A conceptual framework for the implementation of sustainability business processes

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Abstract

This research aims to provide a complete solution to achieve true sustainability in business processes, evaluating all relevant aspects. This paper demonstrates a conceptual framework with a case study to simulate scenarios of potential applications, and discusses the simulation results of different aspects organisations struggle to succeed in the implementation.

Keywords: Business Process Management, Sustainability, Sustainability Implementation

INTRODUCTION

The sustainability topic has been receiving growing importance and attention in the corporate environment in recent years. Motivational factors related to this phenomenon can be related to social aspects, regulatory aspects, customer requirements, among others (Epstein and Buhovac, 2010). Currently, many companies are adopting sustainability practices in all their organisational levels, operations and business processes as a whole. Despite of this, many organisations have yet failed to reach the sustainability level they wished at the beginning of the implementation project. According to Burnes (2003), between 40 to 70% of the sustainability initiatives fail. One reason for this may be that most sustainability initiatives focus in one specific department, or area, of the organisation. In this case, many sustainability initiatives do not consider that organisational departments and functions work along and interact with other departments/functions through end-to-end processes (i.e. systemic view). Therefore, a more refined analysis would consider the whole process interaction to evaluate the full status of the sustainability implementation.

The framework presented in this paper aims to support the business transformation by applying Business Process Management (BPM) techniques to the implementation of sustainability initiatives. The framework thus considers the implementation of sustainability as a multi-departmental and multi-functional activity with an end-to-end process view. The paper (1) reviews the literature in relation to sustainability, business processes and BPM, paying particular emphasis on their interrelations; (2) develops a conceptual framework to support the implementation of sustainability practices in organisations; and (3) exemplifies the conceptual framework through a case study.

LITERATURE REVIEW

Sustainability

According to Agyekum-Mensah et al. (2012) and Adams (2006), the idea of sustainability is relatively recent as it can be traced back to a conference held 40 years ago. In 1987, the term sustainability and sustainable development became more prominent, through the publication of the Brundtland Commission's Report. The Brundtland Commission's Report defines sustainable

development as 'the development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (United Nations, 1987). Nowadays, the term 'sustainability' is mostly used to refer to the best use of natural resources (such as water, energy, etc.) in order to meet the needs of the current population while being able to preserve the environment for future generations.

The importance of and attention to the sustainability theme has been growing in the corporate environment in recent years. Whether the motivation is a concern for society and the environment, government regulations, stakeholder pressures, or economic profit, most managers recognise the importance of developing sustainability strategies and activities (Epstein and Buhovac, 2010). Sustainability is important in the current business scenario as the potential benefits for a company that implements sustainability projects include cost reduction, process optimisation, innovation generation, lower consumption of natural resources, brand enhancement, and increase in competitive advantage. According to Ambec and Lanoie (2008), sustainability also enables greater innovation by encouraging learning and inquiry among employees, which offers access to alternative markets and opportunities to differentiate products while reducing risk management and agency costs, and providing access to cheaper capital and improved labour costs.

Sustainability Implementation

Growing interest in sustainability has been found in both academia and industry (Linton et al., 2007). Several authors have investigated the implementation of sustainability initiatives through different perspectives, namely: Human aspect (Robinson et al., 2006; Vora, 2013); Sustainability Indices/Reporting (Tan et al., 2010; Ahmed and Sundaram, 2012); Project Management (Silvius and Nedeski, 2011; Silvius et al., 2012; Agyekum-Mensah et al., 2012); and Operations (Thies et al., 2012; Uddin and Rahman, 2012; Tan et al., 2008).

Many organisations are committed to transforming their business processes and have taken sustainability initiatives. However, many of them have yet failed to achieve the anticipated goals (Ahmed and Sundaram, 2012). Every sustainability project involves changes in the organisation, from the most basic ones (e.g. replacing disposal plastic cups with individual ceramic mugs) up to drastic changes in the way in which a company operates. However, according to Burnes (2003), a large percentage of these change initiatives fail due to different factors that may include the lack of management support, lack of proper communication, lack of stakeholder engagement, among others. In summary, organisations face various challenges when trying to implement change initiatives to become sustainable. If organisations are unable to overcome a particular challenge, this might result in the failure of the initiative. Some authors (e.g. Epstein and Buhovac, 2010; vom Brocke et al., 2012; and Giunipero et al., 2012) have studied and identified the most common challenges/barriers organisations face when implementing sustainability initiatives. Table 1 represents a summary of some of these challenges.

