



Research Article

The Role of SDMs in Preserving the Organisational Strategy during BPR: Lessons from SA MHEIs

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Abstract

Professionals in system development have recognised and recommended the use of System Development Methodologies (SDMs) in South African organisations (Huisman and Iivari 2003, Huisman 2004). Professionals in BPR have also raised concern over the negative impact that BPR has on the organisational strategy (Mavetera 2012, Hammer and Champy 2005). There has therefore been a call for the use of SDMs during BPR to try and lessen the burden BPR bears on the organisational strategy (Hammer and Champy 2005, Muthu, Whitman and Cheraghi 1999 and Giaglis 2009). This study aimed to bring to light the role of SDMs in preserving the organisational strategy during BPR. The motivation behind this study is informed by past research in BPR, organisational strategy and SDMs. To be able to gather more evidence that support the ideas behind the past research and assist in establishing the purpose of the study in practice; interviews were done with South African Merged Higher Education Institutions (MHEIs) and literature on this topic was also used. This study was qualitative in nature and applied unstructured interviews and literature analysis of which results found that BPR has an effect on the organisational strategy in several ways and SDMs are either being applied or recommended in for BPR projects.

Key words: System Development Methodologies, Business Process Reengineering, Merged Higher Educational Institutions, Organisational strategy.

Introduction

South Africa underwent extensive restructuring of its Higher Education Institutions (HEIs) through mergers during

its first decade of democracy. These mergers caused the restructuring and redirecting of previously individual Information Systems infrastructures to larger and combined ones thereby invoking BPR and causing shifts on

original organisational strategies (Jansen 2010). Rothman (2009) confirmed that the mergers saw the transformation or altering of organisational strategic goals of the different HEIs to suit the requirements of the mergers. Besides the expansion of Information Systems there were modifications and adjustments to original business processes thereby invoking several BPR initiatives. It is with this in mind that this study was undertaken.

Information Systems is one of the most important functions in any organisation, handling the most important asset of any business which is information. Strategic decisions in any organisation are based on the information at hand and it is obvious that BPR initiatives such as mergers affect the way information was previously handled. The BPR process should be well handled in such a way that Information Systems will still allow valuable decisions to be based on existent information.

Combined stories of success or failure on BPR, strategy and SDMs have rarely been published. This study therefore introduced a combined story on the three concepts. A case study on was done from existent literature by evaluating some SDMs for accommodation of strategy and interviews were conducted at MHEIs. The results indicated that there was generally applicability of SDMs to support system development, but vagueness still remained as to the existence and use of particular SDMs for BPR that support strategy.

Problem Statement

With the ever changing technological trends and other factors such as direction of competition and economic trends, organisations are compelled to follow through (Mavetera 2012). In such cases organisations may have to re-examine and reposition the above mentioned strategic functions and also re-engineer their business processes hence triggering BPR (Senn 2001). The above statements give an insight to the problem statement of this study. Depending

on the organisation, some Information Systems are simple involving less processes and older technology while others are complex with more processes and newer technology. Adjusting business processes therefore can be very complicated considering the effects it has on the people and the rest of the organisational functions (MacArthur (2004). Using SDMs could help developers reduce some problems associated with engineering and re-engineering of Information Systems (Muthu, Whitman and Cheraghi 1999 and Giaglis 2009). SDMs could help developers fulfil requirements as well as meet budgets, schedules and produce effective products (Jackson 1995).

For a long time SDMs have been a part of the organisational as well as Information Systems design process (Giaglis 2009). The discussion on SDMs precedes to yet another part of the problem statement. During mergers, business analysts and information systems professionals have often failed to establish the link between BPR, existent or proposed SDMs and organisational strategy. They fail to realise that BPR itself is a process that needs proper planning and direction of which SDMs could be the solution (Muthu et al. 1999). Furthermore, MacArthur (2004) purports that while the benefits of aligning strategy with SDMs during BPR should be apparent in theory such an integrated design has rarely been done in practice.

