.*, 1994; Carr and Johanson, 1995; Bruss and Roos, 1993; Janson, 1992; Kennedy, 1994). Revision of reward systems, communication, empowerment, people involvement, training and education, creating a culture for change, and stimulating receptivity of the organisation to change are the most important factors related to change management and culture.

Revising reward and motivation systems

Staff motivation through a reward programme has a crucial role in facilitating re-engineering efforts and smoothing the insertion of new processes in the workplace (Towers, 1994; Bjørn-Andersen and Turner, 1994; Hinterhuber, 1995; Ostroff and Smith, 1992; Dawe, 1996; Feltes and Karuppan, 1995). As BPR brings about different jobs (*The Trouble with Reengineering*, 1995), existing reward systems are no longer appropriate for the new work environment (Hammer and Champy, 1993; Harvey, 1995; Davenport and Nohria, 1994). Therefore, reward systems should be revised as part of the BPR effort (Jackson, 1997) and the new reward and incentive system must be widespread, fair and encourage harmony among employees (Towers, 1994). Introducing new job titles can be considered as one example of encouraging people to endorse the re-engineering programme without fear (*The Trouble with Reengineering*, 1995).

Effective communication

Effective communication is considered a major key to successful BPR-related change efforts (Davenport, 1993; Jackson, 1997; Zairi and Sinclair, 1995; Hammer and Stanton, 1995; Carr and Johansson, 1995; Arendt *et al.*, 1995; Dawe, 1996). Communication is needed throughout the change process at all levels and for all audiences (Davenport, 1993a), even with those not involved directly in the re-engineering project (Dixon *et al.*, 1994). Effective communication between stakeholders inside and outside the organisation is necessary to market a BPR programme (Talwar, 1993; Hinterhuber, 1995) and to ensure patience and understanding of the structural and cultural changes needed (Berrington *et al.*, 1995) as well as the organisation's competitive situation (Cooper and Markus, 1995). Communication should take place

frequently (Davenport, 1993, Carr, 1993; Janson, 1992) and in both directions between those in charge of the change initiatives and those affected by them (Davenport, 1993a; Jackson, 1997; Grugle, 1994; Talwar, 1993). Communication should be open, honest, and clear (Davenport, 1993; Janson, 1992), especially when discussing sensitive issues related to change such as personnel reductions (Davenport, 1993).

Empowerment

As BPR results in decisions being pushed down to lower levels, empowerment of both individuals and teams becomes a critical factor for successful BPR efforts (Thomas, 1994; Cooper and Markus, 1995; Bashein *et al.*, 1994; Hinterhuber, 1995; Dawe, 1996) since it establishes a culture in which staff at all levels feel more responsible and accountable (Rohm, 1992/93) and it promotes a self-management and collaborative teamwork culture (Mumford, 1995). Empowerment entails that staff are given the chance to participate in the redesign process (Bashein *et al.*, 1994). When empowered, employees are able to set their goals and monitor their own performance as well as identify and solve problems that affect their work, thus they are supporting the BPR efforts.

Human involvement

In re-engineering, all people must be openly and actively involved (Berrington and Oblich, 1995; Jackson, 1997; Bashein *et al.*, 1994; Hinterhuber, 1995; Bruss and Roos, 1993; Arendt *et al.*, 1995; Dawe, 1996) and should be consulted at all stages on the process and its leaders. This includes line managers (Harrison and Pratt, 1993), process owners (Furey, 1993), those involved in IS and human resources (Bashein *et al.*, 1994), and workers (Janson, 1992). The culture of experimentation is an essential part of a successfully re-engineered organisation and, therefore, people involved or affected by BPR must be prepared to endure errors and mistakes while re-engineering is taking place.

Training and education

Many researchers consider training and education to be an important component of successful BPR implementation (Towers, 1994; Berrington and Oblich, 1995; Zairi and Sinclair, 1995; Worsley, 1994; Bashein *et al.*, 1994; Clemmer, 1994; Cooper and Markus, 1995; Arendt *et al.*, 1995; Dawe, 1996). Organisations that undertake re-engineering projects may have to increase their training budget by 30-50 percent (Towers, 1994). BPR-related concept, skills, and techniques (Cooper and Markus, 1995; Berrington and Oblich, 1995; Worsley, 1994) as well as interpersonal and IT skills (Towers, 1994), skills in TQM implementation and process analysis techniques (Dixon *et al.*, 1994), are all important dimensions of training for BPR. It is also important to educate people in IT-related innovations for competitive advantage, the potential of IT in reshaping the business and the leadership of empowered organisations (Bruss and Roos, 1993). Business managers, line managers, IS managers, and other staff in the front-line are the people who benefit most from education and

training activities (Towers, 1994) in both business and IT-related skills and expertise.

Creating an effective culture for organisational change

Organisational culture is a determining factor in successful BPR implementation (Hammer and Champy, 1993; Davenport, 1993; Zairi and Sinclair, 1995; CSC Index, 1994). Organisational culture influences the organisation's ability to adapt to change. The existing culture contains beliefs and values that are often no longer appropriate or useful in the re-engineered environment. Therefore, the organisation must understand and conform to the new values, management processes, and the communication styles that are created by the newly-redesigned processes (*Business Process Re-engineering RIP*, 1996) so that a culture which upholds the change is established effectively (Bruss and Roos, 1993). In a newly re-engineered organisation, people usually share common goals and thus become more capable of working co-operatively without competing against each other (Andrews and Stalick, 1994). As BPR supports teamwork and integration of labour, co-operation, co-ordination, and empowerment of employees become the standard attitudes in the re-engineered work environment. However, trust and honesty among team members is also needed, and within the organisation as a whole (Dixon *et al.*, 1994; Jackson, 1997).

Stimulating the organisation's receptiveness to change

Preparing the organisation to respond positively to BPR-related change is critical to success (Benjamin and Levinson, 1993; Barrett, 1994; Bruss and Roos, 1993). When people are made resilient to change, they remain positive during uncertainty, focused, flexible, organised, and pro-active (Jackson, 1997). Leveraging organisational change requires effective one-to-one and one-to-many interactions to enrol key influencers of both individuals and groups within and without the organisation (Hall *et al.*, 1993; Guha *et al.*, 1993; Jackson, 1994).

Factors relating to management competence

Sound management processes ensure that BPR efforts will be implemented in the most effective manner (Bashein *et al.*, 1994). The most noticeable managerial practices that directly influence the success of BPR implementation are top management support and commitment, championship and sponsorship, and effective management of risks.

Committed and strong leadership

Commitment and leadership in the upper echelons of management are often cited as the most important factors of a successful BPR project (Hammer and Stanton, 1995; Jackson, 1997; Stanton *et al.*, 1993; Bashein *et al.*, 1994; Cooper and Markus, 1995; Harrison and Pratt, 1993; Towers, 1994; Rastogi, 1994; Furey, 1993; Hall *et al.*, 1993; Dixon *et al.*, 1994; Holland and Kumar, 1995;

Berrington *et al.*, 1995; Talwar, 1993; Guha *et al.*, 1993; Carr, 1993; Zairi and Sinclair, 1995; CSC Index, 1994; Arendt *et al.*, 1995; Feltes and Karuppan, 1995). Leadership has to be effective (Holland and Kumar, 1995; Zairi and Sinclair, 1995), strong (Jackson, 1997; Janson, 1992), visible (Jackson, 1997; Bashein *et al.*, 1994), and creative in thinking and understanding (Hammer and Champy, 1993) in order to provide a clear vision of the future. This vision must be clearly communicated to a wide range of employees who then become involved and motivated rather than directly guided (Carr and Johansson, 1995; Hammer and Stanton, 1995). Commitment to (Guha *et al.*, 1993, Berrington and Oblich, 1995; Dixon *et al.*, 1994) and support for (Rastogi, 1994; Dixon *et al.*, 1994; Furey, 1993) the change must constantly be secured from senior management throughout a BPR project (Dixon *et al.*, 1994). Sufficient authority and knowledge, and proper communication with all parts in the change process, are important in dealing with organisational resistance during BPR implementation (Hammer and Champy, 1993, Stanton *et al.*, 1993).

Championship and sponsorship

Barriers such as political, economic, and organisational risks are all associated with BPR-related change. And champions of the change play a major role in overcoming these barriers and increasing the chance of successful BPR implementation (Harrison and Pratt, 1993; Dixon *et al.*, 1994; Worsley, 1994; Ovenden, 1994; Benjamin and Levinson, 1993; Hinterhuber, 1995; Arendt *et al.*, 1995). The champions must be able to persuade top management of the need to change and to continually push the change efforts throughout the organisation. Political and material sponsorship by the champions of change to business processes, job definitions, reward systems, and organisational structure needs strong support from senior management (Hagel, 1993; Bashein *et al.*, 1994; Harrison and Pratt, 1993; Berrington and Oblich., 1995; Barrett, 1994; Arendt *et al.*, 1995; Dawe, 1996).

Management of risk

BPR implementation involves radical change to several systems in the organisation. Risks associated with acceptance of changes in the organisational structure, deploying emerging ITs with little familiarity, large investment in new resources needed for the new processes, loss of personnel, and loss of earnings (Towers, 1994; Clemons, 1995) are some examples of the many risks that an organisation may take when implementing BPR. Therefore, continuous risk assessment is needed throughout the implementation process (Talwar, 1993) to deal with any risk at its initial state (Towers, 1994) and to ensure the success of the re-engineering efforts. Anticipating and planning for risk-handling is important for dealing effectively with any risk when it first occurs (Clemons, 1995).

Factors relating to organisational structure

As BPR creates new processes that define jobs and responsibilities across the existing organisational functions (Davenport and Short, 1990), there is a clear need to create a new organisational structure which determines how BPR teams are going to look, how human resources are integrated, and how the new jobs and responsibilities are going to be formalised.

An adequate job integration approach

Several researchers emphasise that designing and implementing an adequate organisational human resources infrastructure is important to a BPR project's success (Zairi and Sinclair, 1995; Guha *et al.*, 1993; *Has Re-engineering had its 15 Minutes of Fame?*, 1995). Job and labour integration (case worker) is the most appropriate approach of human resources design that supports the process-based organisational structure rather than a function-based one (Davenport and Nohria, 1994; Hammer, 1990). When individuals within a process perform a series of tasks efficiently, product quality, processing time, and cost are all going to improve (Morris and Brandon, 1991). However, the move to integrate human resources architecture necessitates a careful consideration of all related organisational changes.

Effective BPR teams

Cross-functional BPR teams are a critical component of successful BPR implementation (Johansson *et al.*, 1993; Barrett, 1994; Towers, 1994; Furey, 1993; Dawe, 1996). Teams should be adequately composed (Hagel, 1993; Zairi and Sinclair, 1995; Dixon *et al.*, 1994; Harrison and Pratt, 1993; Carr, 1994; Klein, 1994; Moad, 1993). Team members should be experienced in variety of techniques (Carr and Johansson, 1995; Kettinger *et al.*, 1997). Teams should be made up of people from both inside and outside the organisation (Hammer and Champy, 1993). The determinants of an effective BPR team are as follows: competency of team members (Rastogi, 1994), their credibility within the organisation and their creativity (Barrett, 1994), team empowerment (Carr, 1993), motivation (Rastogi, 1994), effective team leadership (Berrington and Oblich, 1995), the training of members in process mapping and brainstorming techniques (Carr, 1993), proper organisation of the team (Guha *et al.*, 1993), complementary skills among team members, adequate size, interchangeable accountability, clarity of work approach, and specificity of goals (Katzenbach and Smith, 1993).

Appropriate job definitions and allocation of responsibilities

As BPR results in a major structural change in the form of new jobs and responsibilities, it becomes a prerequisite for successful implementation to have formal and clear descriptions of all jobs and responsibilities that the new designed processes bring along with them (Talwar, 1993).

Factors related to BPR project management

Successful BPR implementation is highly dependent on an effective BPR programme management (CSC Index, 1994) which includes adequate strategic alignment (Guha *et al.*, 1993), effective planning and project management techniques, identification of performance measures (Zairi and Sinclair, 1995), adequate resources, appropriate use of methodology (Carr, 1993), external orientation and learning (Jackson, 1997), effective use of consultants (Davenport, 1993), building process vision (Talwar, 1993), effective process redesign, integrating BPR with other improvement techniques (Zairi and Sinclair, 1995), and adequate identification of the BPR value (Guha *et al.*, 1993).

BPR
implementation
process

93

Aligning BPR strategy with corporate strategy

As corporate strategy determines objectives and guidance on how organisational capabilities can be best utilised to gain competitive position, BPR strategy, accordingly, guides the alteration of tasks and flows into integrated processes, and variance in how tasks are performed and the flow of material, people, and information becomes a source of competitiveness (Hammer, 1990). Therefore, a consideration of the strategic context of growth and expansion (Bashein *et al.*, 1994), creating a top-level strategy to guide change (Carr, 1993), and careful alignment of corporate strategy with BPR strategy (Jackson, 1997; Guha *et al.*, 1993; Grover *et al.*, 1993; Bruss and Roos, 1993) are crucial to the success of BPR efforts.

Effective planning and use of project management techniques

Proper planning for the BPR project (Berrington and Oblich, 1995; Jackson, 1997) with adequate time frame (Zairi and Sinclair, 1995) are key factors in delivering a successful BPR project on time. Effective use of project management techniques (CSC Index, 1994) and managing people-related issues (Talwar, 1993) have also a crucial role in smoothing the flow of the process redesign stages. A comprehensive piloting of the new design (Jackson, 1997; Hammer and Stanton, 1995; Hall *et al.*, 1993), and learning from errors (Jackson, 1997) are particularly important for tuning a BPR implementation process to the most successful way. Measurement of project progress should also be maintained continually throughout a BPR project (*Is Re-engineering A Fad?*, 1996).

Setting performance goals and measures

Setting high goals for performance (Hagel, 1993; Guha *et al.*, 1993; *Is Re-engineering A Fad?*, 1996; Feltes and Karuppan, 1995) and extendable targets (Hagel, 1993; Hammer and Champy, 1993; Stow, 1993; Hall *et al.*, 1993) for BPR are important success factors. Identifying and setting performance measures (Zairi and Sinclair, 1995; Guha *et al.*, 1993; Gould, 1993) are also necessary as they indicate levels of achievement.

Adequate resources

Adequate resources (Furey, 1993; Bruss and Roos, 1993; Bjørn-Andersen and Turner, 1994; Boyle, 1995) and sufficient budget (Bashein et al., 1994) allocated properly are important for a successful BPR project.

Appropriate use of methodology

Establishing a disciplined approach for BPR (Berrington *et al.*, 1995; Benjamin and Levinson, 1993) and using a sound methodology (Carr, 1993; Guha *et al.*, 1993) are prerequisites for BPR success. A BPR methodology should be designed or selected creatively to satisfy the current needs of the organisation (Klein, 1994). Adequate customisation of available BPR methodologies determines the level of comprehensiveness and effectiveness that a new customised BPR methodology can reach (Kettinger *et al.*, 1997; Klein, 1994).

External orientation and learning

External orientation based on customer research, competitive analysis, and benchmarking is a critical element of successful BPR efforts (Carr, 1993). Benchmarking is an effective technique to learn from customers and competitors (Rastogi, 1994; Jackson, 1997; Harrison and Pratt, 1993; *Is Re-engineering A Fad?*, 1996; Zairi and Sinclair, 1995). Customers' requirements and expectations should be defined and measured for BPR (Hall *et al.*, 1993; Jackson, 1997; Rastogi, 1994), and processes should be defined broadly in terms of customer value (Rastogi, 1994). Benchmarking allows learning from other organisations' experiences in BPR, as well as learning from one re-engineering process to another in the same organisation (Caron *et al.*, 1994).

Effective use of consultants

Several authors suggest that an effective use of consultants is useful in ensuring successful implementation of BPR (Davenport, 1993; Harrison and Pratt, 1993; Towers, 1994; Rastogi, 1994; Klein, 1994; Clemmer, 1994). Consultants can bring to the organisation specialised skills, experience, and know-how that the organisation needs and it is both time-consuming and expensive for it to build internally (Shabana, 1996; Boyle, 1995). They can also provide a firm-wide view, encourage unity between members, and are usually neutral (Davenport, 1993). Success of consultants in BPR is determined by their level of experience in implementing similar projects in other organisations, as well as their ability to direct the re-engineering efforts to areas of substantial benefits to the organisation (Shabana, 1996).

Building a BPR vision

Building an imaginative thinking and a clear and compelling vision for future processes is critical to the successful implementation of BPR (Talwar, 1993; Guha *et al.*, 1993; Bashein *et al.*, 1994; Jackson, 1997; Barret, 1994; Bjørn-Andersen and Turner, 1994; Davenport, 1993a; *Is Re-engineering A Fad?*, 1996). Process vision directs both long-term and day-to-day actions (Holland and

Kumar, 1995). A complete development of process vision includes evaluating business strategy to anticipate future processes, conducting customer-based assessment of performance targets, benchmarking similar BPR efforts, and developing process attributes and its performance measures (Davenport, 1993a).

Effective process redesign

Effective process orientation (Moad, 1993), appropriate level of process knowledge (Zairi and Sinclair, 1995), documentation of existing processes (Guha *et al.*, 1993), appropriate selection of core processes, and use of prototyping (Guha *et al.*, 1993; Benjamin and Levinson, 1993) are all critical components in successful BPR implementation. Adequate identification of process gaps (Guha *et al.*, 1993) and evaluation of effectiveness of current processes by making use of appropriate software tools to visualise and analyse them (Towers, 1994; El Sawy, 1997) is also useful. Identifying process owners is also vital to BPR implementation (Boyle, 1995).

95

Integrating BPR with other improvement approaches

Several researchers suggest that using continuous improvement techniques increases dramatic gains (Carr, 1993; Clemmer, 1994; Feltes and Karuppan, 1995). TQM is particularly suggested to be integrated with BPR (Guha *et al.*, 1993; Zairi and Sinclair, 1995).

Adequate identification of BPR values

BPR efforts should focus on identifying re-engineering opportunities (Guha *et al.*, 1993) and values to internal and external stakeholders (Champy, 1995; *Is Re-engineering A Fad?*, 1996). A continuous focus should be maintained on business objectives (Carr, 1993).

Factors related to IT infrastructure

Factors related to IT infrastructure have been increasingly considered by many researchers and practitioners as a vital component of successful BPR efforts (Brancheau *et al.*, 1996; Malhotra, 1996; Ross, 1998a; Broadbent and Weill, 1997). Effective alignment of IT infrastructure and BPR strategy, building an effective IT infrastructure, adequate IT infrastructure investment decision, adequate measurement of IT infrastructure effectiveness, proper IS integration, effective re-engineering of legacy IS, increasing IT function competency, and effective use of software tools are the most important factors that contribute to the success of BPR projects.

Adequate alignment of IT infrastructure and BPR strategy

BPR and IT infrastructure strategies which are both derived from organisation strategy are in need of effective alignment to ensure the success of the BPR initiative (Kettinger *et al.*, 1997; Venkatraman, 1993; Grover *et al.*, 1993; Martinez, 1995). IT can best enhance an organisation's position by supporting a

business-thrust strategy (McDonald, 1993). The business strategy should be clear and detailed (Earl, 1995). Top management should act as a strategy formulator who provides commitment for the whole process of redesign, while the IS manager should be responsible for designing and implementing the IS strategy (Henderson and Venkatraman, 1993). The strategy describes the role of IT in leveraging changes to the underlying business processes and infrastructures (Meador, 1994).

IT strategic alignment is approached through the process of integration between business strategy and IT strategy, as well as between IT infrastructure and organisational infrastructure (Henderson and Venkatraman, 1993). The degree of alignment between the BPR strategy and the IT infrastructure strategy is indicated by including the identification of information resources needs in the BPR strategy, deriving the IT infrastructure strategy from the business strategy, examining the IT infrastructure strategy against the BPR strategy, the active involvement of management in the process of IT infrastructure planning and IT managers in business planning, and by the degree of synchronization in formulating the two strategies (Reich and Benbasat, 1996).

Building an effective IT infrastructure

Researchers consider adequate IT infrastructure reassessment and composition as a vital factor in successful BPR implementation (Moad, 1993; Rockart and Short, 1989). Adequate understanding and identification of enabling technologies for redesigning business processes (Barrett, 1994; Guha *et al.*, 1993), proper selection of IT platforms (Guha *et al.*, 1993), effective overall system architecture (Jackson, 1997), adaptable and flexible IT infrastructure (*Technology Talks to Business with EAS*, 1997), and proper installation of IT components (Guha *et al.*, 1993) all contribute to building an effective IT infrastructure for business processes.

The IT infrastructure and BPR are interdependent in the sense that deciding the information requirements for the new business processes determines the IT infrastructure constituents, and a recognition of IT capabilities provides alternatives for BPR (Ross, 1998a; Venkatraman, 1993). Building a responsive IT infrastructure is highly dependent on an appropriate determination of business process information needs (Johnston and Gibbons, 1975). This, in turn, is determined by the types of activities embedded in a business process, and their sequencing and reliance on other organisational processes (Sabherwal and King, 1991). Variance in how activities are performed and the flow of materials, people, and information can be a source of competitive advantage (Hammer, 1990).

An IT infrastructure is made up of physical assets (Malhotra, 1996b; Broadbent and Weill, 1997; Kayworth *et al.*, 1997; Ross, 1998a), intellectual assets (Broadbent and Weill, 1997; Kayworth *et al.*, 1997; Ross, 1998a), shared services (Broadbent and Weill, 1997; Kayworth *et al.*, 1997), and their linkages (Kayworth *et al.*, 1997; Ross, 1998a). The way in which the IT infrastructure

components are composed and their linkages determines the extent to which information resources can be delivered. An effective IT infrastructure composition process follows a top-down approach, beginning with business strategy and IS strategy and passing through designs of data, systems and computer architecture (Malhotra, 1996; Ross, 1998a). Linkages between the IT infrastructure components, as well as descriptions of their contexts of interaction, are important for ensuring integrity and consistency among the IT infrastructure components (Ross, 1998a). IT standards also have a major role in reconciling various infrastructure components to provide shared IT services that are of a certain degree of effectiveness to support business process applications, as well as to guide the process of acquiring, managing, and utilising IT assets (Kayworth *et al.*'s, 1997). The IT infrastructure shared services (Broadbent and Weill, 1997; Kayworth *et al.*, 1997) and the human IT infrastructure components, in terms of their responsibilities and their needed expertise, are both vital to the process of the IT infrastructure composition.

Adequate IT investment and sourcing decisions

Adequate investment (Zairi and Sinclair, 1995) and an IT sourcing strategy (Earl, 1996) are critical to the success of BPR projects which involve considerable re-engineering efforts of the IT infrastructure components.

A successful IT infrastructure investment decision should be guided by corporate strategies. A key starting point in an effective IT investment decision process is translating the strategic context into comprehensive strategic statements that are simple, achievable, practical and easy to communicate across the firm (Broadbent and Weill, 1997). This process should also include expectations for IT investment in the firm, data access and use, hardware and software resources, communications capabilities and services, and architecture and standards approach (Broadbent and Weill, 1997).

A sourcing decision should make a trade-off between internal and external sourcing (Earl, 1996; Walker and Weber, 1984). A multisourcing strategy (Hoffman, 1997) is effective for organisations that insource their strategic IT components while outsourcing common and non-critical components. When an outsourcing decision is about to be taken, there is a need to ensure that: the vendor's level of IT expertise and skills are sufficient and up-to-date, the deployment costs are considered as part of outsourcing cost, and that effective linkages are defined between outsourcer and IT staff in the organisation (Earl, 1996).

Adequate measurement of IT infrastructure effectiveness on BPR

Information and IT are the information resources that a business process needs (Sabherwal and King, 1991) to create a competitive value to an organisation and, therefore, they are essential assets that need to be acquired, used, managed, and measured to judge the value obtained by investment in information resources (Earl, 1997). Thus the measurement of IT effectiveness is an important factor in successful BPR implementation. Measurement of the IT

infrastructure effectiveness determines IT deficiencies that exist when business process information resource requirements cannot be met by the current IT infrastructure capabilities.

The measurement process may start with a number of policies and goals which are then translated by the IS function into measures by exploiting other techniques such as monitoring, auditing, and benchmarking. A test of developed measures is conducted and a continuous refinement and review are performed continually as strategies change and as the IS function discovers new means for measurement (Earl, 1997). Measures can be customised from different models (Fiedler *et al.*, 1997) to fit the specific needs of an organisation.

Proper IS integration

The effective integration of various organisational IS is vital to successful BPR implementation (Jackson, 1997). IS integration for BPR can be measured by the extent to which various information systems are formally linked for the purpose of sharing complete, consistent, accurate, and timely information among business processes (Bhatt, 1996; The DoD, 1994). Data integration and communication networking are the most important enablers for IS integration (Teng *et al.*, 1994; Grover *et al.*, 1995; Bhatt, 1996).

The success of the data integration effort depends on the level of integration between organisation planning and IS planning (Teng and Grover, 1992), top management support, user involvement (Goodhue *et al.*, 1988), leadership, effective communication, systematic implementation (The DoD, 1994), the degree of interdependence between business units, the need for flexible action by subunits, the degree of difficulty in designing and implementing systems with integrated data, and the degree of inter-operability between systems (Jackson, 1997).