Besides the above challenges, another factor suggested by Ahmed and Sundaram (2012) as a possible reason for sustainability initiatives to fail is that existing roadmaps, frameworks and systems do not comprehensively support a sustainable business transformation nor do they allow decision makers to explore interrelationships and influences between the sustainability dimensions. Hence, because the sustainability concept continues to be applied unsystematically, practising organisations experience huge difficulties in realising their goals of achieving a full sustainability status. This is due to a lack of understanding and support for the design, development and

implementation process, and a lack of proper procedural and technological support for decision making for sustainability management.

Table 1 - Challenges to Implement Sustainability Initiatives

REFERENCES	CHALLENGES
EPSTEIN AND BUHOVAC (2010)	Setting clear and measureable goals
	Dealing with financial incentive pressures
	Comprehending Stakeholder reactions
VOM BROCKE ET AL. (2012)	How to consider sustainability aspects in the management of an organisation's processes
GIUNIPERO ET AL. (2012)	Lack of consensus at the CEO level
	Costs of sustainability and economic conditions;
	Lack of sustainability standards and appropriate regulations
	Misalignment of short term and long term strategic goals.
AHMED AND SUNDARAM (2012)	Existing roadmaps, frameworks and systems do not comprehensively support sustainable business transformation
	Existing systems do not allow decision makers to explore interrelationships and influences between the sustainability dimensions
	Sustainability concept continues to be applied unsystematically
POVEDA AND LIPSETT (2014)	Select the right sustainability Indicators
	Define the proper measurement method
	Align indicators to goals and objectives

Sustainability and Business Processes

According to Slack et al. (2013), whenever a business attempts to satisfy the needs of its customers it will use various processes in both its operations and other functions. Each of these processes will contribute in fulfilling its customers' needs. Once an organisation decides to reorganise its operations, each product is created from a starting point passing through processes, which contain the necessary elements for the production, to reach a final stage. This concept is called 'end-to-end' process. These end-to-end processes usually cut across conventional organisational boundaries.

'Process' refers to the conversion of inputs (resources) into outputs (goods and services) (Armistead and Machin, 1997). Although the literature provides numerous definitions for 'business processes', all of these reflect, more or less, the same ontology, that a business process is a series of continuous or intermittent cross-functional activities that are naturally connected together with work flowing through these activities for a particular outcome/purpose (Hammer and Champy, 1993; Zairi, 1997; Slack et al., 2013; Harmon, 2010). What seems to make the business process approach so distinct is that it not only focuses on activities, i.e. what is done and/or how they are done, but it also places emphasis on how these activities are interconnected and how work flows through these activities to produce efficient and effective results (Bititci et al., 2011). The key point is that transformed resources (e.g. materials and information) originate from outside the boundaries of the organisation, whereas outputs in the form of goods and/or services leave the boundaries of the organisation.

Nonetheless, many sustainability implementation initiatives have focused in one specific department of the organisation, e.g. IT (Uddin and Rahman, 2012), warehouse (Tan et al., 2010; Tan et al., 2008), logistics (Rossi et al., 2013), etc. They, however, do not consider that those

departments work along with other departments into an end-to-end process. According to Porter's (1985) model, products pass through activities of a chain in order, and at each activity the product gains some value. In a similar way, we can consider that the 'product' (in the case of a product based industry) gains some 'sustainability impact' in each activity. Therefore, a more refined analysis would consider the whole process interaction to evaluate the full status of the sustainability implementation.

According to Houy et al. (2012), taking into consideration resource scarceness, increasing pollution and the debate on global warming, more and more organisations have now recognised the upcoming need to improve the sustainability of their business processes. The matter has gained increasing importance in the business context and driven organisations to put more effort into enhancing resource efficiency and reducing the production of waste materials in the context of their business activities. According to Thies et al. (2012), most large enterprises regularly assess their emission inventories, set reduction targets, and report on their improvements to various stakeholders (Seuring and Müller, 2008). However, leading enterprises are even going beyond static sustainability reporting by incorporating environmental and social activities into their core business processes. Organisations are increasingly realising the importance of sustainability, and many are trying to design or redesign their business processes so that their activities are more environmentally friendly (Klassen and Vachon, 2003). Such companies have understood the value of improving their processes to achieve environmental excellence.

Business Process Management

Several approaches such as lean manufacturing, Six Sigma, and Business Process Reengineering can be used to improve business processes. In this paper, however, the Business Process Management (BPM) approach was considered due to its ability to work in a cross process way which evaluates the impacts of each process in the selected metric whilst relating people, processes and technology. BPM is typically defined as 'a structured, coherent and consistent way of understanding, documenting, modelling, analysing, simulating, executing and continuously changing end-to-end business processes and all involved resources in light of their contribution to business success' (Australian Community of Practice, 2004). It provides adequate techniques for the design, execution, control and analysis of business processes in order to improve value creation within single organisations as well as in inter-organisational value networks (van der Aalst and ter Hofstede, 2005).