Since the mergers of HEIs took place in South Africa, a lot has been written by several authors (Hall and Symes 2005, Moore 2010, Martin and Roodt 2010, Jansen 2010 and Du Plessis 2010). Most of these authors have discussed the effects of the merger on staff or on students, but little has been written concerning the Information Systems side of the mergers. So far, little information can be found concerning the development practices deployed or used during the development of new systems in MHEIs.

The discussions above have attempted to bring out the impact of BPR on organisational strategy, and indicated that some MHEIs had to re-examine and reposition their strategic

functions and also re-engineer their business processes. There was also an attempt to bring out a relationship between BPR and SDMs. The context of this study therefore also intends to investigate the applicability of SDMs during BPR. If there are any SDMs being applied the study intends to determine whether they accommodate BPR characteristics such as organisational strategy for effective use during BPR in MHEIs.

Significance of the Study

Higher education still remains one of the most important sectors in South Africa, training and imparting necessary skills towards the development of qualified employees to service the nation. There have been studies concerning the South African mergers as well as BPR and SDMs from authors such as Jansen (2010), Rothman (2009), Muthu, Whitman and Cheraghi (1999) and Giaglis (2009) and studies on BPR and organisational strategy from authors such as Mylopoulos and Yu (2001) and Hammer and Champy (2005). This study goes further to add to these studies by attempting to establish the relationship between BPR, SDMs, and organisational strategy as it applies to South African Higher Education mergers.

Aim and Objectives

The aim of this study was to evaluate whether SDMs accommodate organisational strategy in order to determine their utility as a change tool during BPR.

The objectives of the study can be summarised as the need to evaluate the effectiveness of SDMs that satisfy the aim of the study. More specifically the objectives of the study are broken down as follows: to

- Identify major categories of existing SDMs for accommodation of strategy present their shortcomings for BPR purposes

- Investigate whether or not SDMs play a role in BPR in MHEIs

System Development Methodologies (SDMs)

Definition

A SDM is defined by Avison and Fitzgerald (2006) as a recommended means to achieve development of information systems based on a set of rationales and an underlying philosophy that supports, justifies and makes coherent such a recommendation for a particular context. The recommended means usually includes the identification of phases, procedures, tasks, rules, techniques, guidelines, documentations and tools.

Types of SDMs

SDMs are recent phenomena and are still under development because Information Systems specialists have various views on what appropriate route to follow in pursuit of optimal software development. One of the reasons for the different views is the philosophical belief associated with these SDMs. Some of the main types of SDMs are discussed below, classified according to their underlying philosophical views that determine the order of phases, techniques and tools.

- **Process Oriented SDMs:** SDMs under this philosophy put emphasis on the analysis and design stages of the system development processes (Benson and Standing 2005). (Examples of the techniques used include functional decomposition, data flow diagrams, decision trees, decision tables and structured English (Hill 2009). Examples of SDMs under this category include: Structured Analysis, Design and Implementation of Information Systems (STRADIS) and Yourdon System Method (YSM)
- **Blended SDMs:** Unlike process-oriented SDMs, blended SDMs give a tremendous emphasis on the analysis of data (Mumford 1995). It tries to identify the problem

behind the system from scratch and data is the building block of the information system. Examples of SDMs under this category include Information Engineering (IE) and Structured System Analysis and Design (SSADM)

- **Object Oriented SDMs:** Khan (2004), highlights that to bring reality closer to technology; software has to be organised according to the structure of our world to increase understandability and the changing nature of the software. Object oriented SDMs philosophy involve modelling of data and processes and do not view data and processes as separate elements (Avison and Fitzgerald 2006). Examples of SDMs under this category include Rapid Unified Process (RUP) and Object Oriented Analysis (OOA)
- **Rapid Development (RAD) SDMs:** This is a revolutionary concept that views system development not as a once-off documentation but that they evolve from time to time and are bound to change. (Surendra 2008). SDMs under this philosophy denote that not all of a system's requirements can necessarily be identified and specified in advance but the system's interaction with the users will highlight more requirements that have to be added to the development process (Zagarrio 2005). Examples of SDMs under this category include Extreme Programming (XP) and Dynamic Systems Development Method (DSDM).
- **People Oriented SDMs:** Systems developed using SDMs in this category need the technology used to fit into the socio-organizational culture if it is to be effective (Bubenko and Wangler 1992). The SDMs attempt to capture the expertise and knowledge of the people in the organization (Khan 2004). Examples of SDMs under this category include Effective Technical and Human Implementation of Computer-Based Systems (ETHICS) and Knowledge Acquisition and Documentation structuring (KADS).