The effective re-engineering of legacy IS

BPR projects often require revamping of the IS to deliver the full potential of the redesigned processes (Teng *et al.*, 1994; Moad, 1993). Re-engineering legacy IS to new systems that use the latest technologies is a key factor in creating an integrative IT infrastructure that supports BPR efforts effectively (Towers, 1994). Critical to this effort is the need for goal-setting and quantitative benefits measures, the role of planning, and the need for determining organisational readiness for re-engineering (Tilley, 1996). Organisational readiness is determined by capability assessment, training needs, surveys of application usage, identification of application evolution trends, operational deployment considerations, and organisational change issues (Tilley, 1996). Automated re-engineering of legacy systems can also add to the effectiveness of this process (Liu *et al.*, 1996; *Process Modelling and Legacy Systems*, 1996).

Increasing the IT function competency

Building a high performance IT function to accommodate the radical shifts in both technology and business is considered a critical factor in the success of

BPR efforts (Moad, 1993; Earl *et al.*, 1997). Appropriate IT function structure (Laud and Theis, 1997), adequate IT management architecture (Boynton *et al.*, 1992), building IT function competencies (Ross, 1998b), effective IT function benchmarking (Gordon, 1994) and IT function performance measurement (Saunders and Jones, 1992) all contribute to the effective role that the IT function plays in BPR. Architectural understanding, programming language and structure of code, dependencies on special language or platform features, and the cumulative effects of continuous maintenance all affect the ability to re-engineer a legacy system (Tilley, 1996). Systems reusability is also an important feature which facilitates the re-engineering efforts (Tilley, 1996). The involvement of maintenance personnel who are familiar with the legacy systems has a positive impact on quality and productivity of the re-engineering efforts (Tilley, 1996).

An effective IT function needs to be designed into a comprehensive and flexible structure that focuses on quality (Laud and Theis, 1997), value creation (Laud and Theis, 1997) and delivery (Ross, 1998b), empowerment through education (Laud and Theis, 1997) and re-skilling of IT staff (Earl *et al.*, 1997; Moad, 1993), motivation of employees (Laud and Theis, 1997), partnerships between all parties involved in managing IT resources (Laud and Theis, 1997) based on mutual trust and credibility (Ross, 1998b; Earl *et al.*, 1997), better strategic planning (Laud and Theis, 1997; Ross, 1998b), faster solution delivery (Ross, 1998), cheaper IT operations and support (Ross, 1998b), and satisfied customers (Ross, 1998b). Distribution, and patterns of IT managerial responsibilities and interdependencies should be specified and adequately implemented to help organisations develop an effective IT management architecture for BPR (Boynton *et al.*, 1992). Benchmarking of the IT function is also an important tool by which areas of improvement are identified along with descriptions of how they can be improved (Gordon, 1994).

Effective use of software tools

Several researchers argue that effective use of modern software tools to assist in BPR efforts is crucial to BPR success (Klein, 1994; Kettinger *et al.*, 1997; Carr and Johansson, 1995; El Sawy, 1997). Use of software tools contributes to BPR success by improving productivity (Klein, 1994), completing projects more quickly (Kettinger *et al.*, 1997), producing higher quality results (Klein, 1994), baselining visions and measuring process costs (Carr and Johansson, 1995), and eliminating non value-added work and focusing instead on value-added work (Klein, 1994).

Effective software tools should have specific features, such as being usable by non-technical people (Klein, 1994), process visualisation (El Sawy, 1997), providing interactive and graphical-based demonstrations of process phases (Davenport, 1993), the ability to analyse processes (El Sawy, 1997) and show information flows between phases as well as rates of flows and resources usages (Davenport, 1993), enhancing the clarity of the BPR team's vision (Klein, 1994), enabling the running of life simulations to discover bottlenecks

and constraints (Davenport, 1993), enforcing consistency in analysis and design (Klein, 1994), facilitating integration with CASE tools that are widely used in designing BPR underlying information systems (Davenport, 1993), permitting iterative and top-down refinement from the BPR project goals to solution (Klein, 1994), and producing an acceptable return on investment (Klein, 1994).

BPR failure factors

Factors related to change of management systems and culture

(1) Problems in communication:

- Inadequate communication of need to change (Davenport, 1993; Grover *et al.*, 1995; Buday, 1993);
- Hiding uncertainties in communication (Jackson, 1997);
- Poor communication between BPR teams and other personnel (Grover *et al.*, 1995);
- Lack of motivation and reward (Hammer and Champy, 1993; Grover *et al.*, 1995; Davidson, 1993).

(2) Organisational resistance:

- Resistance to change (Talwar, 1993; Moad, 1993; Jackson, 1997; Bashein *et al.*, 1994; Stanton *et al.*, 1993; Hoffman, 1997; Hendry, 1995a,b; Dawe, 1996);
- Fear, lack of optimism, and skepticism about BPR results (Bashein *et al.*, 1994; Davenport, 1993);
- Worries about job security (Jackson, 1997);
- Fear of job loss (Talwar, 1993);
- Fear of loss of control and position (Davenport, 1993; Hammer and Champy, 1993; Stanton *et al.*, 1993);
- Middle management impermeability (Jackson, 1997);
- Lack of adequate planning for resistance to change (Hammer and Champy, 1993; Grover *et al.*, 1995; Davidson, 1993; Arendt *et al.*, 1995)

(3) Lack of organisational readiness for change:

- Need for change management is not realised (Grover *et al.*, 1995);
- Lack of determination/courage/skills of management for radical changes (Randall, 1993);
- Demand for change exceeds the capacity to absorb (Jackson, 1997);
- Lack of cross-functional co-operation (Grover *et al.*, 1995; Davenport and Short, 1990);
- Line managers are not receptive for change (Grover *et al.*, 1995).

(4) Problems related to creating a culture for change:

- Underestimating the human side (*Is Re-engineering A Fad?*, 1996; *The Trouble with Reengineering*, 1995);
- Not considering existing management systems and organisational culture (Zairi and Sinclair, 1995; Davenport, 1993; Davidson, 1993; Grover *et al.*, 1995);
- Values ignorance (Hammer and Champy, 1993; Grover *et al.*, 1995; *Business Process Re-engineering RIP*, 1996; Hall *et al.*, 1993);
- A lack of trust between management and employees (*Has Re-engineering had its 15 Minutes of Fame?* 1995);
- The tendency to copy others (*Business Process Re-engineering RIP*, 1996);
- Underestimating the role of politics in BPR (Grover *et al.*, 1995);
- Animosity toward and by IS and human resources specialists (Bashein *et al.*, 1994).

(5) Lack of training and education:

- The absence of theory (*Business Process Re-engineering RIP*, 1996);
- Lack of understanding of BPR (Grover *et al.*, 1995; Davenport, 1993, Alter, 1990);
- Lack of appropriate training for those affected by BPR (Davenport, 1993; Grover *et al.*, 1995; Hall *et al.*, 1993).

Factors related to management support

(6) Problems related to commitment, support, and leadership:

- Lack of sustained management commitment and leadership (Bashein *et al.*, 1994; Hammer and Champy, 1993; Grover *et al.*, 1995; Hall *et al.*, 1993);
- Lack of top management attention and support (Randall, 1993; Davenport and Short, 1990; Grover *et al.*, 1995; Alter, 1990);
- Lack of support from line managers (Grover *et al.*, 1995);
- A “Do It to ME” attitude (Bashein *et al.*, 1994).

(7) Problems related to championship and sponsorship:

- Lacking the visible sponsorship of senior management (*Is Re-engineering A Fad?* 1996; Hoffman, 1997);
- Wrong sponsor (Bashein *et al.*, 1994);
- Lack of a champion (Hammer and Champy, 1993; Gulden and Reck, 1992; Grover *et al.*, 1995; Hoffman, 1997);

BPR
implementation
process

Factors related to organisational structure

- (8) Ineffective BPR teams:
- Lack of a cross-functional project team (Hoffman, 1997);
 - Difficulty in finding suitable teams members (Grover *et al.*, 1995);
 - Lack of IS staff credibility and involvement in re-engineering teams (Moad, 1993; Davenport and Short, 1990; Grover *et al.*, 1995; *Is Re-engineering A Fad?*, 1996; Hoffman, 1997);
 - Inadequate communication among members (Grover *et al.*, 1995);
 - Lack of training for BPR teams (Davenport, 1993; Grover *et al.*, 1995);
 - Lack of authority given to BPR teams (Grover *et al.*, 1995);
 - Inadequate team skills (Hoffman, 1997).
- (9) Problems related to the integration mechanism, job definition, and allocation of responsibilities:
- Inflexible hierarchical structures (Davenport, 1993; Grover *et al.*, 1995);
 - People think solely in terms of their own immediate working group (Jackson, 1997);
 - Conflicts between BPR team responsibilities and functional responsibilities (Grover *et al.*, 1995; Davenport, 1993);
 - Unclear definition of jobs (Hammer and Champy, 1993; Grover *et al.*, 1995; Katzenbach and Smith, 1993).

Factors related to BPR project management

- (10) Problems related to planning and project management:
- Inadequate planning for BPR project (Grover *et al.*, 1995; Davidson, 1993);
 - Compressing the time needed to succeed (*Is Re-engineering A Fad?*, 1996; Randall, 1993);
 - Not enough time to develop new skills for BPR (Grover *et al.*, 1995);
 - Too many improvement projects underway (Bashein *et al.*, 1994);
 - Variable quality of ideas for BPR (Jackson, 1997);
 - Incomplete restructuring of an organisation (Hall *et al.*, 1993);
 - Extremely radical process change (Grover *et al.*, 1995; Davenport, 1993);
 - Too incremental and not enough radical process change (Grover *et al.*, 1995; Hall *et al.*, 1993);
 - Missing assessment of BPR project performance in the early stages (Davenport and Short, 1990; Grover *et al.*, 1995);
 - Inability to control BPR efforts (Grover *et al.*, 1995).

(11) Problems related to goals and measures:

- Lack of clear performance objectives and milestones for BPR project (Dixon *et al.*, 1994; Hagel, 1993; Randall, 1993);
- Poorly defined needs (*Business Process Re-engineering RIP*, 1996);
- Difficulty in establishing performance goals (Grover *et al.*, 1995; Davenport, 1993);
- Difficulty in measuring BPR project performance (Grover *et al.*, 1995; Hall *et al.*, 1993);
- Using only quantifiable and easy measures (Grover *et al.*, 1995);
- Spending too much time in analysing existing processes (Hammer and Champy, 1993; Grover *et al.*, 1995).

BPR
implementation
process

103

(12) Inadequate focus and objectives:

- Narrow technical focus (Bashein *et al.*, 1994; Moad, 1993);
- Cost-cutting focus (Bashein *et al.*, 1994; Coulson-Thomas, 1994);
- Absence of strategic focus (Rastogi, 1994);
- Focusing on planning rather than on doing (*Is Re-engineering A Fad?* 1996);
- Using re-engineering to avoid making hard decisions (*Is Re-engineering A Fad?* 1996);
- Old patterns of automating existing processes without redesign (Hammer, 1990; Moad, 1993; Furey, 1993)
- Short-term view and quick fix mentality (Grover *et al.*, 1995).

(13) Ineffective process redesign:

- Missing process understanding and orientation (Hammer and Champy, 1993);
- Missing process owners (Furey, 1993; Jackson, 1997; Hammer and Champy, 1993; Grover *et al.*, 1995);
- Inadequate determination of scope of change (Hall *et al.*, 1993; Hagel, 1993; Grover *et al.*, 1995);
- Inadequate focus on core processes (Randall, 1993);
- Re-engineering the wrong processes (*Is Re-engineering A Fad?* 1996; Grover *et al.*, 1995);
- Narrowly defined processes (Hall *et al.*, 1993).

(14) Problems related to BPR resources:

- Lack of required resources for BPR efforts (Hammer and Champy, 1993; Cole *et al.*, 1993);
- Unsound financial condition (Bashein *et al.*, 1994);

- Not understanding the total financial impact (*Is Re-engineering A Fad?* 1996);
- Difficulty in forecasting human, financial, and other resources (Grover *et al.*, 1995).

(15) Unrealistic expectations:

- Unrealistic scope and expectations (Bashein *et al.*, 1994; Hall *et al.*, 1993; *Business Process Re-engineering RIP*, 1996; Hoffman, 1997);
- Expecting BPR to solve all organisational problems (Davenport, 1993; Grover *et al.*, 1995; Rigby, 1993).

(16) Ineffective use of consultants:

- Poor implementation by consultants (*Business Process Re-engineering RIP*, 1996; Boyle, 1995);
- Lack of external consultants' support for BPR process (Grover *et al.*, 1995).

(17) Miscellaneous problems:

- Lack of adequate BPR methodology (Klein, 1994; Davenport, 1993; Grover *et al.*, 1995);
- Inappropriate identification of customer's needs for BPR (Grover *et al.*, 1995; Davenport, 1993; Furey, 1993);
- Lack of BPR vision (Grover *et al.*, 1995; Schnitt, 1993; Harrison and Pratt, 1993);
- Difficulty in financially justifying value of BPR (Grover *et al.*, 1995);
- Piecemeal implementation (Hendry 1995a,b).

Factors related to IT infrastructure

(18) Problems related to IT investment and sourcing decisions:

- Optimizing lower-level processes that can be outsourced for cheaper cost and less efforts (*Is Re-engineering A Fad?* 1996);
- Premature IT outsourcing (McFarlane and Nolan, 1995; Earl, 1996);
- Costing models fail to consider the totality of system elements (Tilley, 1996).

(19) Improper IS integration

- Inadequate treatment of compatibility issues (Tilley, 1996);
- Insufficient telecommunication infrastructure capabilities (Davenport, 1993; Grover *et al.*, 1995; Venkatraman, 1994);
- Insufficient database infrastructure capabilities (Davenport, 1993; Grover *et al.*, 1995);

-
- Insufficient IS application infrastructure capabilities (Davenport, 1993; Davidson, 1993).
- (20) Inadequate IS development:
- Failure to deliver the right IS applications on time (Moad, 1993);
 - Rushing off IS development process (Moad, 1993);
 - Inability to change IS development approach to process-based (Jackson, 1997).
- (21) Ineffective re-engineering of legacy IS:
- Existing IT systems (Zairi and Sinclair, 1995; Davenport and Stoddard, 1994; Hoffman, 1997; Boyle, 1995);
 - Legacy systems were not initially designed with reuse in mind (Tilley, 1996);
 - Lack of documentation, or obsolete documentation (Tilley, 1996);
 - Loss of human system expertise (Tilley, 1996);
 - Inability to recover total system architecture (Tilley, 1996);
 - Re-engineering unfinished systems (Tilley, 1996);
 - Insufficient understanding about existing IT infrastructure (Davenport, 1993; Grover *et al.*, 1995).
- (22) Miscellaneous problems:
- Failure to mutually consider and align both business strategies and IT infrastructure strategies (McDonald, 1993; Venkatraman, 1993; Davenport and Short, 1990; Cole *et al.*, 1993; Grover *et al.*, 1995; Boyle, 1995);
 - Lack of IT expertise (Davidson, 1993; Grover *et al.*, 1995);
 - Difficulty of modelling and simulating the new business processes (Davenport, 1993; Grover *et al.*, 1995);
 - Failure to continually assess emerging IT capabilities (Davenport, 1993; Grover *et al.*, 1995);
 - Failure to aggressively use IT enablers (Grover *et al.*, 1995).

Conclusion

Figure 1 provides a summary of the factors discussed in this paper. It can be used as a checklist by which organisations undertaking, or planning to undertake, BPR efforts can ensure that their BPR-related change efforts are comprehensive, well-implemented, and have the minimum chance of failure. Future work includes assessing the criticality of these factors in BPR implementation based on a global survey of organisations in both the USA and Europe.

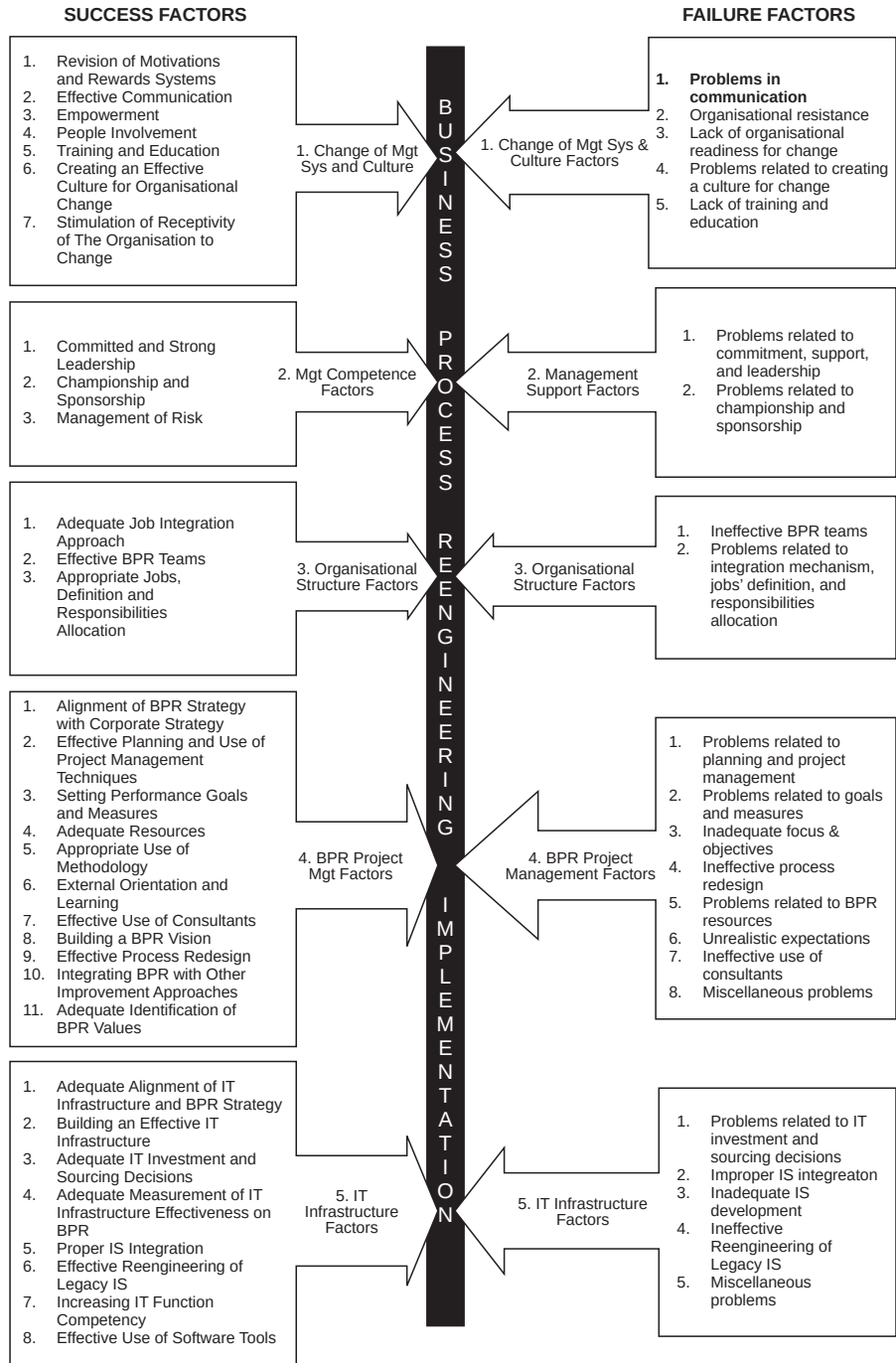


Figure 1.
A summary of key
success/failure factors in
BPR

References

- Alter, A. (1990), "The corporate make-over", *CIO*, Vol. 4 No. 3, December, pp. 32-42.
- Alter, A. (1994), "Re-engineering tops list again", *Computerworld*, Vol. 28 No. 5, January 31, p. 8.
- Andrews, D. and Stalik, S. (1994), "Business reengineering: the survival guide", Yourdon Press, Englewood Cliffs, NJ.
- Arendt, C., Landis, R. and Meister, T. (1995), "The human side of change – part 4", *IIE Solutions*, May, pp. 22-7.
- Barrett, J. (1994), "Process visualization: getting the vision right is key", *Information Systems Management*, Spring, pp. 14-23.
- Bashein, B., Markus, M. and Riley, P. (1994), "Precondition for BPR success and how to prevent failures", *Information Systems Management*, Spring, pp. 7-13.
- Benjamin and Levinson (1993), "A framework for managing IT-enabled change", *Sloan Management Review*, Summer, pp. 23-33.
- Berrington, C. and Oblich, R. (1995), "Translating reengineering into bottom-line results", *Industrial Engineering*, January, pp. 24-7.
- Bhatt, G. (1996), "Enterprise information systems integration and business process improvement initiative: an empirical study", Management Department at the Southern Illinois University, Internet: [<http://hsb.baylor.edu/ramsower/acis/papers/bhatt.htm>].
- Bjørn-Andersen, N. and Turner, J. (1994), "Creating the twenty-first century organization: the metamorphosis of action", in Baskerville, R., Smithson, S., Ngwenyama, O. and DeGross, J. (Eds), "Transforming organisations with information technology", Elsevier Science BV, North-Holland, pp. 379-94.
- Boyle, R. (1995), "Avoiding common pitfalls of reengineering", *Management Accounting*, Vol. 77 No. 4, pp. 24-38.
- Boynton, A., Jacobs, G. and Zmud, R. (1992), "Whose responsibility is IT management?", *Sloan Management Review*, Summer, pp. 32-8.
- Brancheau, J., Janz, B. and Wetherbee, J. (1996), "Key issues in information systems management: 1994-1995 SIM Delphi results", *MIS Quarterly*, June, pp. 225-42.
- Broadbent, M. and Weill, P. (1997), "Management by Maxim: how business and IT managers can create IT infrastructures", *Sloan Management Review*, Spring, pp. 77-92.
- Bruss, L. and Roos, H. (1993), "Operations, readiness and culture: don't reengineer without considering them", *Inform*, April, pp. 57-64.
- Buday, R. (1993), "Reengineering one firm's product development and another's service delivery", *Planning Review*, Vol. 21 No. 2, pp. 14-19.
- Business Process Re-engineering RIP* (1996), *People Management*, 2nd May.
- Caron, J., Jarvenpaa, S. and Stoddard, D. (1994), "Business reengineering at CIGNA corporation: experiences and lessons from the first five years", *MIS Quarterly*, Vol. 18 No. 3, September, pp. 233-50.
- Carr, D. (1993), "Managing for effective business process redesign", *Cost Management*, Fall, pp. 16-21.
- Carr, D. and Johansson (1995), *Best Practices in Reengineering: What Works and What Doesn't in the Reengineering Process*, McGraw-Hill, New York, NY.
- Champy, J. (1995), *Reengineering Management – the Mandate for New Leadership*, Harper Business, London.
- Clemmer, J. (1994), "Process re-engineering and process improvement – not an either/or choice", *CMA Magazine*, June, pp. 36-9.