According to Jeston and Neils (2006), historically, the process literature has suggested that there are three critical aspects to a process improvement project: people, process and technology. The BPM approach comprehensively considers those three aspects since process design needs to be linked to the company strategy and aiming to reach the process objectives; people are key to implement the proposed processes, they are the agents of change; and technology means the tools that support processes and people. BPM, therefore, is a comprehensive management approach to align business processes and corporate strategies and to analyse, optimise and implement best-in-class processes.

SUSTAINABILITY IMPLEMENTATION FRAMEWORK FOR BUSINESS PROCESSES

While several variations of BPM lifecycles have been proposed, in this paper a four phases methodology (i.e. Analyse, Design, Implement, and Monitor & Control) is proposed to support the

implementation of sustainable practices. These four phases were considered because they represent the BPM approach with stages which are analogues to the ones presented in other sustainability implementation frameworks (e.g. Ahmed and Sundaram, 2012; Uddin and Rahman, 2012). Figure 1 presents the proposed conceptual framework to support the implementation of sustainability based on a business process view. It shows the main implementation phases and the sub-activities suggested to be carried out in each phase. The following subsections discuss the main components of the conceptual framework.

Analyse

The 'Analyse' phase aims to assess and evaluate all the relevant aspects related to the implementation of sustainability in the business processes. The first step in the Analyse phase is to identify the current business scenario by identifying the customer's requirements, supplier's requirements and current regulations that may affect the project. Once this assessment is completed, the processes to be considered in the project are defined and prioritised, the stakeholders identified and the main project objectives set. After this, the metrics are defined and aligned to the project objectives, the enterprise map (current situation) created, the baseline values recorded and, finally, a sustainability maturity assessment is performed.

Design

The 'Design' phase aims to propose the changes in the business processes by designing the expected situation. The first step in the Design phase is to define the project scope and the improvement opportunities. This can be done by conducting collaborative. After this new design, the metrics are assigned to the related activities and the implementation strategy is defined.

Implement

The 'Implement' phase is when the project is in fact implemented, when the technical execution happens, so it is when the business processes will be transformed into 'green business processes' (strong commitment with Project Management and Change Management aspects) and further executed and incorporated within the organisation's day to day routine (go-live scenario). During this phase, the tasks need to be followed up and if changes are required, they need to be recorded in a change request form that should be addressed and incorporated (or not, depending on the decision of the project committee) in the project scope.

Monitor & Control Phase

The 'Monitor & Control' phase contains the steps that are necessary to evaluate the status of the implementation. In this phase, the organisational performance is initially monitored, probably using dashboards to analyse objectives, resources and results. After this step, the process performance (based on the Process Performance Indicators) is monitored through the previously established metrics. Afterwards, once the value is fully realised (i.e. all the objectives are met by comparing actual metric values against initial and predicted ones) the implementation project is formally closed. However, since the sustainability requirements (from the market, customers, and regulations) are always changing, it is important to have a step to identify optimisation opportunities, giving a cyclic characteristic to the framework.