- **Organisational Oriented SDMs:** The philosophy behind this category of SDMs is that properties of a whole are not entirely constituted by the parts or elements that is, 'systems thinking' (Olle et al. 2001). Information System development in organizations cannot be viewed separately from the organization's context (Mumford 1995 and Avison and Fitzgerald 2006). Examples of SDMs under this category include: a) Soft Systems Methodology (SSM) and Projects in Controlled Environments (PRINCE).

Strategy

A strategy is a collection of statements that express or propose a means through which an organization can fulfil its mission (Frenzel and Frenzel 2004). Schwalbe (2010) adds that organisational strategy clearly outlines the company's long term objectives and the manner in which it is differentiated from its competitors. Organisational strategy helps to clearly show the organisation's focused purpose, future perspective and strategic advantage including clearly defining the organisation's direction (Weicher et al. 2006).

Business Process Reengineering (BPR)

BPR is addressed as change to business processes which seeks to reduce the number of cumbersome and redundant activities and at the same time provide real strategic benefits to the organisation (Clemons 2000). It is a pioneering attempt to change the way work is performed. BPR involves addressing issues concerning the organisational structure, the roles of process performers, the management system and the underlying corporate culture which holds the beliefs and values that influence everyone's behaviour and expectations (Cypress 2009). The main idea is on improving or building up on what already exists rather than starting afresh. BPR requires a cross-functional effort and usually involves innovative application of technology (Gant 2002, Carter 2005 and Stalk 2010).

South African MHEIs

The idea of merging institutions, as suggested by the then South African Minister of Education, Kader Asmal, caused mixed feelings (Hayward 2004). However, the mergers took place and a new plan for higher education ministry was implemented (Jansen 2010). Jansen (2010) confirms that, the new South African higher education scenery consists of three types of institutions namely; the University of Technology, the traditional research-focused university, and the new comprehensive university that combines academic and vocationally oriented education. All three types are aimed at enhancing student access and expanding research opportunities and market responsiveness (Study SA 2008).

Effects of BPR on the Organisational Strategy

Every organisation depends on its organisational strategy for proper functionality. Reengineering organizational processes implies changes to the fundamental strategic functions or processes and this involves re-examining and repositioning of the organisational strategy. It is important that resultant business processes after BPR be a true representation of the organisation (Mavetera 2012). BPR tasks are derived from the mission and the vision of the organisation (Aremu and Sidikat 2008). Hammer (2008) emphasises that for BPR to succeed it should be aligned to the organizational strategy because it is change to business processes and business processes are a way to implement the organisational strategy. Frenzel and Frenzel (2004) also emphasise that the organisational strategy must be kept in check to ensure that they are aligned with business processes during BPR because they are the major cornerstones of operations in any organization which address every aspect of the organisational strategy.

Hammer and Champy (2005) elaborates that the BPR organisational strategy alignment is

the key to transforming business processes in any organisation in a way that will eliminate confusion to the daily business activities. Any changes due to BPR, no matter how minor, can have dramatic effects on cash flow, service delivery and customer satisfaction which are the most important components of strategy. Mavetera (2012) denotes that if BPR is not aligned to the organisational strategy resultant business processes become non-essential and organizational performance remains poor. The BPR process should involve management selecting business processes that need to be reengineered and define clear and measurable objectives for reengineering based on the existent or intended organisational strategy.