- Clemons, E. (1995), "Using scenario analysis to manage the strategic risks of reengineering", *Sloan Management Review*, Vol. 36 No. 4, Summer, pp. 61-71.
- Cole, C., Clark, M. and Nemec, C. (1993), "Reengineering information systems at Cincinnati Milacron", *Planning Review*, Vol. 21 No. 3, pp. 22-6, 48.
- Cooper, R. and Markus, M. (1995), "Human Reengineering", *Sloan Management Review*, Summer, pp. 39-50.
- Coulson-Thomas, C. (Ed.) (1994), *Business Process Reengineering: Myth and Reality*, Kogan Page, London.
- CSC Index (1994), *State of Reengineering Report*, North America and Europe, CSC Index, Inc., London.
- Davenport, T. (1993), *Process Innovation: Reengineering Work Through Information Technology*, Harvard Business School Press, Boston, MA.
- Davenport, T. and Nohria, N. (1994), "Case management and the integration of labor", *Sloan Management Review*, Winter, pp. 11-23.
- Davenport, T. and Short, J. (1990), "The new industrial engineering: information technology and business process redesign", *Sloan Management Review*, Vol. 31 No. 4, pp. 11-27.
- Davenport, T. and Stoddard, D. (1994), "Reengineering: business change of mythic proportions?", *MIS Quarterly*, Vol. 18 No. 2, June, pp. 121-7.
- Davidson, W. (1993), "Beyond re-engineering: the three phases of business transformation", *IBM Systems Journal*, Vol. 32 No. 1, Winter, pp. 65-79.
- Dawe, R. (1996), "Systems are people too", *Transportation and Distribution*, Vol. 37 No. 1, pp. 86-90.
- Dixon, J., Arnold, P., Heineke, J., Kim, J. and Mulligan, P. (1994), "Business process reengineering: improving in new strategic directions", *California Management Review*, Summer, pp. 93-108.
- Earl, M. (1995), "Information systems strategy: why planning techniques are not the answer", *Executive Reports*, Centre for Research in Information Management, London Business School, London.
- Earl, M. (1996), "The risk of outsourcing IT", *Sloan Management Review*, Spring, pp. 26-32.
- Earl, M. (1997), "Information equity: getting value out of information", *Executive Reports*, Centre for Research in Information Management, London Business School, London.
- Earl, M., Rockart, J. and Ross, J. (1997), "Eight imperatives for today's IT organisation: accommodating a radical shift of responsibility", *Executive Reports*, Centre for Research in Information Management, London Business School, London.
- El Sawy, O. (1997), "Business process reengineering – do software tools matter?", *Conference in Information Systems in Florida*, Internet: [<http://hsb.baylor.edu/ramsower/ais.ac.97/papers/elsaw.htm>]
- Furey, T. (1993), "A six-step guide to process reengineering", *Planning Review*, March/April, 1993, pp. 20-3.
- Feltes, P. and Karuppan, C. (1995), "Reengineering: getting down to the business of doing business", *Industrial Management*, Vol. 37 No. 4, pp. 3-12.
- Fiedler, K., Grover, V. and Teng, J. (Ed.) (1997), "Information systems effectiveness", *ISWORLD NET*, Internet: <http://theweb.badm.sc.edu/grover/isworld/isoehom3.htm>]
- Goodhue, D., Quillard, J. and Rockart, J. (1988), "Managing the data resource: a contingency perspective", *MIS Quarterly*, Vol. 12 No. 3, September, pp. 373-91.
- Gordon, S. (1994), "Benchmarking the information systems function", Centre for Information Management Studies at Babson College, MA. Internet: [<http://www.babson.edu/faculty/gordon/f94bench.html>]

-
- Gould, L. (1993), "Measuring business reengineering is part of its success", *Managing Automation*, May, pp. 45-7.
- Grover, V., Jeong, S., Kettinger, W. and Teng, J. (1995), "The implementation of business process reengineering", *Journal of Management Information Systems*, Vol. 12 No. 1, pp. 109-44
- Grover, V., Teng, J. and Fiedler, K. (1993), "Information technology enabled business process redesign: an integrated planning framework", *Omega: The International Journal of Management Science*, Vol. 21 No. 4, pp. 433-47.
- Grugle, L. (1994), "How effective communication can ensure your strategy and local objectives are met", in *How to succeed at business process re-engineering*, University of Bradford Management Centre, Bradford.
- Guha, S., Kettinger, W. and Teng, T. (1993), "Business process reengineering: building a comprehensive methodology", *Information Systems Management*, Summer, pp. 13-22.
- Gulden, G. and Reck, R. (1992), "Combining quality and reengineering efforts for process excellence", *Information Strategy: The Executive's Journal*, Vol. 10 No. 1, pp. 10-16.
- Hagel, J. (1993), "Core process redesign: keeping CPR on track", *The McKinsey Quarterly*, No. 1, pp. 59-72.
- Hall, J., Rosenthal, J. and Wade, J. (1993), "How to make reengineering really work", *Harvard Business Review*, November-December, pp. 119-31.
- Hammer, M. (1990), "Reengineering work: don't automate, obliterate", *Harvard Business Review*, Vol. 68 No. 4, July/August, pp. 104-12.
- Hammer, M. and Champy, J. (1993), "Reengineering the corporation: a manifesto for business revolution", Harper Business, New York, NY.
- Hammer, M. and Stanton, S. (1995), "The reengineering revolution", HarperCollins, New York, NY.
- Harrison, D. and Pratt, M. (1993), "A methodology for reengineering businesses", *Planning Review*, March/April, pp. 6-11.
- Harvey, D. (1995), "Reengineering: the critical success factors", *Management Today/Business Intelligence*, London.
- Has Re-engineering had its 15 Minutes of Fame?* (1995), *Management Today*, February.
- Henderson, J. and Venkatraman, N. (1993), "Strategic alignment: leveraging information technology for transforming organisations", *IBM Systems Journal*, Vol. 32 No. 1, pp. 4-16.
- Hendry, J. (1995a), "Culture, community and networks: the hidden cost of outsourcing", *European Management Journal*, Vol. 13 No. 2, June, pp. 193-200.
- Hendry, J. (1995b), "Process reengineering and the dynamic balance of the organization", *European Management Journal*, Vol. 13 No. 1, pp. 52-7.
- Hinterhuber, H. (1995), "Business process management: the European approach", *Business Change and Re-engineering*, Vol. 2 No. 4, pp. 63-73.
- Hoffman, Z. (1997), "Business process re-engineering: a new strategic paradigm shift in change management", Bay Zoltan Foundation for Applied Research Institute for Logistics and Production Engineering, Internet: [<http://sun.bzlogi.hu/informatics/publications/management.html>]
- Holland, D. and Kumar, S. (1995), "Getting past the obstacles to successful reengineering", *Business Horizons*, May/June, pp. 79-85.
- Is Re-engineering A Fad?* (1996), *Chief Executive (CE)*, No. 113, May, pp. 52-64.
- Jackson, D. (1994), "BPR: hype or reality", *The TQM Magazine*, Vol. 6 No. 6, pp. 19-22.
- Jackson, N. (1997), "Business process re-engineering '96", *Management Services*, February, pp. 34-6.

- Janson, R. (1992), "How reengineering transforms organisations to satisfy customers", *National Productivity Review*, Winter, pp. 45-53.
- Johansson, H., McHugh, P., Pendlebury, J. and Wheeler, W. (1993), *Business Process Reengineering: Break Point Strategies for Market Dominance*, John Wiley and Sons, Chichester.
- Johnston, R. and Gibson, M. (1975), "Characteristics of information usage in technological innovation", *IEEE Transaction on Engineering Management*, Vol. 22 No. 1, pp. 27-34.
- Katzenbach, J. and Smith, D. (1993), "The rules for managing cross-functional reengineering teams", *Planning Review*, Vol. 21 No. 2, March/April, pp. 12-13.
- Kayworth, T., Sambamurthy, V. and Chatterjee, D. (1997), "A conceptual framework of information technology infrastructure: the critical link of technology standards", Internet: [<http://hsb.baylor.edu/ramsower/ais.ac.97/papers/kayworth.htm>]
- Kennedy, C. (1994), "Re-engineering: the human costs and benefits", *Long Range Planning*, Vol. 27 No. 5, pp. 64-72.
- Kettinger, W., Teng, J. and Guha, S. (1997), "Business process change: a study of methodologies, techniques, and tools", *MIS Quarterly*, March, pp. 55-80.
- Klein, M. (1994), "Reengineering methodologies and tools: a prescription for enhancing success", *Information Systems Management*, Spring, pp. 30-5.
- Laud, R. and Theis, P. (1997), "Great expectations: structuring IT organisations that really deliver", *Business Horizons*, July-August, pp. 25-36.
- Liu, Z., Ballantyne, M. and Seward, L. (1996), "An assistant for reengineering legacy systems", Internet: [<http://www.spo.eds.com/edsr/papers/asstreeng.html>]
- Malhotra, Y. (1996), "Enterprise architecture: an overview", University of Pittsburgh, Katz School of Business, Internet: [<http://www.brint.com/papers/enterarch.htm>]
- Martinez, E. (1995), "Successful reengineering demands IS/business partnerships", *Sloan Management Review*, Vol. 36 No. 4, pp. 51-60.
- McDonald, H. (1993), "Business strategy development, alignment, and redesign", in Scott-Morton, M. (Ed.), *The Corporation of the 1990s: Information Technology and Organisational Transformation*, Oxford University Press, New York, NY, pp. 159-88.
- McFarlane, W. and Nolan, R. (1995), "How to manage an IT outsourcing alliance", *Sloan Management Review*, Winter, pp. 9-23.
- Meador, C. (1994), "IT/strategy alignment – identifying the role of information technology in competitive strategy", *Management Support Technology*, Internet: [http://www.mstnet.com/mstnet/articles/wp_it/wp_it.html]
- Moad, J. (1993), "Does reengineering really work", *Datamation*, 1 August.
- Morris, D. and Brandon, J. (1991), "Reengineering the hospital: making change work for you", *Computers in Healthcare*, Vol. 12 No. 11, pp. 59, 64.
- Mumford, E. (1995), "Creative chaos or constructive change: business process reengineering versus socio-technical design", in Burke, G. and Peppard, J. (Eds), *Examining Business Process Re-engineering: Current Perspectives and Research Directions*, Kogan Page, pp. 192-216.
- Ostroff, F. and Smith, D.S. (1992), "The horizontal organization", *The McKinsey Quarterly*, No. 1, pp. 148-67.
- Ovenden, T. (1994), "Business process re-engineering: definitely worth considering", *The TQM Magazine*, Vol. 6 No. 3, pp. 56-61.
- Process Modelling and Legacy Systems* (1996), Internet: [<http://dsse.ecs.soton.ac.uk/~kp/legacy.html>]
- Randall, A. (1993), "Business process redesign: how to do it", Unpublished.

-
- Rastogi, P. (1994), "Nature, significance and rationale of business process reengineering", *Productivity*, Vol. 35 No. 3, October/December, pp. 467-76.
- Reich, B. and Benbasat, I. (1996), "Measuring the linkage between business and information technology objectives", *MIS Quarterly*, March, pp. 55-81.
- Rigby, D. (1993), "The secret history of process reengineering", *Planning Review*, March/April, pp. 24-7.
- Rockart, J. and Short, J. (1989), "IT in the 1990s: managing organizational interdependence", *Sloan Management Review*, Winter, pp. 7-17.
- Rohm, C. (1992/1993), "The principal insures a better future by reengineering its individual insurance department", *National Productivity Review*, Vol. 12 No. 1, Winter, pp. 55-64.
- Ross, J. (1998a), "IT infrastructure management", presented in the '98 annual conference of information systems management at the London Business School Centre for Research in Information Management, London.
- Ross, J. (1998b), "Strategic management of IT assets", presented in the '98 annual conference of information systems management at the London Business School Centre for Research in Information Management, London.
- Sabherwal, R. and King, W. (1991), "Towards a theory of the strategic use of information resources: an inductive approach", *Information and Management*, Vol. 20 No. 3, pp. 191-212.
- Saunders, C. and Jones, W. (1992), "Measuring performance of the information systems function", *Journal of Management Information Systems*, Vol. 8 No. 4, pp. 63-82.
- Schnitt, D. (1993), "Reengineering the organisation using information technology", *Journal of Systems Management*, January, pp. 14-20, 41-2.
- Shabana, A. (1996), "The effect of outside consultants involvement over the success of BPR projects", College of Business Administration, Texas A&M University, Internet: [<http://hsb.baylor.edu/~ramsower/acis/papers/ashabana.htm>]
- Stanton, T., Hammer, M. and Power, B. (1993) "Reengineering: getting everyone on board", *IT Magazine*, Vol. 25 No. 4, April, pp. 22-7.
- Stow, R. (1993), "Re-engineering by objectives", *Planning Review*, May/June, pp. 14-16.
- Talwar, R. (1993), "Business re-engineering – a strategy-driven approach", *Long Range Planning*, Vol. 26 No. 6, pp. 22-40.
- Technology Talks to Business with EAS* (1997), *Datamation*, April.
- Teng, J. and Grover, V. (1992), "Factors influencing database planning: an empirical study", *International Journal of Management Science*, Vol. 20 No. 1, pp. 59-72.
- Teng, J., Grover, V. and Fiedler, K. (1994), "Business process reengineering: charting a strategic path for the information age", *California Management Review*, Spring, pp. 9-31.
- The DoD (1994), "Corporate information management for the 21st century: enterprise integration – implementing strategy", Internet: [<http://www.dtic.mil/c3i/bprcd/mlibtop.htm>]
- The Trouble with Reengineering* (1995), *Technology Strategies*, January.
- Thomas, M. (1994), "What you need to know about: business process re-engineering", *Personnel Management*, January, pp. 28-31.
- Tilley, S. (1996) "Perspectives on legacy system reengineering", Reengineering Centre, Software Engineering Institute, Carnegie Mellon University, Internet: [<http://www.sei.cmu.edu/~reengineering/pubs/lsysree/lsysree.html>]
- Towers, S. (1994), *Business Process Re-engineering: a Practical Handbook for Executives*, Stanley Thomas Ltd, Cheltenham.

- Towers, S. (1996), "Re-engineering: middle managers are the key asset", *Management Services*, December, pp. 17-18.
- Venkatraman, N. (1993), "IT-induced business reconfiguration", in Scott-Morton, M. (Ed.), *The Corporation of the 1990s: Information Technology and Organisational Transformation*, Oxford University Press, New York, NY, pp. 122-58.
- Venkatraman, N. (1994), "IT-enabled business transformation: from automation to business scope redefinition", *Sloan Management Review*, Vol. 35 No. 2, Winter, pp. 73-87.
- Walker, G. and Weber, D. (1984), "A transaction cost approach to make-or-buy decisions", *Administrative Science Quarterly*, Vol. 29, pp. 373-91.
- Worsley, C (1994), "Preparing staff for BPR", in *How To Succeed At Business Process Re-Engineering*, University of Bradford Management Centre, Bradford.
- Zairi, M. and Sinclair, D. (1995), "Business process re-engineering and process management: a survey of current practice and future trends in integrated management", *Management Decision*, Vol. 33 No. 3, pp. 3-16.

Critical Success Factors for ERP Implementation: A Classification



ISBN: 978-81-924713-8-9

Boby Chaitanya Villari
Indian Institute of Management Kozhikode
(boby cv06fpm@iimk.ac.in)

Sanjay Jharkharia
Indian Institute of Management Rohtak
(sanjay.jharkharia@iimrohtak.ac.in)

In recent years research on ERP implementation has gained prominence because ERP, in most cases, has resulted in improving the efficiency and productivity of the user company. However, the decision to implement ERP alone is not a recipe of success, a lot depends on the planning and quality of implementation. Several factors are found to have an important role in the success of ERP implementation. In the ERP literature these factors are commonly described as Critical Success Factors (CSF). Several researchers have contributed to the body of literature pertaining to these CSF. However, the research in this area is still fragmented and unorganized. Hence, there is a need to identify and classify the relevant success factors, which is paramount for the success of ERP implementation. In this work we have classified various CSFs identified from literature in seven broad categories. This may help the practitioners and researchers in getting a quick understanding of these CSFs.

1. Introduction

In recent years research on ERP implementation has gained prominence because ERP, in most cases, has resulted in improving the efficiency and productivity of the user company. However, the decision to implement ERP alone is not a recipe of success, a lot depends on the planning and quality of implementation. Several factors are found to have an important role in the success of ERP implementation. In the ERP literature these factors are commonly described as Critical Success Factors (CSF). Several researchers have contributed to the body of literature pertaining to these CSF. However, the research in this area is still fragmented and unorganized. Cologero, in his article named “Who is to blame for ERP Failure?” [1] States that though ERP software implementations reduce the costs of the firm and can contribute to the company’s sustainability, an ERP implementation failure can even lead to bankruptcy of the company. Thus this is natural that the researchers, from time to time, seem to have taken special interest in to the Critical Success Factors (CSFs) that contribute to the success of an ERP implementation. There are large number of publications on the CSFs for ERP implementation in various Academic Journals, Conference proceedings, Doctoral and Masters Theses dissertations that were published in recent years.

ERP implementation is tricky and complex phenomenon and many firms had to encounter failure [2]. There are many reasons for the failure of an ERP implementation and the most prominent among them could be the disparity between the estimated budget and the cost overrun that occurred during the software implementation process [3]. Cologero also spoke about the schedule overrun that has been a prominent reason that denied the successful implementation of ERPs by many firms. It is to be noted that ERP implementation requires a strong support from the Strategic management support which will ensure the timely allocation of financial and human resources for changing requirements of ERP implementation projects.

According to Freund [4] (1988), a Critical Success Factors as those things that must be done for a company to be successful. CSFs for ERP implementation success would then be those important steps and measures that must be identified and executed. The identification of CSFs for ERP implementation success has not been an unexplored arena. Prior studies have been reporting different sets of CSFs for the same. There have been efforts to develop Taxonomies of CSFs and that developed by Al-Mashari et al. [5] is an example of the same. We have identified efforts to segregate the CSFs into Strategic and Tactical factors [6] as well. Our attempt in this paper is to extend the research to a more comprehensive way which is inclusive of all such factors that can be logically categorized into a conclusive classification. We propose a classification in this paper while including the relevant research work reported till date i.e., 2014. We organized this paper by allocating an individual section for the Research methodology, Data presentation and results, Discussion & conclusion, Limitations & Implications.

2. Methodology of Research

We conducted an in depth and all-inclusive search with each of the keywords ‘Critical Success factors’, ‘Success factors’, ‘Critical Factors for Success’ searched along with ‘Enterprise Resource Planning’. The search is done on Google Scholar, an academic publication database. Relevant literature published in Journals between 1995 and 2014 was taken in to consideration for the analysis. ERP is quite an established topic of research and we focused only on CSFs as our research questions concentrated on the identification of most relevant CSFs for successful implementation of ERP software in firms and the corresponding implications to Indian scenario. The scope of this research is wide as it spanned relatively a very long duration of time (about 19 years) in which the articles published in various journals were taken into account. We observed

that Information technology management and Information Systems Research are the themes of the journals in which ERP research articles were published in a large number.

We scrutinized the large number of articles we could obtain from the academic journals and excluded many of them. The inclusion criteria are that the articles should have been published in English and the methodology should consist of either a quantitative or qualitative approach to the research. The articles should also mention the geographical regions where the ERP software implementation was done. We did not take into consideration the conference proceedings as certain conference proceedings were later developed into journal publications. Moreover due to the large number of journal publications that we could obtain, we were satisfied with the quantity and quality of the data we had in hand. Nevertheless we have considered a couple of PhD theses and a few conference publications for referring to the then trends during the initial stages of data collection.

Table 1 Distribution of Articles by Regions/Countries

USA	Europe & UK	Australia & Denmark	China & South Asia	Middle East
Amoako & Salam(2004)	Akkermans & Helden (2002)	Ho & Lin (2004)	Davison (2002)	Davison (2002)
Ehie & Medsen(2005)	Allen et.al (2002)	Kraemmerand et al (2003)	Hong & Kim (2002)	Al-Mashari & Al-Mudimigh (2003)
Gattiker & Goodhue (2002)	Botta et.al (2006)	Parr& Shanks(2000)	Law & Ngai (2001)	Park & Hwang (2013)
Mabert et al. (2000)	Holland & Light (1999)	Xu et.al (2002)	Reimers (2003)	
Motwani et al (2005)	Skok & Legge (2002)	Zhao et.al (2002)	Xue et.al (2005)	
Nah et.al.(2001)	Van Everdingen et.al (2000)		Zhang et.al (2003)	
Sarkar & Lee (2003)	Ward et.al (2005)			
Somers & Nelson (2000)				
Somers & Nelson (2004)				
Sumner (1993)				
Sun & Yazdani (2005)				
Trimmer et.al (2002)				
Umble et al (2003)				
Verville & Halingten (2002)				

A total of 38 journal articles are considered for this work and the researchers have worked on ERP software implemented in various geographical regions (Table 1) and published their work in many journals in various years. Nah et.al [13] have identified and classified the factors affecting the successful implementation of ERP software in firms. The information in the following table is extracted from Nah et.al's work and we understood that even though the researchers considered publications spanning the period before 2003, we could identify similar factors and features in ERP implementations that were studied even recently. Hence we decided to use and categorize our finding based on the 11 CSFs identified by Nah et.al [13].

3. Data presentation & Results

We reviewed 38 articles across various journals. Again the researchers have worked on ERP software implemented in various geographical regions (Table 1) and published their work in many journals .The cases studied were the firms from the USA, Europe & UK, Australia & Denmark, South Asian countries including China & India, Countries from the Middle East and Gulf. A few articles discussing cases from India are discussed very recently [7].

We summarized the list of CSFs identified in various publications (see References section) .Nah et al. (2003) have identified major part of these CSFs which were observed repeatedly in many of the research works published even later to 2003.The broad category of the factors are 'Appropriate business and information technology legacy systems, Business plan and vision, Business process reengineering (BPR),Change management culture and program, Communication related, ERP teamwork and composition, Monitoring and evaluation of performance, Project champion, Project management, Software development, testing, and troubleshooting, Top management support. In addition to these 11 factors which we took as a guidance to classify the CSFs, we could also identify a few more factors and the classification is given along with the details of the articles in which these CSFs were mentioned. Top Management Support or Strategic Management Support, Change Management, Training and Education were the most commonly observed CSFs in most of the studies. The details of each of these success factors is given below. The most commonly observed CSFs are given preference and the ordering is based on the most commonly observed CSFs.

CSF 1: Strategic or Top Management Support (TMS)

Top Management Support (TMS henceforth) is one of the most commonly observed CSF in ERP implementation literature. The senior management should have an understanding of their role in driving the ERP project to success and hence they have a wider role spanning over the longest period of time during the ERP implementation. The top management has the authority to support the project with the required resources and planning. They are also expected to provide cushion for the disruptions that the project team may encounter if any. In general the mechanisms that are encountered for dealing with unexpected difficulties during any critical project implementation are to be followed by the senior management personnel. According to Holland and Light [8], the Top management's disposition and inclination for the success of the project will play a key role in the overall success of ERP for the firm and hence this become a top priority CSF. Table 2 gives details of the academic research which consider ERP success factors related to CSF1.

Table 2 ERP Success Factors Categorized as CSF1 (TMS) and the Respective Articles in which they were Identified

		USA	Europe & UK	Australia & Denmark	China & South Asia	MiddleEast
CSF1: Strategic or Top management support (TMS)	Business plan	[Motwani et al (2005), Nah et.al.(2001)]	[Holland & Light (1999)] [Ward et.al (2005)]	[Kraemmerand et al (2003)]	[Reimers (2003)] [Law & Ngai (2001)]	
	Total commitment				[Zhang et.al (2003)] [Law & Ngai (2001)]	
	Top management support	[Ehie & Medsen(2005), Mabert et al. (2000), Motwani et al (2005), , Nah et.al.(2001), Sarkar & Lee (2003), Somers & Nelson (2004), Sumner (1993), Trimmer et.al (2002), Umble et al (2003)]	[Akkermans & Helden (2002), Holland & Light (1999),] [Allen et.al (2002), Ward et.al (2005)]	[Parr & Shanks(2000),,, Xu et.al (2002)] [Kraemmerand et al (2003)]	[,Reimers (2003),, Zhang et.al (2003), [Law & Ngai (2001)]	[Al-Mashari & Al-Mudimigh (2003)]

CSF 2: Communication and Change Management (C&CM)

In our opinion Communication and Change Management stands on par with TMS in terms of importance and the frequency of occurrence in research publications. A detailed curriculum for implementing ERP and the necessary training programs to educate the same are to be formulated. This involves choosing a Project Champion from each department & team. The details of resources for training i.e., data sheets, presentations, demonstration videos and computer based training modules are to be communicated to the concerned employees at the earliest. As on-site training i.e, training in real time had been gaining momentum, the web based training modules should also be explained to employees in advance. As per Robey [9] the planning for such efficient change management and communication involves incorporation of business practices of the company it to the content of the training programs.

Table 3 ERP Success Factors Categorized as CSF2 (C&CM) and the Respective Articles in which they were Identified

		USA	Europe & UK	Australia & Denmark	China & South Asia	MiddleEast
CSF2: Communication and Change Management (C&CM)	Change management culture & Programme	[Nah et.al.(2001)]				
	Change management	Motwani et al (2005), Somers & Nelson (2004), Umble et al (2003)]	[Botta et.al (2006), Skok & Legge (2002)] [Ward et.al (2005)]	[, Xu et.al (2002)]		[Al-Mashari & Al-Mudimigh (2003)]
	User participation & involvement		[Ward et.al (2005)]	[Kraemmerand et al (2003)]	[Zhang et.al (2003), Zhao et.al (2002),] [Law & Ngai (2001)]	[Davison (2002)]
	User Commitment to change			[Parr & Shanks(2000),]		
	Training IT work force in new skills	[Sumner (2013)]				
	Training & education	[Mabert et al. (2000), Motwani et al (2005), Somers & Nelson (2004)]	[Botta et.al (2006), Holland & Light (1),]	[Ho & Lin (2004), Xu et.al (2002)]	[,Reimers (2003), Xue et.al (2005), Zhang et.al (2003)]	[Davison (2002), Al-Mashari & Al-Mudimigh (2003)]

		Nelson (2000), Somers & Nelson (2004), Sumner (), Trimmer et.al (2002), Umble et al (2003)]	[Allen et.al (2002), Ward et.al (2005)]	[Kraemmerand et al (2003)]	(2003), Zhao et.al (2002),]	Al-Mudimigh (2003)]
	Clarity in training & education strategy	[Mabert et al. (2000)]				
	Training on BPR	[Somers & Nelson (2004)]			[Davison (2002)]	
	Communication	[7, Nah et.al.(2001), Somers & Nelson (2000)]	[Botta et.al (2006), Holland & Light (1)] [Ward et.al (2005)]	[Kraemmerand et al (2003)]	[Law & Ngai (2001)]	[Al-Mashari & Al-Mudimigh (2003)]
	Quality of communication across departments	[Somers & Nelson (2000), Somers & Nelson (2004)]	[Akkermans & Helden (2002)]		[Reimers (2003)]	
	Effective and regular communication to concerned employees	[Mabert et al. (2000), Somers & Nelson (2000)]			[Law & Ngai (2001)]	
	Honest communication	[Motwani et al (2005), Sarkar & Lee (2003)]				

CSF 3: Project Management (PM)

The CSF Project Management has been cited very frequently in studies and this has been cited with emphasis on the fact that the ERP implementation processes are complex and exhaustive. This requires a careful project management module to be in place when ERP implementation is required. Effective planning and project management will allow the firms to manage the resources efficiently and with purpose. Goals, Objectives and timelines are essential for success in ERP implementation and hence this CSF is also studied by researchers across various regions. This CSF is prominently observed across various academic studies and we could identify more than 20 different factors which could be put into this category (see Table 4).