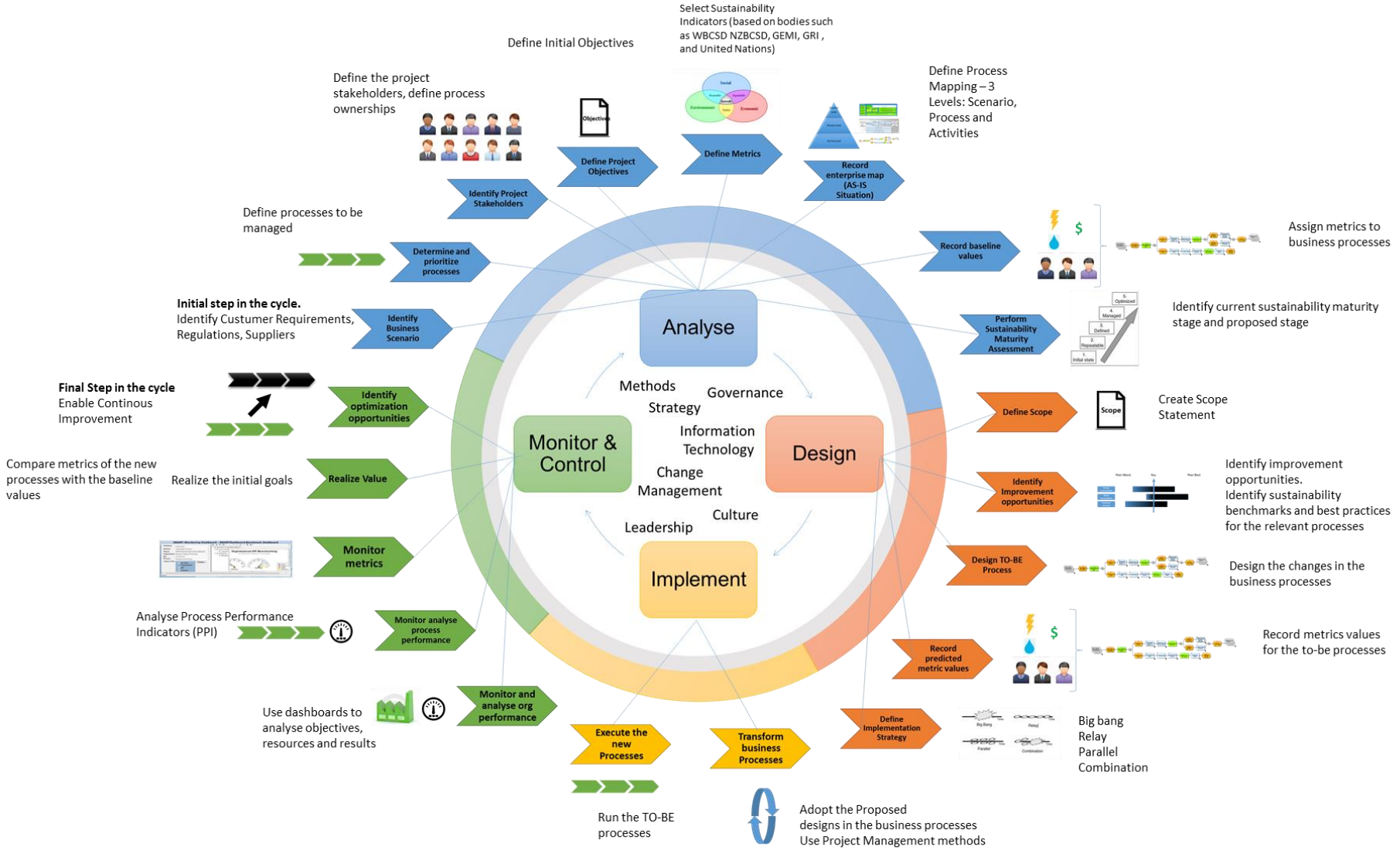

Figure 1 – Conceptual Framework to Implement Sustainability Initiatives in Business Processes

CASE STUDY

The case study considers a fictional organisation termed ‘Organisation 1’. This is a manufacturing company which aims to adopt sustainability practices in its operations. The process structure used in the case study was based on guidelines from SCOR (Supply Chain Operations Reference) and the activities energy data was adapted from the work of Houy et al. (2012).

Analyse

The business environment was initially considered, identifying that current government regulations were forcing ‘Organisation 1’ to reduce its CO_2 emissions by 10%. ‘Organisation 1’ had never undertaken large change management projects, and it was identified that 53% of its customers preferred companies that had a low carbon impact to the environment.

After identifying the current business scenario, the project team evaluated that two processes which could be made more sustainable were the process of ‘Order Entry’ and that of ‘Logistics Planning’. The team chose those processes because they provided an interaction between the manufacturing plant and the company’s distribution centres. The two processes were also not key processes in the organisation, which provided the aspect of a ‘pilot’ project. Similar projects were therefore intended to be rolled out to other business processes after successfully completing the sustainability improvement of the two selected business processes.

‘Order Entry’ was the process of recording new orders in the system and ‘Logistics Planning’ was the process responsible for planning the efficient and effective flow and storage of products from the plant to the distribution centres. The project sponsor (i.e. the organisation’s board) defined as direct project objectives to: (1) reduce fuel consumption; (2) reduce CO_2 emissions; and (3) reduce energy consumption. The chosen metrics for this project were: (1) electric energy consumption (in kWh); (2) total fuel consumption (in L); and (3) CO2 emissions (in Kg).

The enterprise map contained three levels of details: 1) Scenario Level; 2) Process Level; and 3) Activity level.

In the Scenario Level, the organisation could be divided into Management Processes, Core Processes and Supporting Processes. The Management Processes would contain the following processes: Strategy and Planning; Financial Planning and Budgeting; Demand Planning; Procurement Planning; Production Planning & Detail Scheduling; Human Resources Management; Operations Planning; and Logistics Planning. The Core Processes would contain the following processes: Research & Development; Raw material procurement; Order entry management; Manufacturing; and Warehouse Management. The Supporting Processes would contain: IT Services; Product Lifecycle Management (PLM); Recruitment; Financial Accounting; and Maintenance.