Role of SDMS in BPR

It is widely believed that adherence to SDMs is beneficial to organizations and organizations that have used them report that they obtained positive results (Huisman and Iivari 2003, Hill 2009). Mavetera (2012) denotes that the success or failure of BPR lies in the good practices and measures applied into the process, more specifically the SDMs followed to accomplish results. SDMs help to maximise change benefits to an organization and minimise the impacts of change on the organisational strategy as this usually impacts on workers and cause distractions to business processes (Huisman 2004).

Muthu et al. (1999) consider SDMs as a key factor in BPR for organizations that want to witness organised change in its operations. Mavetera (2004), Mavetera and Kroeze (2010), Huisman and Iivari (2006) argue that Information Systems should forge some type of humanistic, non-deterministic, dynamic behaviour which can sometimes be captured and enhanced in most SDMs. Apart from the claims above and all the theory written to appraise application of SDM it is still not very clear how SDMs are being applied or whether they are being used for BPR purposes.

MHEIs, BPR, SDMs and Strategy

The discussions above highlighted that BPR has an effect on the organisational strategy. With this in mind an assumption that the mergers of South African HEIs had an impact on the HEIs' original strategies is also made. It was also highlighted above that BPR is a process that needs to be properly planned, designed, implemented and managed in order to fully capture and protect the organisational strategy hence it requires following some sort of SDM (Stalk 2010, Avison and Fitzgerald 2006 and Muthu et al 1999). SDMs are viewed as leverage to BPR initiatives that may improve the process' effects on the organisational strategy. Jansen (2010) and MacArthur (2004) support that mergers, are viewed as necessary change essential in an organisation. BPR will inevitably lead to original business processes being re-evaluated and redesigned and this also leads to change of the organisational strategy. Using SDMs could help developers reduce some problems associated with re-engineering of Information Systems (Muthu et.al 1999 and Davenport and Short 1990).

Research Design

Research Approach

This study followed the qualitative approach, since the nature of the study is interpretive. Interpretive research focuses on the depth rather than breath of each sample. The researcher managed to obtain as much in depth detail as was required for the study from the MHEIs investigated and literature studied. Data generation was through unstructured interviews which were personally administered and anonymously handled as well as through literature analysis. Since this study followed the qualitative research approach, data analysis was also qualitative in nature and an analysis tool called ATLAS.ti was used for the transcribed interviews and the content and cross case qualitative analysis techniques were used in reporting the findings.

Research Method

Choice of Sample for Investigation

The grouping of the MHEIs as explained in earlier sections (University of Technology, the Traditional Research-Focused University, and the New Comprehensive University) guided the choice of the sample for this study. At least one university from each MHEIs grouping was interviewed and at least two interviewees were interviewed from each university where one of them was at managerial level and the other at operations level such a developer. For the sake of anonymity the universities interviewed were named A, B, C and D respectively. For this study the sample chosen was a good representation of the whole in the sense that each MHEIs grouping was represented and pages of data were generated from each single interview. The sampling was random and based on the convenience of time and proximity as well as being an equal representation of the whole. Relevant literature from previous research was also used.

Data Gathering

Unstructured interviews and literature analysis were used as the data gathering techniques for this study. Each interview lasted about 45 minutes and the interviews allowed the researcher to obtain in depth information from the sample discussed above.

Research Questions

Six research questions were formulated based on the third objectives of this study introduced earlier to answer questions, give deeper insight and provide information that satisfies the requirements of the study as follows:

- Question on SDMs being applied in MHEIs for BPR purposes

1. Are there any specific or other SDMs that are currently being applied in the organisation for BPR purposes?
 2. What success or failure factors are associated with the use of SDMs?
 3. Would organisations be willing to adopt SDMs if there are none or to take up new to replace current ones?
- Question on whether SDMs play a role in preserving the organisational strategy
 1. What effect does BPR have on the organisational strategy?
 2. Are the SDMs being applied structured to in a way that allows consideration of the organisational strategy?
 3. Is there a need to develop specific SDMs that accommodate strategy to suit BPR purposes?