Table 4 ERP Success Factors Categorized as CSF3 (PM) and the Respective Articles in which they were Identified

		USA	Europe & UK	Australia & Denmark	China & South Asia	MiddleEast
CSF 3: Project management (PM)	ERP implementation methodology		[Holland & Light (2001)]			
	Phased vs. Big Bang mode of implementation		[Ward et.al (2005)]		[Reimers (2003)]	
	Implementing accelerated strategy	[Mabert et al. (2000)]				
	In depth understanding of the important issues relating to ERP implementations					
	Careful selection of appropriate package	[Somers & Nelson (2004),]	[Akkermans & Helden (2002), Botta et.al (2006), Van Everdingen et.al (2000)]		[Law & Ngai (2001)]	[Davison (2002)]
	ERP teamwork and composition (Personnel)	[Nah et.al.(2001), Umble et al (2003)]	[Holland & Light (1)] [Ward et.al (2005)]		[Law & Ngai (2001)]	[Davison (2002)]
	Directing committee	[Mabert et al. (2000), Somers & Nelson (2000), Somers & Nelson (2004)]			[Reimers (2003)] [Law & Ngai (2001)]	
	Project team	[Somers & Nelson (	[Akkermans		[Reimers	

capability	2004),Umble et al (2003)]	& Helden (2002),]		(2003),Xue et.al (2005)] [Law & Ngai (2001)]	
Endowed decision makers			[Parr & Shanks(2000),] [Kraemmerand et al (2003)]		
Choosing the right employees	[Trimmer et.al (2002)]				
Employee confidence	[Trimmer et.al (2002)]			[Reimers (2003)]	
Business and technical knowledge of consultants	[Somers & Nelson (2004),Sumner (), Trimmer et.al (2002)]	[Allen et.al (2002)]	[Kraemmerand et al (2003)]	[Law & Ngai (2001)]	
Balanced implementation team	[Sarkar & Lee (2003)]		[Parr & Shanks(2000),,] [Kraemmerand et al (2003)]		
Handling consultants		[Skok & Legge (2002)]		[Reimers (2003)]	
Staff retaining		[Skok & Legge (2002)]			
Employee/personnel relations		[Allen et.al (2002)]	[Xu et.al (2002)]		
Monitoring and evaluation of performance	[Ehie & Medsen(2005),Nah et.al.(2001),Somers & Nelson (2000)]				
clear milestones	[Mabert et al. (2000)]				
Focused performance measures	[Motwani et al (2005),Umble et al (2003)]		[Kraemmerand et al (2003)]		[Al-Mashari & Al-Mudimigh (2003)]
Client approval		[Holland & Light (1)] [Allen et.al (2002)]		[Reimers (2003)]	
Monitoring and feedback		[Holland & Light (1)] [Allen et.al (2002)]		[Reimers (2003)]	
Project champion	[Nah et.al.(2001),, Motwani et al (2005),Somers & Nelson (2000),Somers & Nelson (2004)]	[Akkermans & Helden (2002)]	[Parr & Shanks(2000),,]	[Reimers (2003)]	
Project management	[Motwani et al (2005),Nah et.al.(2001),Somers & Nelson (2000), Somers & Nelson (2004),Umble et al (2003)]	[Akkermans & Helden (2002),] [,Ward et.al (2005)]		[Reimers (2003),,Zhang et.al (2003),]	[Davison (2002)]
Clear and defined project plan	[6,16,Mabert et al. (2000), , Somers & Nelson (2000),Somers & Nelson (2004),Umble et al (2003)]	[Akkermans & Helden (2002),Holland & Light (1),] [Allen et.al (2002)]	[Ho & Lin (2004),Parr & Shanks(2000),] [Kraemmerand et al (2003)]	[Reimers (2003),]	[Davison (2002)]
Lesser scope			[Parr & Shanks(2000),]		
Evade scope creep					[Al-Mashari & Al-Mudimigh (2003)]
Implementation expenses	[Trimmer et.al (2002)]				

	Accurate deadlines for implementation are set	[Somers & Nelson (2000)]				
	Convincing expectations on ROI					
	Management of expectations	[Somers & Nelson (2004)]	[Akkermans & Helden (2002)]			
	Cooperation across departments	[Somers & Nelson (2004)]	[Akkermans & Helden (2002)]			
	Dedicated resources	[Somers & Nelson (2004)]				
	Knowledge management	[Sun & Yazdani (2005)]	[Allen et.al (2002)]			[Al-Mashari & Al-Mudimigh (2003)]
	Handling conflicts in ERP projects		[Skok & Legge (2002)] [Ward et.al (2005)]			
	Clear and simple project organization					

CSF 4: ERP Vendor Selection (VS)

ERP Vendor selection has been a very critical factor for the success of ERP in a firm. In fact vendor selection will form one of the very important primary steps in the process of ERP implementation. The factors to be considered include the Vendor's reputation, Core business area, financial strength, support offered, technical strength and capabilities, mission and vision etc. Bingi et al [10], Zhang et.al [11] emphasize on the same. Table 5 puts forward the details of the academic research which consider ERP success factors related to CSF4.

Table 5 ERP Success Factors Categorized as CSF4 (VS) and the Respective Articles in which they were identified

		USA	Europe & UK	Australia & Denmark	China & South Asia	MiddleEast
CSF4: ERP Vendor Selection (VS)	ERP vendor	[Somers & Nelson (2000), Trimmer et.al (2002)]				
	Vendor-customer cooperation	[Somers & Nelson (2004)]				[Davison (2002)]
	Vendor support	[Somers & Nelson (2000), Somers & Nelson (2004), Trimmer et.al (2002)]	[Akkermans & Helden (2002)]		[Zhang et.al (2003), Zhao et.al (2002)]	

CSF 5: ERP Fitness to Business Processes (FIT)

According to Davenport [12], the fitness between the firm's business processes and the way the ERP is designed will play a critical role in the success of ERP implementations. The match between the practices followed in the firm and the processes adopted by the ERP will determine how quickly the ERP can be assimilated in to the system. Greater the fitness the easier for the organization and people to adopt to the system as there would be lesser requirement for any further business process reengineering. Factors which check if business process/rules are well understood, Business Process Reengineering, Negligible customization, Alignment between business strategy & IT strategy, fit between software and hardware ,use of vendors' customization tools, Fit between ERP and business process etc. were put in this category(see Table 6).

Table 6 ERP Success Factors Categorized as CSF5 (FIT) and the Respective Articles in which they were identified

		USA	Europe & UK	Australia & Denmark	China & South Asia	MiddleEast
CSF 5: ERP Fitness to Business processes (FIT)	Justification upon factors of cost	[Sumner (2013)]	[Ward et.al (2005)]			
	Business process/rules are well understood		[Ward et.al (2005)]	[Ho & Lin (2004)]		
	Business Process Reengineering	[Ehie & Medsen (2005), Motwani et al (2005), Nah et.al.(2001), Somers & Nelson (2000), Somers	[Botta et.al (2006), Holland & Light (1), Skok & Legge (2002), Allen et.al	[Kraemmerand et al (2003)]	[Xue et.al (2005), Zhang et.al (2003), Davison (2002), Hong &	[Davison (2002)]

		& Nelson (2004), Sumner (2002), Trimmer et.al (2002)]	(2002), Ward et.al (2005)]		Kim (2002), Law & Ngai (2001), 66]	
	Negligible customization	[36] [Mabert et al. (2000), 4, Somers & Nelson (2004)]		[Parr & Shanks (2000),]	[Hong & Kim (2002)]	
	Alignment between business strategy & IT strategy	[Somers & Nelson (2000)]		[Ho & Lin (2004)]		[Al-Mashari & Al-Mudimigh (2003)]
	Fit between software And hardware				[Zhang et.al (2003)] [Law & Ngai (2001)]	
	Use of vendors' customization tools	[Somers & Nelson (2004)]				
	Fit between ERP and business process	[Somers & Nelson (2000)]	[Van Everdingen et.al (2000)]		[Hong & Kim (2002)] [Hong & Kim (2002), Law & Ngai (2001), 66]	[Davison (2002)]

CSF 6: Culture and Country Specific Factors (CUL)

The National culture affects organizational culture and hence will affect the way in which the ERP is implemented. Also organizational procedures are also determined by the country and the law of the land. The data output requirements, reporting procedures vary across countries and the ERP should match these norms and rules. From our literature review, we identified factors (see Table 7) like Organizational culture and political arrangements, Understanding corporate culture, Decision-making process or styles, National culture, Country-related or Region specific functional requirements toning into this category.

Table 7 ERP Success Factors Categorized as CSF6 (CUL) and the Respective Articles in which they were identified

		USA	Europe & UK	Australia & Denmark	China & South Asia	MiddleEast
CSF 6: Culture and Country specific factors (CUL)	Organizational culture and political arrangements		[Allen et.al (2002)]	[Ho & Lin (2004)] [Kraemmerand et al (2003)]		
	Understanding corporate culture				[Davison (2002)]	
	Decision-making process or style s				[Reimers (2003)]	
	National culture		[Van Everdingen et.al (2000)]		[Xue et.al (2005), Zhang et.al (2003),] [Davison (2002)]	
	Country-related functional requirements				[Hong & Kim (2002),, Xue et.al (2005)] [Davison (2002), 66]	

CSF 7: Technological Factors (TF)

Technical factors include data management [13], legacy systems compatibility, data validation etc. Zhang et al. mentioned that the data accuracy if achieved quickly can positively affect the success of the ERP implementation process. It is reasonable to understand without contradictions that the data output and input are to be validated and verified regularly. The data model followed by the ERP software should be compatible with the legacy system and if not the necessary adjustments are to be done to make it certain that valid data is given as output. The Technological Factors (TF) include Data management, Data analysis and conversion, Data accuracy, Data quality control, Organizational characteristics, technology/infrastructure already existing, Prior Organizational experience of IT or change management projects of a similar scale, Software development, testing and troubleshooting, Defining the choices of architecture, Integration, Software configuration, Troubleshooting. (See Table 8)

Table 8 ERP Success Factors Categorized as CSF7 (TF) and the Respective Articles in which they were identified

	USA	Europe & UK	Australia & Denmark	China & South Asia	MiddleEast
Data management	[Sun &				

	Yazdani (2005)]				
Data analysis and conversion	[Somers & Nelson (2004)]				[Davison (2002)]
Data accuracy	[Umble et al (2003)]			[Zhang et.al (2003),]	
Data quality control			[Xu et.al (2002)]		
Organizational characteristics		[Botta et.al (2006)]			
technology/infrastructure already existing	[Ehie & Medsen (2005)]	[Botta et.al (2006), Mabert et al. (2000)] [Allen et.al (2002)]	[Ho & Lin (2004)]		[Davison (2002)]
Prior Organizational experience of IT or change management projects of a similar scale		[Allen et.al (2002)]			
Software development, testing, and troubleshooting	[Nah et.al.(2001)]				
Defining the choices of architecture	[Somers & Nelson (2004)]				
Integration	[Trimmer et.al (2002)]	[Botta et.al (2006)]		[Reimers (2003), Zhao et.al (2002)]	
Software configuration		[Holland & Light (1),] [Allen et.al (2002)]			
Troubleshooting		[Holland & Light (2001)] [Allen et.al (2002)]			

4. Business Implications & limitations in the Indian Scenario

These factors can be identified in the case studies which were done very recently in 2013 and hence this study takes a prominent role in identification of the critical success factors which if achieved and observed successfully would improve the chances of obtaining success in ERP implementation processes. Shashank Saini et.al [14] studied Indian SMEs to identify the CSFs affecting the success of ERP implementations. They have segregated these factors into Technological, Organizational and People factors. Nevertheless the factors which appeared relevant in our study were bearing importance in their empirical study as well. Thus this study we conducted can safely be extended to Indian SMEs with higher confidence.

We identified many CSFs for successful implementation of ERP. Some of these factors are fundamental for ERP implementation and hence could be found in most of the journal publications we reviewed for this work. The identification and understanding of these CSFs is a result of the amount financial and human resources spent and risk encountered by the firms in developed countries while they tried to succeed in ERP implementation. This will ease the learning of firms in developing countries while these provide a checklist and caution the firms against the most common pitfalls which may prove fatal not only for the ERP success but also for the organization. This work will also caution the firms which are newly implementing ERP by indicating that the software implementation is a comprehensive, complex and a time consuming task. Hence necessary top management support is to be provided right from the start of the ERP planning process and that support should continue till the implementation is complete. This work will also emphasize that appropriate planning and decision making will play a key role in ERP implementation success. These CSFs are linked to each other and in fact one can find that some CSFs have a stronger relationship between them than the others. This implies that firms should observe necessary caution while putting efforts to satisfy these CSFs.

The limitations of a study based on identification of CSF for ERP implementation is that the theory is evolving from the cases under consideration and the existence of the same factors (influencing these companies) cannot be guaranteed in every company. Also this work is comprehensive but not exhaustive. Hence generalization of the CSFs has been a problem in studies like this. We caution the readers to keep note that this research pertains to literature published till 2014 and to keep track of other future researches published in ways similar to the methodology adopted in this paper. Since many of the cases are from the USA and Europe, which are the developed Nations, the applicability of the same to developing countries like India is a reasonable question. But we do not have enough literature support of the ERP cases from India and we look forward to identifying the cases and comprehensively validating the results for Indian scenario.

5. References

1. Calogero, B. (2000). Who is to blame for ERP failure? Sun Server Magazine.
2. M. Markus, S. Axline, D. Petrie, C. Tanis, Learning from adopters 'experiences with ERP: problems encountered and success achieved, Journal of Information Technology 15 (2000) 245–265.
3. J. Scott, I. Vessey, Implementing enterprise resource planning systems: the role of learning from failure, Information Systems Frontier 2 (2000) 213–232.
4. Freund, Y. P. (1988). Critical success factors. Strategy & Leadership, 16(4), 20-23.

5. M. Al-Mashari, A. Al-Mudimigh, M. Zairi, Enterprise resource planning: a taxonomy of critical factors, *European Journal of Operational Research* 146 (2003) 352–364.
 6. C. Holland, B. Light, A critical success factors model for ERP implementation, *IEEE Software* 16 (1999) 30–36
 7. Saini, S., Nigam, S., & Misra, S. C. (2013). Identifying success factors for implementation of ERP at Indian SMEs: A comparative study with Indian large organizations and the global trend. *Journal of Modelling in Management*, 8(1), 6–6.
 8. C. Holland, B. Light, A critical success factors model for ERP implementation, *IEEE Software* 16 (1999) 30–36
 9. Robey, J. Ross, M. Boudreau, Learning to implement enterprise systems: an exploratory study of the dialectics of change, *Journal of Management Information Systems* 19 (1) (2002) 17–46.
 10. P. Bingi, M. Sharma, J. Godla, Critical issues affecting an ERP implementation, *Information Systems Management* 16 (1999) 7–14.
 11. Z. Zhang, M. Lee, P. Huang, L. Zhang, X. Huang, A framework of ERP systems implementation success in China: an empirical study, *International Journal of Production Economics* 98 (2005) 56–80.
 12. T. Davenport, Putting the enterprise into the enterprise systems, *Harvard Business Review*, July–August (1998) 121–131.
 13. F. Nah, J. Lau, J. Kuang, Critical factors for successful implementation of enterprise systems, *Business Process Management Journal* 7 (2001) 285–296.
 14. Saini, S., Nigam, S., & Misra, S. C. (2013). Identifying success factors for implementation of ERP at Indian SMEs: A comparative study with Indian large organizations and the global trend. *Journal of Modelling in Management*, 8(1), 6–6.
- China, India & South Asia**
15. Saini, S., Nigam, S., & Misra, S. C. (2013). Identifying success factors for implementation of ERP at Indian SMEs: A comparative study with Indian large organizations and the global trend. *Journal of Modelling in Management*, 8(1), 6–6
 16. R. Davison, Cultural complications of ERP, *Communications of the ACM* 45 (7) (2002) 109–111.
 17. K. Hong, Y. Kim, The critical success factors for ERP implementation: an organizational fit perspective, *Information & Management* 40 (2002) 25–40.
 18. C. Law, E. Ngai, ERP systems adoption: an exploratory study of the organizational factors and impacts of ERP success, *Information & Management* 44 (2007) 418–432.
 19. K. Reimers, Implementing ERP systems in China, *Communications of the Association for Information Systems* 11 (2003) 335–356.
 20. Y. Xue, H. Liang, W. Boulton, C. Snyder, ERP implementation failures in China: case studies with implications for ERP vendors, *International Journal of Production Economics* 97 (2005) 279–295.
 21. L. Zhang, M. Lee, Z. Zhang, P. Banerjee, Critical success factors of enterprise resource planning systems implementation success in China, in: *Proceedings of the 36th Hawaii International Conference on System Sciences*, 2003, pp. 236–245.
- USA**
22. K. Amoako-Gyampah, A. Salam, An extension of the technology acceptance model in an ERP implementation environment, *Information & Management* 41 (2004) 731–745.
 23. Ehie, M. Madsen, Identifying critical issues in enterprise resource planning (ERP) implementation, *Computers in Industry* 56 (2005) 545–557.
 24. T. Gattiker, D. Goodhue, Software-driven changes to business processes: an empirical study of impacts of enterprise resource planning (ERP) systems at the local level, *International Journal of Production Research* 40 (18) (2002) 4799–4814.
 25. V. Mabert, A. Soni, M. Venkataramanan, Enterprise resource planning: managing the implementation process, *European Journal of Operational Research* 146 (2003) 302–314.
 26. [26] J. Motwani, R. Subramanian, P. Gopalakrishna, Critical factors for successful ERP implementation: exploratory findings from our case studies, *Computers in Industry* 56 (2005) 529–544.
 27. F. Nah, K. Zuckweiler, J. Lau, ERP implementation: chief information officers' perceptions of critical success factors, *International Journal of Human–Computer Interaction* 16 (2003) 5–22.
 28. S. Sarker, A. Lee, Using a case study to test the role of three key social enablers in ERP implementation, *Information & Management* 40 (2003) 813–829.
 29. T. Somers, K. Nelson, The impact of strategy and integration mechanisms on enterprise system value: empirical evidence from manufacturing firms, *European Journal of Operational Research* 146 (2003) 315–338
 30. T. Somers, K. Nelson, A taxonomy of players and activities across the ERP project life cycle, *Information & Management* 41 (2004) 257–278.
 31. M. Sumner, Critical success factors in enterprise wide information management systems projects, in: *Proceedings of the 1999 ACM SIGCPR Conference on Computer Personnel Research*, 1999, pp. 297–303.
 32. Sun, A. Yazdani, J. Overend, Achievement assessment for enterprise resource planning (ERP) system implementations based on critical success factors (CSFs), *International Journal of Production Economics* 98 (2005) 189–203.
 33. K. Trimmer, L. Pumphrey, C. Wiggins, ERP implementation in rural health care, *Journal of Management in Medicine* 16 (2002) 113–132
 34. E. Umble, R. Haft, M. Umble, Enterprise resource planning: implementation procedures and critical success factors, *European Journal of Operational Research* 146 (2003) 241–257.

Europe & UK

35. H. Akkermans, K. Helden, Vicious and virtuous cycles in ERP implementation: a case study of interrelations between critical success factors, *European Journal of Information Systems* 11 (2002) 35–46.
36. D. Allen, T. Kern, M. Havenhand, ERP critical success factors: an exploration of the contextual factors in public sector institutions, in: *Proceedings of the 35th Hawaii International Conference on System Sciences*, 2002, pp. 3062–3071.
37. V. Botta-Genoulaz, P. Millet, An investigation into the use of ERP systems in the service sector, *International Journal of Production Economics* 99 (2006) 202–221.
38. C. Holland, B. Light, A critical success factors model for ERP implementation, *IEEE Software* 16 (1999) 30–36.
39. M. Krumbholz, N. Maiden, The implementation of enterprise resource planning packages in different organizational and national cultures, *Information Systems* 26 (2001) 185–204.
40. W. Skok, M. Legge, Evaluating enterprise resource planning (ERP) systems using an interpretive approach, *Knowledge and Process Management* 9 (2002) 72–82.
41. Y. Van Everdingen, J. Van Hillegersberg, E. Waarts, ERP adoption by European midsize companies, *Communications of the ACM* 43 (2000) 27–31.
42. J. Ward, C. Hemingway, E. Daniel, A framework for addressing the organisational issues of enterprise systems implementation, *Journal of Strategic Information Systems* 14 (2005) 97–119.
43. Asemi, A., & Jazi, M. D. (2010). A comparative study of critical success factors (CSFs) in implementation of ERP in developed and developing countries. *International Journal*, 2(5), 99–110.
44. Doom, C., Milis, K., Poelmans, S., & Bloemen, E. (2010). Critical success factors for ERP implementations in Belgian SMEs. *Journal of Enterprise Information Management*, 23(3), 378–406.

Middle East & Gulf

45. N. Ahituv, S. Neumann, M. Zviran, A system development methodology for ERP systems, *The Journal of Computer Information Systems* 42 (3) (2002) 56–67.
46. M. Al-Mashari, A. Al-Mudimigh, ERP implementation: lessons from a case study, *Information Technology & People* 16 (2003) 21–33.
47. Park, Y. J., & Hwang, H. J. (2013). Critical Success Factors of ERP Systems: Kazakhstan Perspective.

Australia & Denmark

48. L. Ho, G. Lin, Critical success factor framework for the implementation of integrated enterprise systems in the manufacturing environment, *International Journal of Production Research* 42 (17) (2004) 3731–3742
49. P. Kraemmerand, C. Moller, H. Boer, ERP implementation: an integrated process of radical change and continuous learning, *Production Planning & Control* 14 (2003) 338–348.
50. [Parr, G. Shanks, A model of ERP project implementation, *Journal of Information Technology* 15 (2000) 289–303.
51. 23
52. X. Zhao, F. Lai, S. Young, A study of Manufacturing Resources Planning (MRPII) implementation in China, *International Journal of Production Research* 40 (14) (2002) 3461–3478.
53. H. Xu, J. Nord, N. Brown, G. Nord, Data quality issues in implementing an ERP, *Industrial Management & Data Systems* 102 (2002) 47–58.



Business process reengineering: a survey of international experience

Business process reengineering

437

Majed Al-Mashari,

*Department of Information Systems, CCIS, King Saud University,
Riyadh, Saudi Arabia*

Zahir Irani

*Department of Information Systems and Computing, Brunel University,
London, UK, and*

Mohamed Zairi

European Centre for TQM, University of Bradford, Bradford, UK

Keywords *Business process re-engineering, Information technology, Total quality management, Organizational change*

Abstract *Despite the widespread adoption of business process re-engineering (BPR), it has in many cases repeatedly failed to deliver its promised results. The lack of integrated implementation approach to exploiting BPR is seen as one of the important reasons amongst others, behind BPR failures. Yet, a relative void in the literature remains the scarcity of suitable models and frameworks that address the implementation issues surrounding BPR. This motivates the presented study to attempt to provide a "frame of reference" with which current practices can be re-positioned. A survey was therefore designed to collect data from a sample of organizations in the USA and Europe. The survey assesses the level of importance placed on the essential elements of integrated BPR implementation. In doing so, the study was also able to identify the level of maturity of BPR concepts within organisations. Empirical findings are then discussed in the context of other studies.*

Introduction

Increases in consumer requirements for both product and service efficiency and effectiveness has resulted in business process reengineering (BPR). The reengineering of business processes is concerned with fundamentally rethinking and redesigning business processes to obtain dramatic and sustaining improvements in quality, cost, service, lead-times, outcomes, flexibility and innovation (Hammer and Champy, 1993).

Watts (1995) calls for the need to establish an integrative and holistic view on BPR. Al-Mashari and Zairi (2000, p. 36) define holistic BPR as:

... a continuum of change initiatives with varying degrees of radicalness supported by IT means, at the heart of which is to deliver superior performance standards through establishing process sustainable capability.

Along similar lines, Andreu *et al.* (1997) and Watts (1995) believe that holistic BPR should recognize the importance of processes and technology and their integration in business vision, structure and relationships, resources and culture. Yet, research studies that claim to adopt a holistic perspective are still

lacking many critical constructs, as found by Deakins and Makgill (1997, p. 104) who state that:

... there is limited evidence that broad implementation issues are now being addressed to the same extent as the (previously dominant) IT issues

Survey studies like those of Mitchell and Zmud (1995), Doherty and Horsted (1996), Braganza and Myers (1996) and Kohli and Hoadley (1997) do not address BPR implementation factors from a holistic view. Even some large industry surveys (e.g. ProSci, 1997), that have attempted to enhance the understanding of BPR, fail to capture some of the dimensions that the holistic perspective demands. Other work that has addressed BPR success factors, has been largely anecdotal in nature or based on single organisations (e.g. Davenport, 1993; Davidson, 1993). Although, Vakola and Rezgui (2000) go some way to extrapolating key success factors through critiquing development and implementation BPR methodologies. Clearly, an exploratory survey study is necessary to achieve an assessment and generalizability, as well as providing additional richness about some pertinent concepts and issues involved in implementing the BPR holistic perspective.

BPR: definitions and barriers

Much of management's difficulty in understanding BPR centres around the inherent difficulty in defining the constituents of a "business process" (Nickols, 1998). This presents much difficulty, as it then becomes unclear what is actually being reengineered. Irani *et al.* (2000) provides a comprehensive review of differing opinions on what constitutes a business process. Similarly, Al-Mashari and Zairi (2000, 1999) review the BPR literature and show that there is no clear and agreed definition of this term. Examples of definitions extrapolated by Irani *et al.* (2000) include:

- "a set of activities that, taken together, produces a result of value to a customer" (Hammer and Champy, 1993);
- "a set of logically related tasks performed to achieve a defined business outcome" (Davenport and Short, 1990);
- "an ordering of work activities with a beginning, end, and clearly identified inputs and outputs" (Davenport, 1993); and
- "any sequence of pre-defined activities executed to achieve a pre-specified type or range of outcomes" (Talwar, 1993).