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The organisation needed to make sure that its operations abided to the current regulations and had already identified some sustainability indicators to monitor this situation. The organisation, however, neither had the processes formally defined nor was able to manage and control them using any specific tool. Therefore, we can conclude that 'Organisation 1' is in an early stage of maturity. However, due the external requirements, the firm aimed to improve this level.

Design

In order to define the project scope, the 'Project Scope Statement' was elaborated. The organisation decided to initially study the process of 'Logistics Planning' and then, after the implementation, the 'Order Entry' process. 'Organisation 1' performed a benchmarking analysis and identified its position among its competitors in terms of CO_2 emissions (direct and indirect); Packaging (recycling); Health & Wellbeing (health rates); and Electricity Consumption. A poor performance was identified in terms of 'CO_2 emissions' and in 'Energy Consumption'; and it was average in terms of 'Packaging' and 'Health & Wellbeing'.

After the benchmarking analysis, the project team gathered the stakeholders related to the processes of 'Order Entry and 'Logistics Planning' to help them identify improvement strategies. The improvement ideas put forward by the team were: (1) optimising the product delivery, which could result in a better allocation of products and reduction of the delivery route, and (2) change the machine to transfer products to outbound logistics. This would save energy consumption. These ideas were used as an input for the design of the new/improved processes. This step aimed to gather products to close destinations in order to reduce the transportation mileage spent in the delivery of products.

The Implementation followed the Relay strategy in which the project will implement initially the changes into the 'Logistics Planning' process. Once the full value is achieved, it will implement the changes in the 'Order Entry' process. With this approach, lessons learned from the preceding roll-out can be fully taken into account and the same implementation team can be used.

Implement

To help in the implementation of the project, the Project Management methodology was used. To schedule the activities, a Gantt chart was used. The chart consists of a horizontal scale divided into time units - days, weeks, or months - and a vertical scale showing project work elements - tasks, activities, or work packages.

Monitor & Control

At the beginning of the process, Process Performance Indicators (PPIs) to measure the organisation's performance were not defined. However, it was observed that the process became more efficient and more effective. It became more efficient by gathering products with close destinations, this improvement resulted in the reduction of fuel consumption and CO_2 emissions. It became more effective due to the change of the machine to transfer the products to outbound logistics.

After successfully implementing the sustainability practices in the processes of 'Order Entry' and 'Logistics Planning', the organisation will roll-out the initiative to other processes. Initially, the firm can start with other processes from 'Order Entry Management' and then move to other Macro-processes (e.g. Manufacturing, IT, Human Resources). More than that, the organisation aims to adopt sustainability projects in all their value chain, identifying opportunities of enhancement in other aspects, such as the end-of-life of the product, origin of the inputs, among others.

CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCH

Sustainability is nowadays a subject relevant to the business community as this concept is becoming an increasingly strategic and integrated element of companies' operations. More and more organisations are looking to adopt sustainability practices in their operations, strategy, and processes. Companies have started to realise the potential benefits of sustainability, whether it is related to cost reduction, innovation generation or lower consumption of natural resources.

However, adopting sustainability practices is not something trivial as its implementation involves several elements of an organisation (such as stakeholders, culture, and business environment) and has several barriers. Existing roadmaps, frameworks and systems do not support sustainable business transformation nor do they allow decision makers to explore interrelationships and influences between the sustainability dimensions. More than that, several current solutions tend to focus in one specific department of the organisation. This goes on the opposite direction of recent management theories that consider process-centric as a key characteristic to improve an organisation's performance. Thus, a more refined analysis would consider the whole process interaction to evaluate the full status of the sustainability implementation.

This research proposes a four phases ('Analyse', 'Design', 'Implement' and 'Monitor & Control') conceptual framework based on Business Process Management to support organisations implement sustainability practices in their business processes. It involves several management methodologies (such as business process modelling, maturity assessment, and process performance monitoring) adapted to the sustainability topic and working together as a holistic solution. The paper has also presented a case study to exemplify the use of the conceptual framework.

The main limitation of this paper is the lack of empirical validation. Future work aims to conduct Delphi studies to refine the framework and later apply it in real world companies. This type of application will allow an exchange of information between the academic practices and the industry based practices. Further research will also investigate the symbiosis of the BPM approach with other management approaches, such as Balanced Scorecard and Project Management, aiming to reduce the failure rate during the implementation phase.

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