Al-Mashari and Zairi (2000) suggest that reengineering of business processes involves changes in people (behaviour and culture), processes and technology. As a result, there are many factors that prevent the effective implementation of BPR and hence, restrict innovation and continuous improvement. These are identified by Irani *et al.* (2000) to include loss of nerve, focus and stamina; senior management who are comfortable in their "ivory towers"; lack of "holistic" focus and settling for minor improvement gains; human and

organisational issues; organisational culture, attitudes and skills based; and resource restrictions and fear of information technology (IT). Business process reengineering

BPR's promised business benefits, in most cases, remain very elusive and the problems it creates are a bigger distraction than it could have been anticipated. Numerous surveys and reports highlight the problems associated with BPR implementation. Some of the problems associated with the BPR concept include for instance the following areas:

439

- BPR appeals to senior managers because it promises the quickest short cut to success and business excellence.
- The concept itself has a lot of appeal because it is simple to absorb and its rules are not too complex.
- BPR promises immediate benefits and major leaps in competitive performance. This is very compatible with a culture of "short termism" in the West.
- BPR is promoted as a better alternative to other modern management concepts such as total quality management (TQM), since it is supposed to be less costly to implement and guarantees real benefits much more quickly.
- BPR in most cases refers to the implementation of hard solutions dealing with soft problems, thus suggesting that the use of IT for instance will go a long way to making businesses more effective and securing future competitiveness.

Research methodology and framework

Table I summarizes the themes and findings of six representative empirical studies on a variety of BPR issues. These studies show the importance of this study in eliciting the experience of organisations regarding elements and key factors in holistic BPR implementation (Figure 1). This is clearly targeting the "what" components of research (structural components), and it requires a possible large sample and a wide range of organisations. Given the nature of the topic, and as supported by Eisenhardt (1989) and Yin (1989), this type of inquiry favours the use of an exploratory structured questionnaire survey. This study attempts to unify the available writings and research work, which mostly represent different schools of thought on BPR implementation. As a result, groups and categories are extrapolated from the literature, and represented by a set of structural elements based on which a large-scale mail survey can be designed and used to collect data.

This study begins with a comprehensive review of relevant literature on BPR implementation. The literature review provides a grounding of the research and focus, as well as establishing a basis for developing the research instrument. The identified key components in BPR implementation represented the structural elements that make up the questionnaire survey.

A standardised questionnaire was developed to elicit data from a large sample of organisations in the USA and Europe. The rationale for choosing the

Table I.
Emprical surveys on
various BPR issues

Author	Themes of research
Doherty and Horsted (1996)	Organisations becoming increasingly aware of cost of survivor syndrome during and after BPR Managing both leavers and survivors a necessity in managing major change Successful BPR must consider people-related issues at three levels: organisational change, personal transition and psychological contract
Zairi and Sinclair (1995)	Organizations that have adopted TQM show greater use of strategic and process management techniques, benchmarking, and self-assessment in BPR efforts On project basis, BPR appears less successful at TQ organisations
ProSci (1997)	Ensuring sponsorship, creating strategic alignment, building strong teams, establishing business case for change, using proven methodology, and managing change effectively are areas critical to successful BPR projects
Hewitt and Yeon (1996)	Ranking of management philosophies, objectives, and techniques associated with BPR BPR practice in terms of duration, initiators, scope, success factors, and drivers
Braganza and Myers (1996)	Degrees of awareness of BPR by different management personnel Ranking of key reasons for doing BPR BPR is adopted alongside other change initiatives Identifying degree of importance and difficulty associated with five essential items
Kohli and Hoadley (1997)	BPR concepts and tools assessed considered useful BPR effective approach to improve competitiveness BPR not a passing fad 40 percent of responding organisations are planning for more BPR in future

USA and Europe is justified by Deakins and Makgill's (1997) findings that suggest BPR practice has more presence in these parts of the world than others. The survey was an attempt to assess the level of importance of the elements that constitute the holistic approach to BPR implementation. It was also aimed at identifying the level of maturity of BPR concepts and practices. Moreover, it sought to provide assessment of the level of familiarity, experience and comprehension of the essential elements of BPR within the sample organisations.

The organisations that took part in this survey were chosen from three main sources, the *American Society for Quality Directory* (1998), the *European Foundation for Quality Directory* (1997), and the *Strategic Planning Society Directory* (1998) of the UK. These three societies have a long-established history, particularly in relation to business performance improvement through

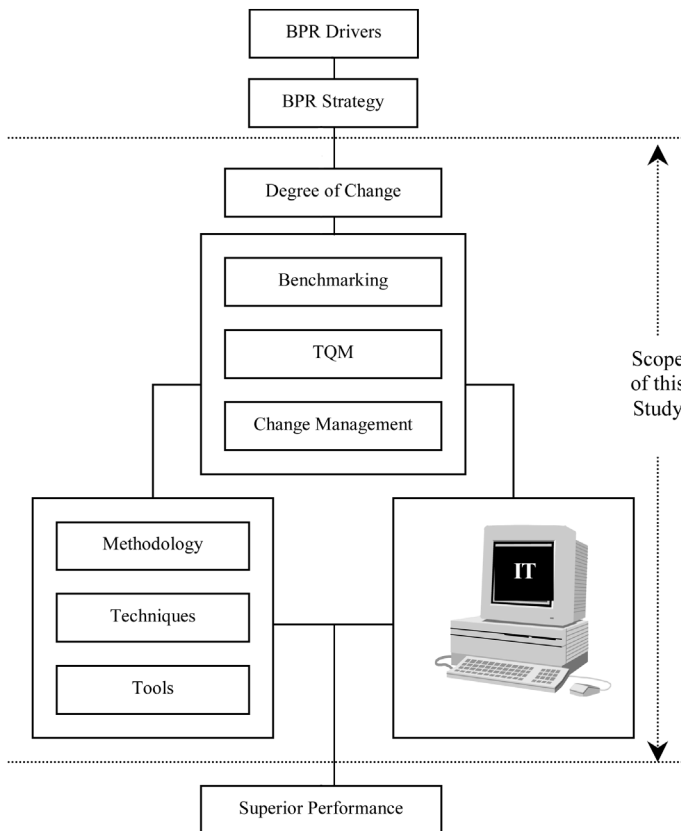


Figure 1.
Holistic BPR framework
adopted

strategic programmes of TQM and BPR-related changes. These directories list the names and addresses of the organisations' representatives (e.g. directors, quality managers, and process improvement managers). Addressing the questionnaires to these representatives directly (rather than to the organisation anonymously) was thought to enhance the chance of getting back a quick and effective response. Moreover, the membership of all these societies is subscription-based. This gives more confidence in the relevance and quality of the population from which organisations were sampled. Two major BPR newsgroups on the Internet, (BPMI@quality.org) and (BPR-IAC@quality.org), were also used to gain more participation in the survey.

This study planned to obtain responses from different industries, so that generalisation of the findings could be established. However, the selection process was made semi-randomly, as some organisations which are known from the literature for their mature experiences with BPR were intentionally selected. Nonetheless, it is the case that many other organisations were not selected on this basis. As supported by Trochim (1997) and Vaus (1985), this approach can ensure a balance between richness and quality of data obtained

which helps develop a better understanding of a phenomenon that is research-poor, and random selection which enables generalisation of findings. Initially, a total of 498 questionnaires were mailed to the selected organisations. Of these, 362 were sent to the USA, while 136 were sent to European organisations. Resulting in a final response rate of 10.16 percent. This response rate compares to some mail surveys reported in the BPR literature (e.g. Zairi and Sinclair (1995), with 13 percent response rate). The analysis of the data collected from the questionnaires follows a number of basic statistical techniques to identify and interpret the respondents' ratings. To meet these needs, frequency distributions and means were calculated. Empirical data from secondary survey questionnaires available from the BPR literature were used to validate externally the findings of this survey, and to offer possible explanations and comparisons that would help build theories from data.

Survey findings

Degree of BPR-related organisational change

As the study takes an integrative perspective and views BPR as a continuum of change initiatives with varying degrees of radicalness, respondents were asked to indicate the amount of effort spent on each level of change, in the form of a percentage. The scale was as follows: 1 = process improvement, 2 = moderate redesign, 3 = process redesign, 4 = moderate reengineering, and 5 = very radical reengineering. Although the response rate to this question was very low, some exciting and interesting results can be drawn from the data. Figure 2 presents a novel contribution through the “BPR progression ladder” that shows that process change efforts tend to decrease as change increases in scope and

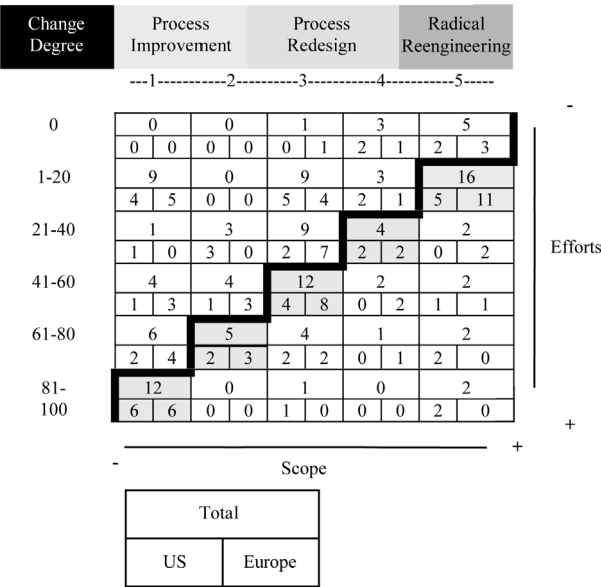


Figure 2.
BPR progression ladder

degree of radicalness. One possible explanation for this trend is that when organisations consider business improvement as a never-ending strategic initiative, they keep themselves at the forefront of change by adopting several tools, like continuous benchmarking, which stop them from having to embark on huge, radical reengineering efforts. In such cases, incremental improvement and process redesign efforts may result in big gains and, as a result, the scope for radical and innovative reengineering efforts decreases. This appears to be less evident in organisations that do not have an integration mechanism by which process change is deployed as a strategic programme. In these cases, organisations usually find themselves in a position where there is a great urgency for radical change and where an incremental improvement will not be of sufficient help.

Integration of BPR with other improvement tools

Respondents were asked to rate the level of integration of three major improvement tools with BPR, on a scale ranging from 1 = very low to 5 = very high (Table II). Change management was ranked highest, followed by TQM (both of which are above average), with benchmarking ranking last.

However, there is a variation in rankings between the US and European organisations, in that the US respondents rank TQM highest, whereas the Europeans rank change management highest. This may be due to the US organisations' greater experience in practising BPR, and the priority placed on adopting TQM to sustain the benefits gained from BPR. In contrast, and with their lesser experience in implementing BPR-related change, the European organisations' consideration of change management as a first priority for integration can be put down to its crucial role in implementing BPR. In this sense, benchmarking is logically expected to follow change management in integration in European organisations, as it is essential to uncover areas of change and to prioritise them. In US organisations, change management is a secondary priority of integration, as it is viewed as supporting the continuous improvements resulting from TQM efforts.

Integrating BPR with TQM

Table III shows an overall agreement across all organisations in both the USA and Europe in rating the level (on a scale of 1 = very low to 5 = very high) of attempting six approaches for integrating TQM with BPR. Although ranked

Tool	Overall		USA		Europe	
	Mean	Rank	Mean	Rank	Mean	Rank
Change management	3.11	1	2.97	2	3.26	1
TQM	3.03	2	3.37	1	2.71	3
Benchmarking	2.85	3	2.73	3	2.97	2

Note: Scale: 1 = very low; 5 = very high

Table II.
Levels of integrating
other improvement
tools with BPR

Table III.
Ranking of approaches
of integrating TQM
with BPR

Approach	Overall		USA		Europe	
	Mean	Rank	Mean	Rank	Mean	Rank
Combining short-term improvement with long-term innovation	2.97	1	2.97	1	2.96	1
Making continuous improvement come after radical process change	2.92	2	2.90	2	2.93	2
Using a revolutionary design of change, and an evolutionary implementation	2.45	3	2.53	3	2.36	3
Using BPR for a high level design of processes & TQM for a detailed design	2.40	4	2.50	4	2.29	4
Creating a process portfolio, where processes are classified based on types of changes required whether they are radical or incremental	2.16	5	2.21	5	2.11	5
Wavering between TQM and BPR	2.12	6	2.17	6	2.07	6

Note: Scale: 1 = very low; 5 = very high

the same by the US and European respondents, the US organisations are somewhat ahead in utilising these approaches of integration. The highest ranked approach among all organisations, however, is combining short-term improvement with long-term innovation. The second approach is making continuous improvement follow radical change efforts. Using a revolutionary design of change along with a “clean-slate” approach was rated below average. This does support the claim that a “clean-slate” approach is rarely found in practice (Davenport and Stoddard, 1994).

Use of benchmarking in BPR

Table IV shows overall agreement across all organisations in rating the level of using five approaches of benchmarking in BPR (on a scale of 1 = very low to 5 = very high). Although ranked the same by both the US and European respondents, the European organisations are slightly ahead in using these approaches. This is

Use of benchmarking in BPR	Overall		USA		Europe	
	Mean	Rank	Mean	Rank	Mean	Rank
To identify best practice performance and processes in the future	3.46	1	3.44	1	3.48	1
To highlight areas of change and prioritise them	3.10	2	2.91	2	3.30	2
To identify innovative process attributes	2.87	3	2.81	3	2.93	3
To determine process objectives	2.79	4	2.69	4	2.90	4
To make a proper decision about type of change whether to be a revolutionary or an evolutionary	2.49	5	2.50	5	2.48	5

Table IV.
Ranking of use of
benchmarking in BPR

Note: Scale: 1 = very low; 5 = very high

compatible with the results shown in Table II, where benchmarking was ranked second in its level of integration with BPR in the European organisations, compared to being ranked third in the US organisations. The highest ranked approach among all the organisations, however, is using benchmarking to identify best practice performance and processes in the future. Using benchmarking to highlight areas of change and prioritise them was ranked second.

Business process reengineering

445

Change management elements in BPR

Table V shows that there was overall agreement on the rankings for levels of consideration of six elements of change management in BPR. However, the European organisations are slightly ahead in considering these elements of change, which, again, is compatible with the results shown in Table VI where Europe ranked change management top in its level of integration with BPR, whereas the USA ranked it as a second priority. All organisations ranked the approach of changing roles and responsibilities highest. The second element is changing organisational structure.

BPR methodology

Table VI shows the average effort spent on each stage of a BPR methodology. The results indicate that organisations put most of their efforts into the “Diagnosis” stage. This is probably because, due to lack of experience of a

Dimensions of change	Overall		USA		Europe	
	Mean	Rank	Mean	Rank	Mean	Rank
Roles and responsibilities	3.55	1	3.22	1	3.88	1
Organisational structure	3.48	2	3.19	2	3.77	2
Management systems	3.24	3	3.06	3	3.42	3
Skill requirements	3.19	4	3.03	4	3.35	4
Shared values and beliefs	3.16	5	3.03	4	3.28	5
Reward and recognition systems	2.55	6	2.81	5	2.28	6

Note: Scale: 1 = very low; 5 = very high

Table V.
Ranking of change management elements in BPR

Stage	Overall		USA		Europe	
	Mean	Rank	Mean	Rank	Mean	Rank
3. Diagnose	3.61	1	3.59	1	3.64	1
2. Initiate	3.32	2	3.15	3	3.49	2
1. Envision	3.21	3	3.12	4	3.30	4
4. Redesign	3.17	4	3.01	5	3.34	3
6. Evaluate	3.14	5	3.16	2	3.13	6
5. Reconstruct	2.92	6	2.69	6	3.17	5

Note: Scale: 1 = very low; 5 = very high

Table VI.
Ranking of major stages of BPR methodology

systematic approach, organisations may have difficulties in analysing existing processes and this, in turn, may require more attention and effort. The greatest emphasis was placed on the “initiation” stage, followed by the “envision”, “redesign”, “evaluate”, and “reconstruct” stages.

BPR techniques and tools

Table VII illustrates usage levels of 11 major groups of techniques and tools in BPR efforts. Overall results show that eight techniques were used moderately, with the levels of using the other three being below average. “Project management” techniques that are used for budgeting and scheduling, such as PERT, CPM and Gantt charts, were ranked highest. This is probably because organisations consider project planning activities as the most critical task in managing a BPR programme. The next most used techniques were “Process capture and modelling”, followed by “Problem solving and diagnosis”. Surprisingly, the results revealed that the organisations made least use of process prototyping and simulation techniques. This can be put down to the complexity frequently associated with them, the prerequisite minimum level of familiarity, the variety of approaches for making use of them, and the conditions that need to be met to ensure feasible use of such techniques. The techniques related to “IS system analysis and design” were also ranked below average. One possible justification for this may be that these techniques are usually used at lower levels, where further stages of the detailed design of the software system are taking place. Also, many organisations choose to outsource the information system (IS) components rather than develop them internally and, therefore, they do not need to go deeply into the detailed design. “Change management” techniques, such as persuasion and assumption surfacing, were not rated highly, possibly because, as Malhotra (1996) noted, there is a lack of software tools and established techniques which can deal effectively with the human side of change.

As demonstrated in Table VII, there is a considerable difference between utilisation levels of BPR techniques between the US and European organisations.

Technique	Overall		USA		Europe	
	Mean	Rank	Mean	Rank	Mean	Rank
Project management budgeting	3.50	1	3.25	4	3.77	1
Process capture and modelling	3.45	2	3.31	3	3.60	2
Problem solving & diagnosis	3.27	3	3.38	1	3.16	6
Organisational analysis & design	3.19	4	3.03	7	3.34	3
Customer requirement analysis	3.16	5	3.09	5	3.22	4
Business planning critical	3.13	6	3.06	6	3.20	5
Process measurement	3.03	7	3.37	2	2.67	8
Creative thinking	3.00	8	3.03	7	2.97	7
Change management	2.43	9	2.50	8	2.34	9
IS systems analysis and design	2.19	10	2.34	9	2.03	10
Process prototyping and simulation	2.08	11	2.28	10	1.86	11

Note: Scale: 1 = very low; 5 = very high

Table VII.
Ranking of usage to
techniques and tools in
BPR efforts

While the European respondents rank “Project management” techniques highest, the US organisations rank “Problem solving and diagnosis” techniques highest. Also, while eight techniques were ranked above average in the US organisations, just six techniques were given the same ranking by the European organisations. Furthermore, the European organisations lag behind the USA in using the “Process prototyping and simulation” techniques, as this group of techniques was the only one that was rated very low.

Respondents were asked to rate the levels of realisation of four major benefits they expected from using software tools in BPR efforts. Contrary to the results highlighted in the literature (Kettinger *et al.*, 1997; Klein, 1994), Table VIII indicates that none of the four benefits were highly achieved, especially in the European organisations. The US organisations, however, rate three of these benefits above average, but the benefit of finishing projects faster was ranked least by both sets of respondents. A similar ranking was also given by both the US and European respondents to the benefit of using BPR software tools to produce higher quality results.

Relationship between IT infrastructure and organisation in BPR

Respondents were asked to indicate the nature of the relationship between IT infrastructure and organisation in implementing their BPR efforts, by selecting one of three statements describing three imperatives in this process.

Results show that 45 percent of the organisations take a socio-technical perspective of this process. From this perspective, both IT infrastructure and organisational infrastructure are viewed as being mutually evolving, thus the information needs of new processes determine the IT infrastructure constituents, and a recognition of IT capabilities provides alternatives for BPR. A further 40 percent of respondents take the organisational perspective. This perspective is based on identifying organisational information needs and then determining IT infrastructure choices. Finally, 11.7 percent of the respondents take the technical perspective, making it the least used approach. The technical perspective entails implementing IT and then determining change opportunities.

Overall, these perspectives were ranked the same by both the US and European respondents. Interestingly, Table IX shows that the European organisations are more inclined to adopt the socio-technical and organisational

Benefits	Overall		USA		Europe	
	Mean	Rank	Mean	Rank	Mean	Rank
Producing higher quality results	2.92	1	3.10	1	2.72	1
Improving productivity	2.83	2	3.00	3	2.66	2
Eliminating non-value-added work	2.81	3	3.03	2	2.57	3
Finishing projects faster	2.63	4	2.77	4	2.46	4

Note: Scale: 1 = very low; 5 = very high

Table VIII.
Ranking of benefits of
using software tools

BPMJ
7,5

perspectives in BPR than the US organisations. However, in taking the technical perspective, the US organisations are ahead of the European organisations.

BPR success

Respondents were asked to give a percentage indicating the level of success that their organisations have achieved in BPR implementation. Overall average success percentage was 55.46 percent. This result disconfirms the often-cited 30 percent rate of success (Hammer and Champy, 1993). US organisations, however, are more successful in BPR than European organisations. While US organisations have achieved 61.44 percent level of success, the average success rate in Europe is 49.48 percent. Table X shows percentages of success after they were grouped into five levels: fail, low, moderate, high, and very high. Most success rates were in a high range, followed by success rates in moderate ranges, a very high range, and lastly in a low range.

Discussion of findings

The findings from the survey questionnaire presented are discussed in the following sections in the context of other studies and major empirical surveys in the field of BPR.

General findings

The overall findings of this study confirm that BPR implementation issues are generic. Clearly, they do not differ in terms of organisation nationality, and that US organisations are generally somewhat ahead in the level of awareness and familiarity with various tools and techniques of BPR, due to the longer experience they have had with it. This is in line with the results of Sockallingham and Doswell's (1996) empirical study, which shows that US businesses outperform others in terms of levels of awareness, commitment and contemplation regarding BPR.

Table IX.
Assessment of IT
implementation
approaches in BPR

Perspective of IT implementation	Overall (%)	USA (%)	Europe (%)
Socio-technical	45	43.3	46.7
Organisational	40	36.7	43.3
Technical	11.7	13.3	10
Other	3.3	6.7	–

Table X.
Percentages of levels of
BPR success

Success level (%)	Frequency	Percentage
Fail (0)	13	20.3
Low (1-25)	7	10.9
Moderate (26-50)	17	26.6
High (51-75)	18	28.1
Very high (76-100)	9	14.1

Degree of BPR change

It was found in this study that BPR, which adopts a strategic integrated perspective, can be implemented as a continuum of change initiatives that vary in scope and magnitude of improvement. Taking such an approach can ensure a smoother implementation for more radical and wider scope of change. It can also ensure that less radical change will be needed as efforts proceed. Organisations that follow this approach should have the advantage of being more proactive to changes taking place in their business environment. This way, organisations can better perceive their needs early on, and respond to them carefully through more strategic and planned programmes. This is supported by Zairi and Sinclair (1995, p. 15), who state that:

Organizations which have adopted TQM show greater use of strategic and process management techniques, benchmarking and self-assessment, which place them in an ideal position to make use of re-engineering techniques.

However, more research is still needed to set out the conditions of applying a particular improvement approach for a specific change imperative. Techniques and tools that help link different scales of change into one integrated improvement strategy are also needed. Results of this study, and the study by Kettinger *et al.* (1997), can provide a good basis for further work in this direction.

Integration with improvement tools

Change management, TQM and benchmarking are important tools for organisations aiming to establish the BPR practice. Change management facilitates the insertion of the newly-designed business processes in the working environment. TQM ensures that reengineering efforts take place when and where they are needed, and secures longer life for the improvements attained. Benchmarking helps shape the strategic direction of the efforts. Yet the findings show that these tools are not highly integrated with BPR. Similar supporting findings can also be drawn from Zairi and Sinclair's (1995) study, where TQM and benchmarking particularly were rated average. This finding reveals that organisations are still not competent in integration aspects of BPR. This can be put down to a lack of tools, techniques and deployment scenarios that provide assistance and guidance on when and how strategic improvement tools can be linked to BPR implementation. Research is also needed to determine conditions under which a particular strategic approach becomes a priority. The findings of this study show that change management and benchmarking may become priorities for organisations that want to establish BPR as a new program of change. On the other hand, organisations that have already lived with BPR efforts may turn to TQM to sustain the BPR benefits. In line with Kohli and Hoadley's (1997) findings, organisations with longer experience in BPR are most likely to perceive the benefits of tools related to it. The findings of this study show that while there is a mutual agreement among respondents in ranking various approaches used to integrate each improvement tool with BPR, a variation does

exist in ranking their usage of these tools. This can lead to the argument that these approaches are identical, and the variations in their usage are inherited from the variation in their supergroup tools (e.g. TQM, change management, etc). Though the findings suggest that TQM and BPR success are positively linked, they also reveal that organisational experience in integrating TQM with BPR is still in its infancy, and that more research is needed in this regard. As the findings show, integration of TQM with BPR may take different forms, and serve different strategic themes. Therefore, more research is needed to determine when and how a specific approach of integration can be implemented. As supported by Davenport and Stoddard (1994) and Sockalingam and Doswell (1996), the study asserts that the "clean-slate" approach is impractical. Sockalingam and Doswell (1996) explain that organisations tend to break BPR implementation into several projects in avoidance of the "clean-slate" approach, which results in greater scope of a BPR project with higher level of risk. In a similar way to TQM, though the findings suggest that benchmarking and BPR success are positively linked, they also reveal that organisational experience in integrating them together is still immature, and that more research is needed in this regard. Furthermore, as the findings show, integration of benchmarking with BPR may take different forms, and serve different strategic themes. Therefore, more research is needed to determine when and how a specific approach of benchmarking can be used.

Though the findings suggest that change management and BPR success are positively linked, they also reveal that organisational experience in integrating them together is still in its infancy, and that more research is needed in this regard. In addition, as the findings show, integration of change management with BPR may take different forms, and thus, more research is needed to determine when and how a specific approach of change management can be used.

BPR methodology, techniques and tools

The findings of this study show that success of BPR implementation is associated with the use of methodological tools. Yet human resources and change management-related issues are the areas that need to be methodologically addressed by researchers. The study also shows that while diagnosing current processes represents an important stage in BPR, organisations have a difficult task in implementing it. This can be traced directly to the difficulties associated with operationalizing the concept of process orientation and thinking itself, which has been discussed earlier. The study also points to the importance of both ensuring commitment and selecting processes, as two essential initial tasks. It also suggests that both management culture and the degree of formalisation and transparency in management systems can influence the way in which different individual activities may be prioritised. The findings reveal that BPR success is associated with the use of techniques, and that organisations tend to use simple techniques and tools. They show that techniques of project planning and management, and process capturing and modelling are highly important in implementing BPR. The results of this study show that features of simplicity and usability by non-technical people, and the ability to enforce consistency in

analysis and design are important to consider by software tools developers. They also support the findings of El Sawy's (1997) study, which proved a significant positive relationship between the use of BPR software tools and the quality of the resulting process. At the same time, they contradict the finding that making use of BPR tools would result in finishing a BPR project faster. The results also confirm Manganelli and Klein's (1994) findings that tool users' productivity is expected to drop during early use of a new tool. One possible explanation of these results could be, as Davenport (1993) maintains, that using such tools may cause managers to lose sight of the importance of the initiative. This is because, being unaware of the capabilities of such tools and technologies, they reject them, or, at the very least, do not attempt to create an appropriate climate for their successful use by, for example, changing the work and the user support (perceived training, perceived productivity gain and perceived loss of expertise).

IT infrastructure role in BPR

As supported by Klempa (1995) and Marchand and Stanford (1995), this study shows that a socio-technical perspective is the most suitable approach to derive a successful BPR. It also shows that taking a technical perspective to BPR implementation is highly associated with failure. However, BPR success is associated with the level of using supporting technologies. As supported by Grover *et al.* (1995), this study shows that document management, databases, and communication networks are the most widely implemented technologies to enable BPR today, and thus, a continuous development of them is in order.

BPR success and failure

Contrary to the 70 percent failure rate claimed by Hammer and Champy's (1993), and the results of the CSC Index (1994) survey, this study shows that the success rate of BPR is higher (55.46 percent). This is supported by the study of Sockalingam and Doswell (1996), which shows that in Scotland only 6 percent of the BPR projects result in failure, and in the USA it is 78 percent. However, variation between studies in this respect refers to the subjectivity in measuring BPR success and the lack of a common understanding of BPR measures and their application levels. Sockalingam and Doswell (1996, p. 43) state that :

... it would be dangerous to conclude that BPR is a global success phenomenon. BPR performance evaluation is inherently subjective, and goals and targets set vary between organizations.

This, in turn, suggests that more research is still needed in the area of BPR measurement, and that a generic measurement framework might be worth developing to suit various levels of BPR application in terms of business position and level of competition, strategic targets, cultural and organisational beliefs and values, and levels of change required.

Conclusions and implications for future research

The advent of BPR remains the subject of great interest and yet, of great controversy. Although, the term BPR might have lost favour, most

organisations knowingly or not are involved in BPR. It is the pressure of survival and the need to prevent complacency that prompt BPR. Further motivation comes from the desire to close competitive gaps and achieving superior performance standards, which prompt many organisations to embark on huge BPR projects. In doing so, “wiping out” the past and looking forward to the new thinking, the new ways and the more enlightened approach. Indeed, many of the reported failures are thought to be due to the primary focus of BPR on “technical aspects” and that contemporary strategic thinking takes a competence view of an organisation. The findings presented in this paper make a distinctive contribution to the normative literature by pointing to important elements associated with the BPR implementation process, which adopts a holistic approach:

- Establishing a sound case for change through a comprehensive realisation of internal and external threats and opportunities, benchmarking internal and external practices, identifying the business visions in the targeted areas, and consolidating all that in a well-planned strategy is commonly ascertained by both quantitative and qualitative findings.
- Facilitate the establishment of a “sound knowledge base” through developing a culture based on “knowledge creation” and sharing, where success is awarded/rewarded and yet, failure not stigmatised.
- Taking an integrative approach to BPR implementation through combining different change efforts in one strategic improvement programme is another important element of the holistic BPR. This involves determining improvement areas and developing synchronised strategies to achieve them at different levels and scopes.
- Making use of sound methodologies, tools and techniques ensures a systematic and a well-disciplined process of BPR implementation.
- Assess the “fit” between the most appropriate BPR implementation path and the organisations commitment to change and learning.
- Making use of IT enablers and support for both analysing and modelling processes, as well as to support the new process configuration. In doing so, assessing the human and organisational impact of new technology.
- Change management that includes cultural and structural changes is also asserted by both sets of findings as a core element of BPR implementation. Support and commitment from top management are also an important facilitating factor.
- A variety of socio-technical factors often prevent management from embarking on process improvement initiatives together with a misunderstanding of what type of change may be required (continuous change of major step-change).

This study has a number of limitations that need to be discussed. These limitations are mainly related to the broadness of the topic under investigation,

representativeness and generalizability issues, lack of homogeneous organisational experiences, time constraints, and the limited access to information. However, the findings of the study point to several areas that are worthy for future research. As this study covers a broad area of research, there are many directions in which future research is needed. Through the review of the literature, and from the data collection process, it has been found that there is a lack of common and standardised terms and definitions for BPR, and other types of improvements related to it. This has been reflected negatively in organisational perceptions of BPR concepts and practices. Even the concept of “process” itself has not yet been fully comprehended by organisations. Therefore, there is a great need for more research which solicits opinions and perceptions of both academics and practitioners of BPR definitions and terms, and develops a clearer and common use of the BPR terms. This study can be considered as a good starting point in this area of research, since it embraces a holistic perspective that unifies different focuses and definitions.

There is a lack of methodological research constructs and variables suitable for conducting BPR research. In the measurement area, for instance, research has difficulties in measuring the success of projects that are semi-completed. In BPR practice, it is not unusual to see several projects that have not been completely rolled out. Therefore there is a pressing need to develop multi-level measures that could more accurately provide assessment of the efforts.

As BPR is a long-term programme of change, especially when embraced as a strategic improvement effort, it is more likely that a longitudinal type of research will be most suitable for studying such a phenomenon. This approach allows for more data to be collected, and enables more complete assessment to be made, and more rigorous evidence to emerge.

Research that designs its quantitative and qualitative samples to be heterogeneous, representing different sectors, cultures, approaches and management configurations, should enable the emergence of more research findings, and facilitates comparative kinds of studies.

In view of the assessment related to the future of BPR concepts and practice, it would be interesting for researchers to explore how the concepts and practice of BPR are being integrated with other recently-emerging management approaches, like enterprise resource planning, business process management, learning organisation, and knowledge management. It is expected that organisations will begin to face the challenge of embracing different management tools in a complementary manner.

Finally, the area of electronic commerce (EC) is emerging very rapidly. EC applications will undoubtedly call for some type of business process change. Therefore, it would be interesting for researchers to explore how the application of EC technologies, such as the Internet, will integrate with the principles of BPR. In addition, researchers and practitioners alike will need to develop suitable frame of references to support the navigation through evaluating the scope and impact of BPR-IT related change initiatives.

References

- Al-Mashari, M. and Zairi, M. (1999), "BPR implementation process: an analysis of key success and failure factors", *Business Process Management Journal*, Vol. 5 No. 1, pp. 87-112.
- Al-Mashari, M. and Zairi, M. (2000), "Revisiting BPR: a holistic review of practice and development", *Business Process Management Journal*, Vol. 6 No. 1, pp. 10-42.
- American Society for Quality Directory (1998), American Society for Quality Council.
- Andreu, R., Ricart, J. and Valor, J. (1997), "Process innovation: changing boxes or revolutionizing organizations?", *Knowledge and Process Management*, Vol. 4 No. 2, pp. 114-25.
- Braganza, A. and Myers, A. (1996), "Issues and dilemmas facing organizations in the effective implementation of BPR", *Business Change & Re-engineering*, Vol. 3 No. 2, pp. 38-51.
- CSC Index (1994), "State of reengineering report", CSC Index, Inc., London.
- Davenport, T. (1993), "Process innovation: re-engineering work through information technology", *Harvard Business School Press*, Boston, MA.
- Davenport, T. and Short, J. (1990), "The new industrial engineering: information technology and business process redesign", *Sloan Management Review*, Vol. 31 No. 4, Summer, pp. 11-27.
- Davenport, T. and Stoddard, D. (1994), "Reengineering: business change of mythic proportions?", *MIS Quarterly*, Vol. 18 No. 2, June, pp. 121-7.
- Davidson, W. (1993), "Beyond re-engineering the three phases of business transformation", *IBM Systems Journal*, Vol. 32 No. 1, Winter, pp. 65-79.
- Deakins, E. and Makgill, H. (1997), "What killed BPR?: Some evidence from the literature", *Business Process Management Journal*, Vol. 3 No. 1, pp. 81-107.
- Doherty, N. and Horsted, J. (1996), "Re-engineering people – the forgotten survivors", *Business Change & Re-engineering*, Vol. 3 No. 1, pp. 39-46.
- Eisenhardt, K. (1989), "Building theories from case study research", *Academy of Management Review*, Vol. 14 No. 4, pp. 532-550.
- El Sawy, O. (1997), "Business process re-engineering – do software tools matter?", Internet: [<http://hsb.baylor.edu/ramsower/ais.ac.97/papers/elsaw.html>].
- European Foundation for Quality Directory (1997), European Foundation for Quality, Brussels.
- Grover, V., Jeong, S., Kettinger, W. and Teng, J. (1995), "The implementation of business process reengineering", *Journal of Management Information Systems*, Vol. 12 No. 1, pp. 109-44.
- Hammer, M. and Champy, J. (1993), "Re-engineering the corporation: a manifesto for business revolution", *Harper Business*, New York, NY.
- Hewitt, F. and Yeon, K. (1996), "BPR perceptions, practices and expectations – a UK study", *Business Change & Re-engineering*, Vol. 3 No. 3, pp. 47-55.
- Irani, Z., Hlupic, V., Baldwin, L.P. and Love, P.E.D. (2000), "Re-engineering manufacturing processes through simulation modelling", *Journal of Logistics and Information Management*, Vol. 13 No. 1, pp. 7-13.
- Kettinger, W., Teng, J. and Guha, S. (1997), "Business process change: a study of methodologies, techniques, and tools", *MIS Quarterly*, Vol. 21 No. 1, March, pp. 55-80.
- Klein, M. (1994), "Reengineering methodologies and tools: a prescription for enhancing success", *Information Systems Management*, Spring, pp. 30-5.
- Klempa, M. (1995), "Understanding business process reengineering a sociocognitive contingency model", in Grover, V. and Kettinger, W. (Eds), *Business Process Change: Reengineering Concepts, Methods and Technologies*, Idea Group Publishing, London, pp. 78-122.
- Kohli, R. and Hoadley, E. (1997), "Business process re-engineering concepts and tools effectiveness: a survey of practitioners", *Knowledge and Process Management*, Vol. 4 No. 4, pp. 278-85.

-
- Malhotra, Y. (1996), "Business process redesign: an overview", Internet: [<http://www.warwick.ac.uk/rc-lib.html>]
- Manganelli, R. and Klein, M. (1994), "Your reengineering toolkit", *Management Review*, Vol. 83 No. 8, August, pp. 26-9.
- Marchand, A. and Stanford, M. (1995), "Business process redesign: a framework for harmonizing people, information and technology", in Grover, V. and Kettinger, W. (Eds), *Business Process Change: Reengineering Concepts, Methods and Technologies*, Idea Group Publishing, London, pp. 34-56.
- Mitchell, V. and Zmud, R. (1995), "Strategy congruence and BPR rollout", in Grover, V. and Kettinger, W. (Eds), *Business Process Change: Reengineering Concepts, Methods and Technologies*, Idea Group Publishing, London, pp. 428-52.
- Nickols, F. (1998), "The difficult process of identifying processes", *Knowledge and Process Management*, Vol. 5 No. 1, pp. 14-19.
- ProSci (1997), *Best Practices in Business Process Reengineering and Process Design*, ProSci, Loveland, CO.
- Sockalingam, S. and Doswell, A. (1996), "Business process re-engineering in Scotland: survey and comparison", *Business Change & Re-engineering*, Vol. 3 No. 4, pp. 33-44.
- Strategic Planning Society Directory (1998), The Strategic Planning Society, London.
- Talwar, R. (1993), "Business re-engineering – a strategy-driven approach", *Long Range Planning*, Vol. 26 No. 6, pp. 22-40.
- Trochim, M. (1997), "An online research methods textbook", Internet: [<http://trochim.human.cornell.edu/>].
- Vakola, M. and Rezgui, Y. (2000), "Critique of existing business process re-engineering methodologies", *Business Process Management Journal*, Vol. 6 No. 3, pp. 238-50.
- Vaus, D. (1985), *Surveys in Social Research*, UCL Press Ltd., London.
- Watts, J. (1995), "An introduction to holistic BPR", *Business Change & Re-engineering*, Vol. 2 No. 4, pp. 3-6.
- Yin, R. (1989), *Case Study Research, Design and Methods*, Sage Publications, London.
- Zairi, M. and Sinclair, D. (1995), "Business process re-engineering and process management: a survey of current practice and future trends in integrated management", *Management Decision*, Vol. 33 No. 3, pp. 3-16.

THE IMPACT OF BUSINESS PROCESS MANAGEMENT ON ORGANIZATIONAL STRATEGY

Vlad BĂLĂNESCU

*The Bucharest Academy of Economic Studies, Bucharest, Romania
balanescu.vlad@yahoo.com*

Paul SOARE

*The Bucharest Academy of Economic Studies, Bucharest, Romania
paulsoare@yahoo.com*

Vlad BELICIU

*The Bucharest Academy of Economic Studies, Bucharest, Romania
vlad.beliciu.mb@mfinante.ro*

Cristina ALPOPI

*The Bucharest Academy of Economic Studies, Bucharest, Romania
calpopi07@yahoo.com*

Abstract

In this paper I attempted to establish a link between business process management and strategic management. After the introduction, in the second chapter I made a short presentation of business process and business process management, what the concept entails and prospects. The third chapter contains a definition of strategic management and some key issues of this concept that are pertinent in relation to business process management. Finally, the fourth chapter focuses on the impact that business process management has on organizational strategy as a whole and on its components.

Keywords: Business process management (BPM), Strategy, Strategic process.

1. INTRODUCTION

Business process theory has evolved in the last few decades at a very rapid pace, much more so compared to the period before 1990. The focus and importance of organizations, both public and private, have made possible many innovations in this field of research. The contributions have come from either theoretical concepts or applications. Business process management is considered to be the third wave in business process theory and it will, by no means, be the last. BPM will, like its predecessor, business process reengineering, make a mark, a contribution. But this concept is still in its infancy.

Strategic management is not a new concept but new ideas concerning it are formulated frequently. This paper does not focus on strategic management concepts, but rather tries to link these concepts to business process management. More and more researchers try to come up with integrated or holistic approaches to management. That is because no management concept, be it strategic management, change management, human resource management or process management can stand alone. The reality is that organizations have to combine these concepts in practice. Establishing a link between concepts and attempting to integrate them in models is, in my opinion, of key importance.

2. PROCESSES AND BUSINESS PROCESS MANAGEMENT

Before discussing Business Process Management and the link between this and Change Management I believe it is important to, first of all, define business processes. In table nr.1 below I presented several definitions given by experts and attempted to present a definition of my own.

TABLE 1 – BUSINESS PROCESSES - DEFINITION

No.	Authors	Definitions offered to business processes
1	Thomas Davenport	Business processes are a structured, measured set of activities designed to produce a specific output for a particular customer or market. It implies a strong emphasis on how work is done within an organization, in contrast to a product focus's emphasis on what. A process is thus a specific ordering of work activities across time and space, with a beginning and an end, and clearly defined inputs and outputs: a structure for action. Taking a process approach implies adopting the customer's point of view. Processes are the structure by which an organization does what is necessary to produce value for its customers.(Davenport,2003)
2	Michael Hammer and James Champy	A business process is a collection of activities that takes one or more kinds of input and creates an output that is of value to the customer (Hammer et Champy, 1993)
3	Rummler and Brache	A business process is a series of steps designed to produce a product or service. Most processes are cross-functional, spanning the 'white space' between the boxes on the organization chart. Some processes result in a product or service that is received by an organization's external customer. We call these primary processes. Other processes produce products that are invisible to the external customer but essential to the effective management of the business. We call these support processes (Rummler et Brache, 1995)
4	Mohamed Zairi	A business process a series of activities that lead to the transformation of input into output. A process represents the means by which the resources of the organization are used safely, repeatedly and consistently in order to achieve strategic objectives. (Zairi, 1997).
5	Personal opinion	Business Processes represent those activities or series of activities that contribute to the realisation of a final product either directly by adding value to the inputs of the organization or indirectly by contributing to the optimal running of organizational activities.

Source: Made by the authors

Business Process Management is a theoretical concept that has appeared relatively recently. It is only in the last decade the serious attention has been paid to it and to the improvements that it supports. Business Process Management (BPM) is derived from Business Process Reengineering which was defined by one its creators, as being: “the fundament rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service and speed” (Hammer et Champy, 1993).

Business Process Reengineering has had its share of criticism. This criticism had more to do with the practical implementation of reengineering rather to the theoretical aspect of it. The most important aspect that is considered to be neglected by BPR is the human dimension of the organization. Very often, the label BPR was used for major workforce reductions, even though the creators of the concept promoted that is should not be used solely with the purpose of reducing costs. According to M.Hammer and J.Champy, 50 to 70% of reengineering efforts fail to produce the intended dramatic results. The study conducted by the two authors pointed out that there are two sets of issues that needed to be dealt with. The first was implementation problems: unclear concepts, lack of a well-established methodology, misinterpretation of what BPR is supposed to do for a company. These were just some of the issues that appeared. The second part of the problem had to do with perception and expectations. As I mentioned earlier, Thomas Davenport described BPR as the way to achieve multiplicative growth and reengineering was marketed as such. Of course the popularity of the concept sky rocketed and everybody wanted a piece of it: companies that wanted to achieve a financial bottom line three or four times higher in the next couple of years and consultants that promised to fulfil these dreams in return for a lot of cash. In the quote at the beginning of the paragraph it said 50 to 70% of reengineering efforts fail to produce the intended dramatic results. So the implementation did not necessarily fail, but it did not meet expectations, and if these expectations were just part of the hype this statistic is not bad at all (Balanesu, 2011).

As a response to the critique, solutions have been formulated in order to optimize the efficiency of business processes. These solutions are integrated in Business Process Management (BPM). BPM is a management approach focused on aligning all aspects of an organization with the wants and needs of clients. It is a holistic management approach that promotes business effectiveness and efficiency while striving for innovation, flexibility, and integration with technology (Brocke et Rosemann, 2010). Mathias Weske defines Business Process Management as being: „concepts, methods and techniques to support the design, administration, configuration, enactment and analysis of business processes” (Waske, 2007). From this definition, Mathias Weske has identified five categories of activities related to Business

Process Management: design and analysis, modelling, configuration, enactment, and evaluation (Balanesu, 2011).

The process based management approach has, at its core, a perspective that views the organisation as a system of interconnected processes which involve efforts in documentation, improvement and respect for the business practices of the organization. It is considered that this concept evolved from the works of W. Edgards Demings, Joseph M. Juran and Kaoru Ishikawa, following a rapid popularisation of Total Quality Management in the late 1980's. Further contributing factors can be identified such as: the ISO 9000 programmes, Business Process Reengineering and Six Sigma (Benner and Tuchman, 2002).

Business Process Management is a management approach that has, as its main objective, to align the functions of the organisation to the needs of the customer, promoting an open environment favourable to change and continuous improvement and growth.

3. STRATEGIC MANAGEMENT

Strategy has become an important part of economic theory in the second half of the last century. Since then strategic management has become one of the most debated and widely implemented economical concepts.

TABLE 2 – STRATEGY - DEFINITION

No.	Authors	Definitions offered to strategy
1	H. Igor Ansoff	Strategy is the comun axes of organizational actions and products/services which define the essential nature of economic activities that are done by the organization either now or in the future (Ansoff, 1965).
2	Ovidiu Nicolescu, Ion Verboncu	Strategy can be defined as the sum total of major organizational long term objectives, the main ways to achieve them using the resources at hand in order to obtain a competitive advantage in accordance with the mission statement. (Nicolescu, Verboncu, 1999)
3	B. Quinn, H. Mintzberg, M R. James,	Strategy represents a model or a plan that integrates into a coherent whole the major aims of the organization, its policies and programs. (Quinn, Mintzberg, Jamaes, 1988)
5	Personal opinion	Strategy represents a long term plan and vision that describes the desired future state of the organization and the means by which to reach this state.

Source: Made by the authors

According to H. Igor Ansoff, Strategy is the comun axes of organizational actions and products/services which define the essential nature of economic activities that are done by the organization either now or in the future (Ansoff, 1965).

Strategic management established itself in economic theory in the 1970's, the most important name credited to this is that of Igor Ansoff. C. Russu defines strategic management as a process through which the top management of the organization determines long term evolution and performance, by ensuring rigorous formulation, appropriate application and continuous evaluation of strategy (Russu, 1999).

According to R. Daft strategic management represents the set of decisions and actions used in order to formulate and implement strategies and plans, set that can become a correlation, from a competitive point of view, between the organization and its environment which will allow the organization to achieve its strategic objectives (Daft, 1992).

These are, of course, only a few definitions that have been given to strategy and strategic management. I will not go into further detail concerning strategic management, as it is a domain with vast ideas and interpretations. However, I consider it important to present an example of a strategic management model to serve as an example for the correlation.

4. IMPACT OF BUSINESS PROCESS MANAGEMENT ON STRATEGY

First of all, I believe it is important to mention that business process management, although a very complex subject should not be considered a stand alone strategy. BPM can be a very strategic component, the use of which can greatly influence other parts of organizational strategy.

The link between business process management and organizational strategy has been looked into before. Pritchard and Armistead listed a series of recommendations for implementing business process management. Among these were the following (Pritchard and Armistead 1999):

- Introducing Business Process Management as an integral part of organizational strategy. Successful BPM implementation tied it to a strategy that aimed for business excellence or organizational efficiency. The lack of correlation between process development and strategy is one of the main reasons why reengineering had questionable results. This correlation is essential for business process management as well.
- The impact of a business process management oriented strategy on individuals and teams must be taken into account. It is easy to think of BPM as an abstract system that can benefit a company in the long term. It is also easy to forget that BPM has impact on an individual level and it is the individuals, the human resource of the organization that will be the decisive factor in determining the successful implementation.

In addition to these points I would like to point out another. Process orientation in organizations has become something relatively common, especially for large companies. These companies view processes as a means of sustaining a competitive edge and therefore business processes are considered to be of strategic importance. It is becoming more and more common for companies to formulate a strategy that specifically targets business processes. This should not be mistaken for the organizational strategy as a whole.

In order to study the impact of business process management on organizational strategy, the first thing to do is to identify the elements of that strategy. As with the case of definitions, many theories have been published concerning this subject. For the purposes of this paper I have selected the classification made by Professor Ovidiu Nicolescu.

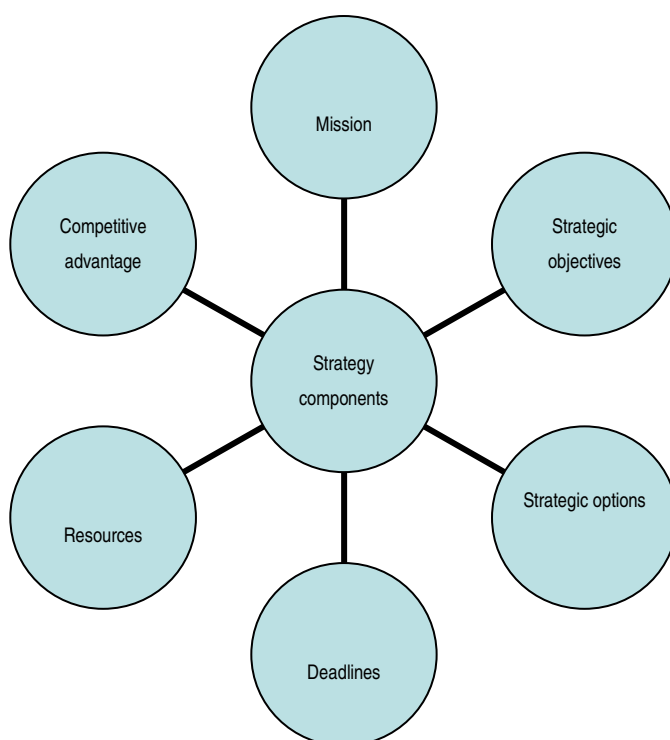


FIGURE 1 – THE COMPONENTS OF STRATEGY

Source: ADAPTATION FROM O.NICOLESCU AND I.VERBONCU, 1999.

Most of these aspects are influenced by the implementation of business process management.

- a. **The mission of the organization** represents the basis for the company strategy, it is a set of principles that guide its activity, the general expression of its reason for existing, guiding the evolution of the organization in accordance with expectations from stakeholders. There are two general lines followed in mission statements: either focuses on customer satisfaction or internal efficiency. In the case of BPM, mission changes are not a necessity. BPM is created in

order to align the business processes of the company with the needs and expectations of the customers. However, most companies and large organisations already address the need to focus on the customer in their mission statements and realise the importance of that fact. The only alteration that can occur in this case is putting the business processes of the organisation to serve these needs and expectation. All in all, the changes to the mission if the organisation should be minor by implementing BPM.

- b. **Strategic objectives** represent a desired future state of the organization in quantitative terms. Professor Nicolescu identified seven areas of performance that are relevant to strategic objectives: profitability, market share, innovation, productivity, human and financial resources, managerial performance and public responsibility. Of course, one organization does not need to include all of these aspects into the strategy. Two situations can arise in the relationship between strategic objectives and business process management. First of all, if the strategy is based around BPM that can influence long term strategic goals by the increase on internal efficiency and overall profitability. The second situation is more common: strategic objectives demand an increase in process efficiency and so BPM is implemented. With the possible exception of public responsibility, business process management can have a long term impact on all other areas of performance.
- c. **Strategic options** represent courses of action that a company can take in order to achieve the strategic objectives, with implications on all organization activities or a significant part. In my opinion, and based on this definition business process management can be considered a strategic option, but a very complex one. Implementing BPM requires the usage of other strategic options that may or may not be used at present: refurbishment, the increase of computerization in work processes, modernization of personnel staff etc. BPM is a very flexible concept: it can affect only one or two processes in the company or can represent a complete redesign of major processes, the decision being based on the strengths, weaknesses, opportunities and threats that the organisation has to deal with.
- d. **Resources** represent all the efforts made by the organization in order to achieve its objectives. BPM can be broken down in two: a technological approach and a managerial approach. After understanding this it is clear that technological changes must occur in the organization in order for BPM to be implemented with success. A very large part of BPM is automation of activities and processes wherever possible in order to increase efficiency. To that end the acquisition of state of the art technology becomes a necessity. The implementation of BPM can only occur with the modernization of the technology used by the organization.

- e. **Competitive advantage** means making products and offering services that are superior from one point of view to consumers in comparison to other similar products offered by the competition. Gaining a competitive advantage is the goal of the strategy. There are two major types of competitive advantage: cost based and differentiated based. The most obvious way BPM can affect competitive advantage is through cost. Increasing the efficiency of business processes can lead to lower production costs.

REFERENCES

- Bălănescu V. (2011), *The evolution in Business Process Theory*, Modern Approaches in Organizational Management and Economy, Bucharest.
- Benner, M., Tushman M. (2002), *Process Management and Technological Innovation*, The Wharton School, University of Pennsylvania.
- Brocke, J., Rosemann, M. (2010), *Handbook on Business Process Management: Strategic alignment, People and culture*, (electronic version).
- Davenport, T. (2003), *Process innovation: Reengineering Work through Information Technology*, Boston: Harvard Business School Press.
- Hammer, M. and Champy, J.(1993), *Re-engineering the Corporation: A Manifest for Business Revolution*, Boston: Harvard Business School Press (electronic version).
- Lewin, K., (1997), *Field Theory in Social Science*, New York: Harper & Row.
- Moorhead, G. and Griffin, R. (1998), *Organizational Behaviour*, Boston: Houghton Mifflin.
- Nicolescu O. and Verboncu, I. (1999), *Management*, Bucharest: ASE.
- Russu. C, (1999), *Management*, Bucharest: Expert Publishing.
- Weske, M. (2007), *Business Process Management: Concepts, Languages, Architectures* (electronic version).
- Zairi, M. (1997), Business Process Management: A Boundaryless Approach to Modern Competitiveness, *Business Process Management Journal*, 3(1).

Business Process Management: a maturity check of Saudi Arabian organizations

[omar alshathry](#) • Published 2016 • Business, Computer Science

TLDR The proposed re-conceptualization of IT Business Value benefits benefits of BPM approach and ownership relevance in aspect-oriented Business Process Models are presented.

2 Citations

[Background Citations](#) 2

[View All](#)

Highlight Information

Methods

Results

Abstract Purpose – Business Process Management (BPM) has become increasingly common among organizations in different industries. There is very limited research on the application of BPM in the MENA region and particularly in Saudi Arabia. The purpose of this paper is to provide empirical maturity assessment for selected Saudi Arabian organizations from broad range of industries. Findings showed that there is notable variability of BPM perception within the functional groups of the sample organizations. Organizations with holistic business strategy and resilient change management procedures showed more adherence to BPM practices than those with functionally driven or ad-hoc BPM initiatives. **Design/methodology/approach – In this empirical study, structured interviews were undertaken with selected business functions owners from ten Saudi organizations. All selected organizations resides in the city of Riyadh with most of them having local and regional branches.** The selection of the organization followed non-probability sampling technique whereby the selected organizations were those seemed easy to access and showed willingness to participate in the research. The sample organizations included different types of businesses in different industries. **Even though the purpose of the study is not applicable to a particular industry type or sector, variety of business domains and variability in organizations size were considered in the selection process.** Table 1 shows an overview of the organization business sector. **Findings – This research investigates the current status of BPM implementation among Saudi Arabian organizations. Although there is positive favour towards BPM concepts among Saudi organizations, it seems that the practical understanding of BPM is yet to be matured. One of the noticed findings from the survey is the apparent sharp disjoint between information technology (IT) and business strategy. This segregation, from a BPM perspective, created two variants of BPM understanding; a business variant related to designing and managing business operations, and the IT one which focusses on configuring and installing BPM systems. There is a lack of a holistic view of business processes and its associated activities within an organization. Most surveyed organizations have either no clear business strategy or it is too complicated the thing that make it difficult to integrate it with BPM initiatives. Some organizations have no defined process owners for their main core business processes neither there are measurable goals for their performance. Their main BPM endeavour is mainly focused on the process activities rather than the process output and performance.** **Originality/value – This is the first research paper that provides empirical research on the status of BPM in the MENA region and particularly in Saudi Arabia.**

[Collapse](#)

No Paper Link Available

Save

Alert

The impact of leadership and human resource management system on compliance through the implementation of strategic business process management

Compliance is a useful factor in carrying out a business strategy that has implications for achieving company goals optimally and securing the company from various fatal deviations and negligence... [Expand](#)



≡ 1 Excerpt

■ Save

22 References



Date Range ▾

Citation Type ▾

Has PDF

Author ▾

More Filters

More Filters

Filters

Sort by Relevance ▾

Advances in business process management implementation based on a maturity assessment and best practice exchange

Michael Rohloff

Business · Inf. Syst. E Bus. Manag. · 2011

TLDR The paper presents the implementation of Business Process Management in a large international company and some findings of the first assessment cycle are pinpointed to illustrate the benefits and best practice exchange as a result of the assessment. [Expand](#)

👍 72

💡 Highly Influential

≡ 3 Excerpts

■ Save

Understanding Business Process Quality

Matthias Lohrmann

M. Reichert

Business · [International Conference on Business Process...](#) · 2013

TLDR This chapter considers effectiveness requirements towards business process quality concepts from a management perspective, compare existing approaches from various fields, deduct a definition framework from organizational targets, and take initial steps towards practical adoption. [Expand](#)

👍 52

PDF

≡ 1 Excerpt

■ Save

Maturity models in business process management

Maximilian Röglinger

J. Pöppelbuß

J. Becker

Business, Computer Science · [Business Process Management Journal](#) · 2012

TLDR BPM maturity models provide limited guidance for identifying desirable maturity levels and for implementing improvement measures, and the design principles for a prescriptive use are hardly met. [Expand](#)

👍 482

💡 Highly Influential

≡ 3 Excerpts

■ Save

Business Process Re-engineering in Saudi Arabia: A Survey of Understanding and Attitudes

Essam Rahali

Z. Chaczko

J. Agbinya

C. Chiu

Business · 2008 Third International Conference on Broadband... · 2008

TLDR This survey was conducted in the Kingdom of Saudi Arabia to investigate the level of awareness of BPR and findings indicate a general awareness in KSA. [Expand](#)

👍 5

PDF

≡ 1 Excerpt

■ Save

The role and impact of business process management in enterprise systems implementation

Abdullah S. Al-Mudimigh

Business, Computer Science · [Business Process Management Journal](#) · 2007

TLDR The role and impact of BPM in successful ES implementation is addressed to improve the experience of many organizations that are undertaking or plan to undertake this effort to improve performance, undertake better decision-making, and so on. [Expand](#)

👍 25

≡ 1 Excerpt

■ Save

Ten principles of good business process management

J. Brocke Theresa Schmiedel J. Recker P. Trkman Willem Mertens Stijn Viaene Business

Business Process Management Journal · 2014

TLDR A set of ten principles that characterize BPM as a research domain and guide its successful use in organizational practice are proposed and suggest several areas of research regarding each of the identified principles of good BPM. [Expand](#)

212 PDF 1 Excerpt Save

The Six Core Elements of Business Process Management

M. Rosemann J. Brocke Business · Handbook on Business Process Management · 2015

TLDR This chapter provides a framework that consolidates and structures the essential factors that constitute BPM as a whole and suggests six core elements of BPM: strategic alignment, governance, methods, information technology, people, and culture.

[Expand](#)

👏 567 💡 Highly Influential ≡ 4 Excerpts 📌 Save

A global investigation of key turning points in business process maturity

Kevin McCormack · Jurgen Willems · +9 authors · Nikola Vlahovic · Business · Business Process Management Journal · 2009

TLDR The results of research into the precedence of the maturity factors, or key turning points in business process maturity (BPM) implementation efforts are reported on. [Expand](#)

242 PDF 1 Excerpt Save

Culture in Business Process Management: How Cultural Values Determine BPM Success

Theresa Schmiedel · J. Brocke · J. Recker · Business, Sociology · Handbook on Business Process Management · 2015

TLDR This chapter introduces a framework that explains the role of culture in BPM, and presents the relevant cultural values that compose a BPM culture, and introduces a tool to examine the supportiveness of organizational cultures for BPM. [Expand](#)

57 PDF Save

Prioritizing barriers to successful business process re-engineering (BPR) efforts in Saudi Arabian construction industry

N. Abdul-hadi Abdulsalam A. Al-Sudairi S. Al-Qahtani Engineering, Business • 2005

Engaging in business process re-engineering (BPR) efforts could prove to be highly rewarding for construction companies in Saudi Arabia. However, BPR is risky and could be disastrous if not properly... [Expand](#)

50 1 Excerpt Save

Related Papers

Industrial Management & Data Systems

Understanding Web content management systems : evolution , lifecycle and market

Susan McKeever

Business, Computer Science

TLDR This paper focuses on the development of a model for a content management system that automates the very labor-intensive and therefore time-heavy and expensive

OCLC Systems & Services : International digital library perspectives Archives and memory

Randall C. Jimerson

History

TLDR By recognizing and overcoming the bias toward records of powerful groups in society, archivists can provide a more balanced perspective on the past, and enable future generations to examine and evaluate the activities and contributions of all voices in one's culture.

process of developing and maintaining a content management system.

41

Save Alert

91

Save Alert

Stay Connected With Semantic Scholar

Your E-mail Address

Sign Up

What Is Semantic Scholar?

Semantic Scholar is a free, AI-powered research tool for scientific literature, based at the Allen Institute for AI.

[Learn More](#)

About

- [About Us](#)
- [Meet the Team](#)
- [Publishers](#)
- [Blog](#)
- [AI2 Careers](#)

Product

- [Product Overview](#)
- [Semantic Reader](#)
- [Scholar's Hub](#)
- [Beta Program](#)
- [Release Notes](#)

API

- [API Overview](#)
- [API Tutorials](#)
- [API Documentation](#)
- [API Gallery](#)

Research

- [Publications](#)
- [Researchers](#)
- [Research Careers](#)
- [Prototypes](#)
- [Resources](#)

Help

- [FAQ](#)
- [Librarians](#)
- [Tutorials](#)
- [Contact](#)

THE IMPACT OF BUSINESS PROCESS MANAGEMENT ON BUSINESS PERFORMANCE SUPERIORITY

Haitham M. Alzoubi

Associate Professor of Management, Skyline University, SUC, POBox. 1797, Sharija-UAE

Neama A. Khafajy,

Professor of Management, Amman Arab University, POBox.2234 Amman.11953-JORDAN

ABSTRACT: *The objective of this study is to measure the impact of business process management on organization's business performance superiority. The study adopted the approach of business processes management life cycle as a basis for detecting the idea of superiority. The sample included (89) managers, and their opinions and responses were used to describe (process identification and design, process modeling and documentation, process monitoring and controlling, and process optimization , in addition to describe the dimensions of business performance superiority, operational and competitive. Multiple regression analysis method was used to test the idea of the study model, to highlight the contribution of business process management to interpretation of organization's business performance superiority. Sustained superiority requires organization managers to support business processes orientation financially and morally within the business entrepreneurship window, under uncertainty environment, characterized by risk and changeable as future perspective of the value of organization's business performance superiority.*

KEYWORDS: Business Process Management, Business Performance, Superiority

INTRODUCTION

The theoretical and scientific efforts in the field of quality and its management and the re-engineering business process management and its continuous improvement have formed the basis of the researchers' interest in Business Process Management (Trkman, 2010; Kung and Hagen, 2007; Smith and Fingar, 2003). The idea of Business Process Management and the studies and the set of perspective that have appeared to examine it created a new perspective to its life cycle which was thoroughly investigated by Smith(2007) and this perspective is compatible with the problem of the study and its objective. While the modern view of the superiority has taken different road that depends of the company's existed resources which are difficult to imitate . These resources are called unseen assets which are considered the basic factor in achieving superiority. Superiority in the fields of operational and competitive performance has attracted the researchers interest (Chen and Lin, 2006, Sittimalakorn and Hart, 2004). For the purposes of the study, there was a concentration on two fields; superiority of operational business performance as it belongs to the internal organization environment and the superiority in the competitive business performance as it represents the organization's competitive environment . And both of these types of superiority are considered the source of business superiority (Yaghi,2010). Based on what is mentioned previously, the purpose of this study is to identify the impact of the Business Process Management on Business Performance Superiority

LITERATURE REVIEW

Business Process Management pointed that the methodology used to revise and review the organization business and to develop the business processes as the basis for building units of organizations processes systems (Laudon & Laudon, 2013) and business processes system focuses on designing and improving the processes which include business flow from one person to another and from one system to another and from one system to a communication system in the organization (Baltzan, 2012) while Franz and Kirchmer(2012) think it is an advanced management system that helps in achieving efficiency and leading excellence, creativity and strategic initiatives achievement in the organization and so it ensures the rational use of the organization assets and its successful business. Turban,et al(2011) defines business process management as the measurement of advanced performance and analysis entrance which is the host of planning and strategy. While Kung and Hagen(2007) define it as management method that include methods and supportive tools to design the operational business processes , to analyze ,implement and strengthen its value. It is a rule applied by the organizations to maintain the competitive advantage and it is a set of activities supported by tools and systems of business process management which are used by the organization to improve the business processes or to adapt them to the new organization's requirements.

Smith and Fingar (2003) identified the business process management as the supportive power to the management system which leads efficiently the organization and it is the creativity language to achieve the strategic results which its value is seen in supporting the change processes. Irmily (2011) identified it as an organized management approach aims to improve the products' quality and the services to achieve integrated operational results that can guide and link the resources towards achieving strategic goals . therefore , it is an organized method for understanding , documenting , modeling, analyzing , implementing and continuous changing of the business processes and other related resource concerning the organization's ability of adding a value to the businesses (Turban and Volonino, 2012).

The business processes management helps in achieving the organization's competitive advantage which is linked with the organization's processes' efficiently and its products' quality in addition to its services' performance since it has linked to Porter's model (1985)to increase the revenues and this relies on carrying analysis of the value that enable that organization to redesign its internal and external processes to improve effectively and efficiently the organization so as to help the organization uses its resources effectively to produce goods and services that meet the customers' needs and requirements. Singh(2012) clarified the contribution of business processes management in achieving the organization's competitive advantage and he stated that the business processes consists of management processes , operational processes and the supportive processes in addition to other processes describe the basis of the business processes which are classified as : client's strategy , customers' relations , employees' development and satisfaction, process development , quality , change management , financial analysis , reports preparation , capital management , management responsibility , product development , product delivery , the service , administrative accounting , and technology management and all of these processes form the basis of achieving the competitive advantage . Some of the successful factors for adopting the business processes management in the organization's performance as Ringim et al (2012) illustrated in a study investigated the banks' performance in Nigeria were investment in the information technology , size of the financial activities , the management's commitment , the strength of the capital and the

efficiency of the incentives' system as these factors have significant relation with the organization's performance as a whole (cost reduction, customers' service management and the processes performance efficiency).

Perspectives of Business Processes Management

In his study, Irmily (2011) mentioned Gillot's opinion (2008) that stated four perspectives :

- Business perspective which includes three dimensions which are : organization's strategy , compatibility with the market and the organization's position in the target market.
- Organization perspective which includes performance dimension (financial goals, access time to the market, level of service quality), improvement dimension (cost reduction , processes improvement and stability of following up tools of the processes.
- Processes perspective as there are many processes in every organization to make it strong or weak and these processes are used all the levels of the organization because its economic activity consists of multi processes as manufacturing the products , providing the services and managing the customers' relations.
- Technology perspective which is represented by two levels : the ability of the existed information systems in facilitating the processes' implementation and the impact of using technology in the processes ' continuity .

Models & types of business processes

The researchers looked at models and types of business processes from different points of views; Baker and Maddux(2008) identified them as the customers' external processes as marketing, sales and services after sale and internal processes as production and distribution processes while Llewellyn and Armisted(2000) believed that they were operational process accompanied the method that the organization used to develop its strategies , create and produce its products and services in addition to marketing and selling these products. And Gillot (2008) divided the processes to four groups according to the goal ; integration processes, human or cooperation processes , taking decision processes and documentation processes. Whereas, Barnes(2008) classified the processes into three types based on the type of the resource that is transferred during the process; materials treatment processes, processes of information processing and the customers' following up processes whereas Irmily(2010)classified them into primary processes as production or services that starts and ends at the customer and the secondary processes that support the primary processes as those processes related to the suppliers , stakeholders, administrative processes and employees.

Business Process Cycle

The researchers addressed the stages of the business processes cycle within different methods ; Gillot(2008) believes that the stages of the business processes cycle includes the following : modeling the processes , processes management , and processes improvement while Irmily(2010) pointed that the stages of the business process cycle could include the following : identifying and designing the processes , process implementation following up the controlling the processes and the

process development . Singh(2012) classified these stages into five activities : designing the processes ,modeling the processes, implementing the processes , controlling and the development of the processes .

Dimensions of the business processes management

The business processes management is an organized management method that aims at improving the quality and services' development through identifying ,designing, modeling ,documenting ,controlling and improving the business processes to achieve integrated operational results that can link the resources and guide them towards achieving the organization's strategic goals (Gillot,2008,p25). It is possible to look at the dimensions of the business processes according to the following classification (Irmily,2011):

Identifying & designing the processes: to identify ,determine and analyze the processes, in addition to the general perspective and the nature and size of the processes ,and their varieties and advantages through identifying the goals, abilities , resources and the integrated nature of the processes .

Modeling & documenting the processes :to identify the processes' goals ,limits and responsibilities accurately and to carry out careful analysis to the data in addition to use the plans and the stimulation to understand its impact on the system in general and then to document the processes and to evaluate the feedback.

Following up & controlling the processes : to follow up the processes and their activities ,procedures, resources , technology and information and to review continuously the processes , to control and match the implementation with the goals achievement and to identify the deviations , problems and the corrective procedures to have the outputs with the planned scope.

Improving the processes : it is an approach includes the procedures that are followed to analyze and develop the existed processes in the organization so as to improve its future performance and to propose improvements concerning methods of achieving the processes that help in improving the outputs better than today.

Superiority in business performance : the successful organizations look continuously to organizational , administrative and leading ways that enable them to maintain the level of the success and the transformation to better ones that enhance the idea of superiority . Al-Khafagi& Al-Ghalbi (2010) identified the trends of superiority by focusing on the processes that participate in achieving such superiority and the results through achieving progress in the results of the competitive organizations in the fields of market superiority and quality, in addition to the superiority that can be achieved through focusing on the distinguished performance and the other one is based on electing the organization's best skills that support the strength of the initiative . And superiority as a result of excellence in using comparative points of a reference with the competitive and advanced organizations, and superiority as a result of balance. Yaghi(2009) used financial and competitive superiority to express performance superiority and Porter(1985) pointed that the company's superior performance is linked with the level of the company's performance progress compared to its competitors' performance.

The companies' desire of superiority requires continuous improvement in their products to suit the customers' needs and expectations and such improvement needs an organizational culture and

environment that accept improvement and the organizational learning could be a basic determiner to the competitive advantage and the superiority in business performance (Fiol & Lyles, 1985, p14). The superior performance is identified as one standard deviation which is higher than performance average or the level of the achieved performance within the high limits at work (Leemann, 2005, p3).

Views of Superiority

Researchers who agreed with the resource-based view pointed to the importance of nonphysical resources as the company's reputation and its ability in sustaining the superior business performance (Chen & Lin, 2006). Others linked the organization's nonphysical resources as the company's good reputation that affects its products' quality and services with its superior performance. Some studies (Sittimalakorn and Hart, 2004) investigated measurements and marketing standards that lead to superiority as using the assets, social and environmental friendship, the ability of developing and keeping the major individuals in the company, degree of creativity, investment value, quality of management and product. Tang and Ogunlana (2003, p 274) presented policies of performance superiority as using information technology in forming management information systems to improve knowledge via the organizations and to improve the quality through the systems of confirming the quality which are expected to help in improving the quality performance and consequently to strengthen the company's reputation and its market share. And Forza (1996) addressed superiority in the operational processes performance through the integration of managing the product flow from the supplier to the consumer as he pointed that companies that seek to achieve superiority in its operational processes should adjust methods of its interaction and communication with the suppliers and the customers; interaction to the top (suppliers) and interaction to the bottom (customers) and the influence of this interaction on the companies' superiority. Other studies addressed the external effects in the strategic actions of the industrial organizations as they assumed that these effects are the basic element in the superiority of the companies' performance. Others as Hoskisson et al (1999) linked the companies' performance's superiority to the characteristics of the industrial structure as measurements of industry's access and restriction of market access, variety, products' excellence and the company's attendance in industry field (Seth & Thomas, 1994). But the resource-based view supposed that every organization has its own unique resources and capabilities that are the basis for its strategy and they serve as the basic source for the company's profitability (Lee et al, 2001). Schmalensee (1985) was the first one who employs a new method as he analyzed practically the factors of the company and the industry and their effect in the company's superiority while Rust et al (1994) adopted the quality approach and its impact on the superior business performance through reducing the costs or through improving the customers' loyalty and attracting new customers. As Schmalensee (2003, p 14) pointed that the companies with superior performance have to struggle for improvement strongly and continuously and the companies with superior environmental performance have common attitudes as committed and transparent management in addition to the internal and external goals' compatibility and the continuous improvement. A number of researcher identified some of the effective factors in sustaining the superior performance as McGaham & Porter (1999) pointed that industry has stronger effects in following up the superior performance than the effects of the company or the businesses. Application studies showed that market share, the company's size, products' variety and the foreigner companies and the growth have a positive relation to superior performance sustaining (Drouopoulos & Lianos, 1993) whereas Robert & Dowling (2002) pointed to the relation between the superior performance and

the companies' good reputation. Others pointed to the effect of the marketing strategies in the superior competitive performance; the companies that follow Cost Leadership Strategy support a great production size with a competitive price for the customers and confirm the role of Cost Leadership Strategy in achieving the company's processes (Alulakh et al, 2000), in addition to the excellence in performance that create a value for the customer through many ways as creating products, superior quality and technology, besides the good services that distinguish the company from its competitors (Hutchinson, et al, 2007).

Areas of Business Performance Superiority

The researchers address different types of superiority for example, the study of Pil & Rothenberg (2003, p 404) clarified the efforts' nature that enhances the environmental performance and which helps in improving manufacturing patterns in supporting quality which in turns contributes in achieving superiority in the environmental performance as such superiority could be derived from superiority in quality. And the study of Yoshimorig (2005, p 447) addressed another different type of superiority through linking company governance with its ability to achieve the sustainable profitability which in turns achieve returns to shareholders and strengthen the company's value. Waddock & Graves (1997, p 306) pointed that performance superiority provides the necessary financial resources to organizations to get benefit of the investment opportunities and it helps in meeting the stakeholders' needs and achieving their goals. The performance superiority is affected by environmental factors represent: economic factors and the industry structure; organizational factors as the organizational structure and other management factors as management abilities and the availability of managers' experience and knowledge (Hopkins & Hopkins, 1997, p637). The company's superiority over other companies confirmed its competitive position (Hunt & Morgan, 1995, p6). And the best evidences of strategic performance of the company is its competitive performance (Thompson & Streckland, 1999, p104).

Superiority Domains of Performance

We can look at superiority according to the company's achieved goals and compare them with the competitors as the superior performance with one standard deviation that is higher than the achieved performance rate within the 10% of the market (Leemann, 2005, pp.3-10). And although the company's superior performance is usually linked with many fields, but the business performance superiority in this study will be measured within the following two fields:

- Operational performance superiority: superiority in the operational processes performance occurs through the integration of the internal activities management in addition to the integration of activities management of the product flow from the supplier to the consumer as the companies that seek superiority in its operational processes should modify its ways of interaction and communication with the suppliers and the customers (Forza, 1996).
- Competitive performance superiority: it showed the level of the company's performance progress compared to the level of its competitors' performance (Porter, 1985), and it will be measured by the market share and sales volume.

Significance of the study

The significance of the study lies in the subject it addresses which is business processes management and its important role in improving its major processes and it addresses the modern approach of superiority which depends on the available resources in the company that is difficult to imitate as the intangible assets which are considered a basic determinant to achieve superiority (Alavarrieta & Friedmann, 1994, pp216)

Study's objectives

The study aims to identify the status of business process management in the pharmaceutical industry sector in Jordan and to analyze the role and the effect of business process management in achieving superiority in the performance of the companies of the pharmaceutical industry sector in Jordan instead of providing suggestions and recommendations to the pharmaceutical and food companies to help them to achieve superiority.

Methodology and study's instrument

Based on the nature of the study and the information that should be obtained from the respondents' views and through the questions and the hypotheses of the study, the researchers adopted descriptive, analytic and exploratory approaches. The research investigates the extent of achieving the study's factors represented by the business process and the superiority dimensions in the business performance in the organizations of the pharmaceutical industry sector in Jordan and describes their perceptions using the significance of data that were collected and analyzed using descriptive and analytical statistical methods. The questionnaire, which was used to collect data, consisted of two parts; the first one is allocated to measure the business processes dimensions and the second part is allocated to measure the superiority performance dimensions. The study gets benefit of the studies of Irmily(2011) and Yaghi(2009) in building the instrument.

Statement of the problem

The issue of business processes management has attracted the interest of scholars, experts and managers in their attitudes towards improving the level of the organization's business performance superiority. The limited number of the studies that examined, identified and analyzed the idea of business processes management cycle and its components for their expected influence on the different aspects of the organization's superior business performance was a motivation to adopt this idea in terms of perception, design and achievement in the sector of pharmaceutical industries which has a pioneer role in the Jordanian economy and therefore this sector's companies have to be aware of business processes management cycle and use it to achieve superiority in their businesses performance.

Based on what was mentioned previously, the problem of the study is represented by the following questions:

- 1- Is there any impact to the business process management on the superiority of the business performance ?
- 2- Is there any impact to the business process management on the superiority of the operational performance ?

- 3- Is there any impact to the business process management on the superiority of the competitive performance ?

Major & sub-Hypotheses of the study:

HO1: there is no statistically significant effect at the level of significance ($\alpha \geq 0.05$) to the business process management and its domains(identifying and designing the process, modeling and documenting the processes ,following and controlling the processes , improving the processes) on the superiority of business performance.

HO1-1 there is no statistically significant effect at the level of significance ($\alpha \geq 0.05$) to the business process management and its domains(identifying and designing the process, modeling and documenting the processes ,following and controlling the processes , improving the processes) on the superiority in the operational business performance .

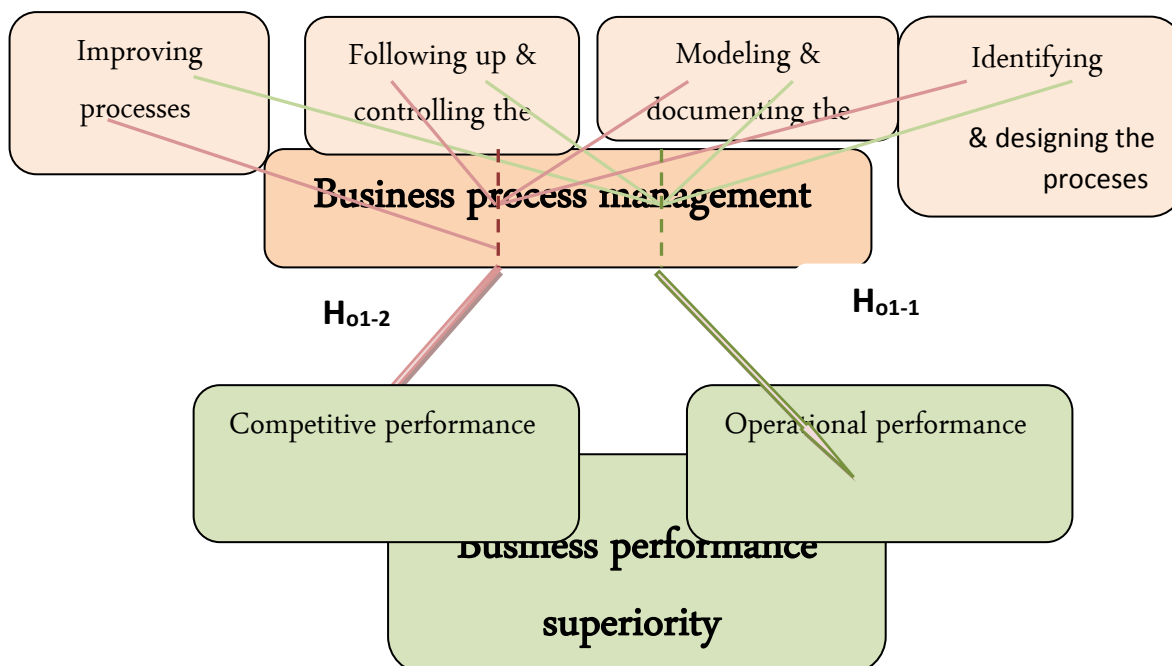
HO1-2 there is no statistically significant effect at the level of significance ($\alpha \geq 0.05$) to the business process management and its domains(identifying and designing the process, modeling and documenting the processes ,following and controlling the processes , improving the processes) on the superiority in the competitive business performance .

Study's variables

Independents variables : the business process management(identifying and designing the process, modeling and documenting the processes ,following and controlling the processes , improving the processes) (Ermily,2011). Dependent variables : superiority in business performance (superiority in the competitive business performance ,superiority in the operational business performance)(Yaghi,2009).

The study's model

Impact of business processes management on superior business performance



The study's populations & its sample

The population of the study consisted of (17) organizations in the pharmaceutical industry sector in Jordan while the sample of the study which was selected purposefully consisted of managers .

The sample& analysis unit

The researchers retrieved 89 questionnaires out of 142 questionnaires which were distributed to 142 managers (executive manager, vice of executive manager, department manager) . And these 89 questionnaires were valid for analysis. The response proportion, which was 63%, was considered acceptable statistically.

Statistical treatment

A set of statistical methods were used to analyze data collected from the questionnaires as : analytical method, ANOVA, and Simple and multi linear Regression to achieve the study's goals through describing the respondents' responses and testing the major and sub - hypotheses so as to come up with the results that help the researcher to present recommendation concerning the topic of this study.

Study's Instrument's Validity &Reliability

To check the instrument's validity, it was presented to a group of academic staff whose opinions and notes were taken into account as it is illustrated in appendix (1). Results in table (1) showed that the value of Cronbach's alpha for the questionnaire as a whole was (89%) , for business operations value was (0.77) and for business performance superiority was (0.82) and this value is considered higher than the acceptable one (60%) in the administrative sciences (Sekaran,2003) and this shows the questionnaire's reliability , therefore , the results are dependable.

Table (1) coefficient of Cronbach's alpha

Reliability Coefficients (Cronbach Alpha)	
Business operation variable	0.774
business performance superiority variable	0.820
Questionnaire domains as a whole	0.891

RESULTS & DISCUSSION

Managers' attitudes towards variables of the Model:

This part includes description and analysis of respondents' responses towards the model's variables .Means, standard deviations of the variables domains were calculated and these domains were ordered according to their importance (Newbold et al., 2007, p55). The mean was adopted for the relative importance order to compare between the means as there were three levels of importance: high (>3.66), moderate (3.66-2.33) and low (>2.33) (Sekaran, 2000, p198).

The results in table (2) showed that the independent variable (business process management) achieved general mean (3.47) with a moderate significance indicating the population ‘s achievement of the business process management’s factor and the mean of the independent variable “ superiority in the business performance” was (2.96) with moderate significance indicating the respondents’ attitudes were positive and all of them agree on all the domains of the business process management and business performance superiority . The value of calculated T of the means which was significant assured this result.

Table (2) Means & standard deviations of variables’ domains (N=89)

Domains of variables			M	Std	Rank of significance	Level of significance	t	Sig
Independent variable	Business process management	Identifying & designing the operations	3.62	0.88	2	Moderate	26.66*	0.00
		Modeling & documenting the operations	3.07	0.95	4	Moderate	18.27*	0.00
		Following up & controlling operations	3.51	0.99	3	Moderate	17.54*	0.00
		Improving operations	3.66	0.87	1	Moderate	19.88*	0.00
		Business process management	3.47	0.92	Moderate		2769*	0.00
Dependent variable	Superiority in business performance	Superiority in operational business performance	2.81	0.67	6	Moderate	29.54*	0.00
		Superiority in competitive business performance	2.93	0.72	5	Moderate	21.82*	0.00
		Superiority in business performance	2.96	0.69	Moderate		22.54*	0.00

- Calculated T value = 1.165 at (0.05).

The previous table showed that the domains of business process management’s domains have high means ; in the first rank was “ improving processes” with a mean (3.66)and with moderate significance which indicates the interest in improving the processes while in the second rank was “ identifying & designing the process” with a mean (3.62) followed respectively by “ following up& controlling the processes” with a mean (3.51), “ modeling & documenting the processes” with a mean (3.07) which indicates that managers pay much attention to these domains as an indication to the significance of business process management .

The domains of superiority in the business performance achieved means with moderate significance which are less than the means of the domains of business process management . the mean of domain “superiority in the competitive process performance” was (2.93) with a moderate significance which indicates the managers’ belief in achieving superiority in the competitive business performance while the mean of “ superiority in the operational business performance” was (2.81) with moderate significance indicating availability of superiority in the operational business performance from the perspective of the managers .

Testing the major & sub hypotheses

HO1: there is no statistically significant effect at the level of significance ($\alpha \geq 0.05$) to the business process management and its domains(identifying and designing the process, modeling and documenting the processes ,following up and controlling the processes , improving the processes) on the superiority of business performance.

To test this hypothesis , ANOVA analysis and simple and multiple linear regression were used to check the availability of the impact of business process management on the superiority of business performance .And table (3) illustrated the results of ANOVA analysis between business processes management and the superiority in business performance . There was a significant impact to the business processes management on superiority of business performance at the level of significance α (≤ 0.05). The value of the calculated F was (17.12) and its was statistically significant at the level of significance ($\alpha \leq 0.05$). Table (4) showed the results of simple linear regression analysis that prove the existence of business process management’s impact on the superiority in the business performance as R coefficient was (0.419) at the level of significance ($\alpha \leq 0.05$) while R^2 coefficient was (0.097) which means that (0.097) of the changes in the superiority in business performance is a result of the change in the level of business processes management .

Table (3) results of ANOVA test between business process management and business performance superiority

	Source	SOS	MS	DF	Calculated T value	Sig.
business process management / business performance superiority	Regression	3.215	3.215	1	17.120*	0.000
	Remains	29.861	0.188	88		
	Total	33.077		89		

* calculated F= 2.60 at level of significance (0.05).

Table (4): simple linear regression analysis of the business process management on the business performance superiority

	B	Standard error	Beta	Value t*	Sig.	R	R ²
Reliability coefficient	2.337	0.389				0.419	0.097
Business process management	0.403	0.097	0.419	4.138	0.000		

* tabulated T = 1.165 at the level of significance (0.05)

The value of β is (0.419) which indicates an increase with a degree in the business process management leads to an increase in the superiority in the business performance (0.419). The calculated value of T for the impact of business process management on the superiority in the business performance, which was (4.138), was significant at the level of significance ($\alpha \leq 0.05$).

Table (5) Multi Linear Regression analysis of impact of business processes management dimensions on superior business performance

Business process management	B	Standard error	Beta	Value t*	Sig.	R	R ²
Reliability coefficient	1.586	0.428				0.408	0.167
Identifying & designing the processes	0.308	0.098	0.256	3.131	0.002		
Modeling & documenting the processes	0.136	0.101	0.121	1.834	0.018		
Follow up & controlling the processes	0.154	0.107	0.131	1.844	0.015		
Improving the processes	1.88	0.04	0.380	2.34*	0.01		

Tabulated T= 1.165 at (0.05)

To know which dimension of the business process management's dimension has more impact on the superior business performance, multi linear regression test was used as it is

illustrated in table (5). It is clear from table (5) that “improving the processes” is the most influential in the superior business performance with $\beta(0.380)$ which indicates the increase with one degree in (improving the processes” leads to an increase in superior business performance with a value (0.380). The significant value of this influence is confirmed by the calculate T value (2.34) and it is significant statistically at ($\alpha \leq 0.05$) followed respectively by items: “ identifying & designing the processes” with β value (0.256) indicating the increase with one degree (identifying & designing the processes) leads to an increase in superior business performance with a value(0.256) and the significance of this impact was asserted by the value of calculate T (3.131), “ following up & controlling the processes” with $\beta(0.131)$ indicating an increase with a degree in “following up & controlling the processes” leads to an increase in superior business performance with (0.131) and the significance of this impact was confirmed by the value of the calculate T (1.844) while β value of “ modeling & documenting the processes” is (0.121) indicating an increase with a degree in “modeling & documenting the processes” leads to an increase in superior business performance with (0.121) and the significance of this impact was confirmed by the value of the calculate T (1.834) and all of them were statistically significant at ($\alpha \leq 0.05$) and therefore the null hypothesis is rejected and the alternative one is accepted which means there is no impact to the business processes management on the superior business performance.

Testing Sub-Hypotheses

To test the sub-hypotheses, ANOVA and multi linear regression analysis were used to check the impact of business processes management dimensions impact on the superior business performance's dimensions. It is clear from table 6) there is a significant impact of the business processes management on the superior operational business performance at ($\alpha \leq 0.05$)

Also , there is a significance to the business processes management in the competitive business performance at ($\alpha \leq 0.05$).the value of calculate T for every dimension of business performance superiority's dimensions exceeds the value of tabulated T and all of them are statistically significance , therefore; the null hypotheses are rejected and the alternative ones are accepted. Hence, there is an impact of the dimensions of business performance management on the operational business performance superiority and the competitive business performance superiority.

Results of multi linear regression analysis of the impact of superior business processes management's dimensions on the operational business performance superiority showed that all the dimensions of business processes management are significant and this is approved by the β value. This significance impact is approved by T value which exceeds the tabulated value and it is significant at ($\alpha \leq 0.05$). Results concerning multi linear regression analysis of the impact of the business processes management's dimensions on the competitive business performance superiority showed the significance of all the dimensions of business processes management which was proved by the β value. Moreover, the significance of this impact was confirmed by the value of calculated (T)which was higher than the value of tabulated T and it is significant at the level of significance ($\alpha \leq 0.05$)

Results also showed that processes development has the greatest impact on achieving superiority in the operational business performance followed respectively by identifying and designing the processes, following up and controlling the processes and modeling and documenting the processes. Regarding achieving superiority in the competitive business performance , results showed that identifying and designing the processes has the greatest impact on achieving

superiority in the competitive business performance followed respectively by processes development , following up and controlling the processes ,and modeling and documenting the processes .

Table (6) : ANOVA analysis & Multi Linear Regression of the dimensions of business processes management in superiority in the competitive business performance and superiority in operational business performance .

			Beta	t*	R	R ²	F**	Sig
ANOVA analysis & Multi Linear Regression of the dimensions of business processes management	superiority in operational business performance	Identifying & designing the processes	0.335	4.750*	0.371	0.138	4.479**	0.00
		Modeling & documenting the process	0.188	2.253*				
		Following up & controlling the process	0.281	3.803*				
		Improving the process	0.338	4.977*				
	superiority in the competitive business performance	Identifying & designing the processes	0.681	5.788*	0.294	0.086	7.875**	0.00
		Modeling & documenting the process	0.412	2.637*				
		Following up & controlling the process	0.459	1.491*				
		Improving the process	0.530	5.175*				

* tabulated (t)=1.165 at (0.05) **tabulate (f)=3.60 at (0.05).

Table (7) illustrated the Multi Correlation Matrices between the dimensions of the study's model's variables. The relation between designing processes dimension and the operational superiority achieved the strongest relation in terms of correlation value (35.8%) followed respectively by the relation between process development and operational superiority with a correlation value (34.2%), the relation between process development dimension and competitive superiority dimension with correlation value(24.8%) and finally the correlation value between designing processes dimension and competitive superiority dimension was (21.4%). The least correlation values were between the operational superiority dimension and the competitive superiority dimension with (5.1%) and the relation between process design and processes modeling with (9.1%).

Table (7) Multi Correlation Matrices between the study's variables

Business processes management	Designing processes	1					
	Modeling processes	.091 **	1				
	Controlling processes	.188 **	.154 **	1			
	Processes development	.165 **	.186 *	.199 *	1		
	Operational superiority	.358 **	.223 **	.292 *	.342 **	1	
	Competitive superiority	.214 **	.207 *	.226 **	.248 **	.051 **	1
		Designing processes	Modeling processes	Controlling processes	Processes development	Operational superiority	Competitive superiority

Business processes management

Superiority in performance

*significance at (0.05)

**significance at (0.01)

Results& Recommendations

The researchers concluded the following results :

- There is a statistically significant impact at the level of significance ($\alpha \leq 0.05$) to the business processes management and its dimensions (identifying & designing the process, modeling and documenting the processes, following up &controlling the processes , improving the processes) on the superiority of business performance.
- There is a statistically significant impact at the level of significance ($\alpha \leq 0.05$) to the business processes management and its dimensions on the superiority of operational business performance .
- There is a statistically significant impact at the level of significance ($\alpha \leq 0.05$) to the business processes management and its dimensions on the superiority of competitive business performance.

Based on these results, the researchers came up with the following conclusions:

- The managers' interest in the components of business processes management's cycle is moderate which indicates an integrated symmetry in improving the processes , identifying and designing processes , following up and controlling the processes and modeling and documenting the processes.
- The managers' interest in the superiority of business performance was distinguished and distributed to both; the competitive performance and the operational processes superiority in an integrated and balanced manner.
- The acceptance of the study's model's idea which was shown in the existence of the impact of business processes management and its dimensions on the business performance superiority and its dimensions. The results also confirmed the acceptance of the major hypothesis and its sub-hypotheses. And therefore , it is possible to interpret the fields of superiority in business performance (competitive and operational) depending on dimensions of business processes management .
- The validity of the business processes perspective as an objective and practical view to promote the superiority in the operational and competitive performance in a sustainable manner that enhances the value of business and its excellence .

Recommendations

- The increase of the awareness of business processes management as an important factor to achieve business performance superiority .
- Having the same degree of interest of both the competitive and operational performance to assure the organization's continuity and excellence in the field of business .
- Holding training courses that help in spreading the knowledge and culture of business processes and superiority fields in business performance .
- Encouraging the researchers to investigate the ideal of the study's model and its hypotheses and to get benefit of its scale so as to generate the results and to spread its use cognitively and practically.

REFERENCES

- Irmily,Azam(2011). Evaluating the role of business processes management in implementing the organization's strategies ,comparative study in banks and communication sectors, Arab Amman University for Higher Education, Business Management , Unpublished Dissertation.
- Al-Khafaji,N'ma & Al-Ghalbi,Tahir(2010). *Theory of the organization, business entry* ,Dar Amman.
- Yaghi,Asama,Naem(2009). *Impact of strategic competencies and quality improvement on the performance superiority of food & drug companies in Palestine* , Arab Amman University for Higher Education, Business Management , Unpublished Dissertation.
- Al-Mudimigh, A., (2000), The Role and Impact of Business Process Management in Enterprise systems implementation, *Business Process Management Journal*, 13 (6).

- Armistead, C., and Machin, S., (1997), Implications of Business Process Management for Operations Management, *International Journal of Operations and Production Management*, 17 (9), pp. 886-898
- Baltzan, Painge, (2012), *Business Driven Information Systems*, 3rd ed, McGraw Hill, P2.
- Boselie, P. & Paauwe, J. (2004). Human resource function competencies in european companies. *Personnel Review*, 34(5), 550-566.
- Chen, Y., Lin, F., (2006). Sources of Superior Performance: Industry Versus Firm Effects among Firms in Taiwan. *European Planning Studies*, 14, pp. 733-750.
- Chong, S., (2007), Business Process Management for SMEs: an Exploratory study of Implementation Factors for Australian wine Industry, *Journal of Information Systems and Small Business*, 1 (2), pp. 41-58.
- Day , G . S . and Wensley , R . (1988) ‘ Assessing advantage: A framework for diagnosing competitive superiority ’ , *Journal of Marketing* , Vol. 52 , No. 4 , pp. 1 – 20 .
- Elzinga, D.; Horak, T.; Lee, C.; and Bruner, C., (1995), Business Process Management: Survey and Methodology. *IEEE Transactions on Engineering Management*, 42 (2), pp. 119-128.
- Forza ,C. (1996). Achieving Superior Operating Performance from Integrated Pipeline Management:an Empirical Study. *International Journal of Physical Distribution & Logistics Management*, 26, 36-63.
- Franz, Peter and Kirchmer, Mathias, (2012), *Value-Driven Business process Management*, McGraw Hill.
- Gillot, J., (2008), *Complete Guide to Business Process Management*. NY, USA.
- Gonsalves, G., (2002), *Business Process Management: Integration of Quality Management and Reengineering for enhanced Competitiveness*, unpublished Doctoral Dissertation, College of Business, University of Kentucky, USA.
- Hinterhuber, H., (1995), Business Process Management: The European Approach, *Business Change and Reengineering*, 2 (4), pp. 63-73.
- Hung, R., (2006), Business Process Management as Competitive Advantage: a Review and Empirical Study, *Total Quality Management*, 17 (1), pp.21-40.
- Jenlicins, M., 2004, Innovative management superior performance in changing times, *European Business Journal*, pp10-19.
- Kung, P. and Hagen, C., (2007), The Fruits of Business Process Management: an experience report, Swiss bank, *Business Process Management Journal*, 13(4), 477-487.
1. LaudonKenneth & Laudon, Jane, (2013), *Management Information Systems*, 7rd ed, McGraw Hill.
- Lee, R., and Dale, B., (1998), Business Process Management: a Review and Evaluation, *Business Process Management Journal*, 4 (3), pp. 214-225.
- Llewellyn, N., and Armistead, C., (2000), Business Process Management: Exploring Social Capital within Processes, *International Journal of Service Industry Management*, 11 (3), pp. 225-243.
- Maclean, R. (2003).Superior Environmental, Health, and Safety Performance: What is it?, *Environment Quality Management* , 13, 13-18.
- Olavarrieta , S. and Friedman, R. (1999) . Market –Oriented Culture, Knowledge-related resources, reputational assets and superior performance: a conceptual framework. *Journal of Strategic Marketing*, 7(1), 215-228.
- Pantazi, M., and Georgopoulos, N., (2006), Investigating the Impact of Business Process Competent Information Systems on Business Performance, *Managing Service Quality*, 16 (4), pp. 421-434.

- Pil, F. and Rothenberg, S. (2003), Environmental Performance as a Driver of Superior Quality. *Production and Operations Management*, 12(1), pp404-411.
- Porter, M. (1985), *Competitive Advantage*, New York, McGraw Hill.
- Prichard, J. and Armistead, C., (1999), Business Process Management: Lessons from European Business, *Business Process Management Journal*, 5 (1), pp. 10-32.
- Rigim, Kabiru; Razalli, Mohd and Hasnan, Norlena, (2012), Critical Success Factors for Business process Management for small and medium Banks in Nigeria, *Business and Management Review*, Vol.2, No.1, Pp83-91.
- Roberts, P. and Dowling, G., (2002). Corporate Reputation and sustained Superior Financial Performance. *Strategic Management Journal*, Vol23, pp1077-1093.
- Scheer, A., (1999), *Business Process Frameworks*, ARIS, Springer, Germany.
- Singh, Pramentrta, (2012), Management of Business process can help an Organization Achieve Competitive Advantage, *International Management Review*, Vol.18, No.2, Pp19-26.
- Sittimalakorn, W. and Hart, S., (2004), Market Orientation versus Quality Orientation: Sources of Superior Business Performance. *Journal of Strategic Marketing*, Vol.12, pp243-253.
- Slack, N.; Chambers, S.; Johnston, R. and Betts, A., (2006), *Operations and Process Management: Principles and Practice for Strategic Impact*, England Pearson Education Limited.
- Smith and Fingar, (2003), *Business Process Management: the Third wave*. Meghan-Kiffer Press, Florida, USA.
- Smith, R., (2007), *Business Process Management and the Balanced scorecard: using processes as strategic drivers*. John Wiley and Sons, New Jersey, USA.
- Spencer, L. M., & Spencer, S. M. (1993). *Competence at work: Models for superior performance*. New York, USA.
- Tang, Y. and Ogunlana S.O. (2003). Selecting Superior Performance Improvement Policies. *Construction Management and Economics*, Vol 21, pp 247-256.
- Trkman, P., (2010), The Critical Success Factors of Business Process Management, *International Journal of Information Management*, 40 (2), pp. 65-86.
- Turban, Efraim and Volonino, Linda, (2010), *Information Technology for Management: Transforming Organizations in the Digital Economy*, 7th ed, Wiley, P2.
- Turban, Efraim; Sharada, Ramesh; Delen, Dursun; King, David, and Aronson, Janine, (2011), *Business Intelligence: A Managerial Approach*, 2nd ed, Prentice Hall, P295.
- Van der Aalst, P.; Hofstede, M. and Weske, M., (2003), Business Process Management, International Conference on BPM, Springer, Eindhoven, pp. 1-12.
- Wiggins, R.R. and Ruefli, T. W.(2002). Sustained Competitive Advantage: Temporal Dynamics & the Incidence & Persistence of Superior Economic Performance. *Organization Science*, 13, pp82-102.
- Zabjek, D., Kovac, A., and Stemberger, M., (2009), The Influence of Business Process Management and some other CSFs on Successful ERP Implementation, *Business Process Management Journal*, 15 (4), pp. 588-608.