Results

The results from the interviews were firstly transcribed and were then analysed with ATLAS-ti and propositions were formulated where answers were derived. Content analysis was applied to make it possible to distil literature into required content of related categories. Thereafter cross case analysis was applied to these results in order

to formulate a comprehensive story on the role of SDMs in preserving the organisational strategy. The results were presented according to the objectives of the study.

Interpretation of Results

Universities interviewed formed Cases A, B, C and D of this study. Depending on the number of interviewees from each university, interviewees were referred to as interviewee 1, 2 or 3. The results were then presented as of Case A for interviewee 1, 2 or 3, for example; AI1 and AI2 and the same applies for the rest of the cases B to D. The objectives were labelled OB1 or OB2 and each result was labelled R1 or R2.

Research Findings According to Research Objectives

OB1: Identify Major Categories of Existing SDMs for Accommodation of Strategy Present their Shortcomings for BPR Purposes

For this objective, literature analysis was done and major categories of SDMs were identified and presented as shown in Table 1 below. The major criterion used to motivate SDMs to succeed as useful tools during BPR is the extent to which they accommodate organisational strategy.

Table 1: Evaluation of SDMs for Accommodation of Strategy

SDMs	SDMs support to strategy	SDMs for BPR	Recommendation for use in BPR
- STRADIS - YSM	- very little emphasis on inclusion of strategy	- Not specific for BPR	- need to capture strategy in terms of culture, and the human aspect
- IE - SSADM	- no emphasis on strategy	- Not specific for BPR	- need to address buy in issues from stakeholders and productive change
- RUP - OOA	- mentions strategy means but there are specific steps on how to implement it.	- Not specific for BPR	- need for criteria to implement strategy
- XP - DSDM	- no mention of strategy	- Not specific for BPR	- need to take up new recipes that include making use of strategy
- ETHICS - KADS	- there is less emphasis on how strategy is incorporated	- Not specific for BPR	- need to combine management and customer issues in addressing strategy
- SSM - PRINCE	- Points out that strategy is important but miss out on addressing strategy steps	- Not specific for BPR	- need to understand the organisation's mission were strategy is derived from

The findings from these discussions show that none of the SDMs identified emphasise on the accommodation of strategy as is required for the purpose of the study. Some SDMs have briefly highlighted issues of strategy in passing, but no particular phases within them are dedicated to strategy. However some SDMs were recommendable provided they meet the requirements suggested for them to qualify as specific for BPR.

OB2: Investigate Whether or Not SDMs Play a Role in BPR in MHEIs.

For this objective and to answer the research questions, responses from interviews with MHEIs as highlighted below were given by the different interviewees.

On SDMs Being Applied in MHEIs for BPR Purposes

R1: Universities confirmed application of SDMs during both new developments and improvements of existent systems. SDMs

such as agile RUP, PRINCE ITIL, TOGAF and agile SRUM are the most commonly used ones. [AI1, AI2, BI1, BI2, CI1, DI1, DI2, DI3]

R2: Universities confirmed that they have not identified specific SDMs for BPR that either exist or have been introduced. [AI1, BI1, CI1, DI1, DI2, DI3]

R3: Universities' operational staff know little about SDMs; they are more knowledgeable with development languages.

R4: Universities' operational staff are undergoing training on more recent SDMs such as ITIL and TOGAF. [AI2, BI2, CI1, DI2, DI3]

R5: Universities agreed that SDMs are effective and develop systems that work citing a success rate of almost 75% in developed systems. [AI1, AI2, BI1, BI2, CI1, DI1, DI2, DI3]

R6: Universities explained that SDMs help them to organise BPR plans such that the

extent of changes to business processes is related to the extent BPR implementation problems are encountered. [AI1, BI2, DI1, DI2, DI3]

R7: Universities are concerned that existent SDMs are too general and do not apply to the unique MHEIs BPR projects meant to address their unique organisational strategies. [AI1, BI1, CI1, DI1, DI2, DI3]

R8: Universities revealed that a lot of confusion still lingers with regards to how SDMs should be applied for BPR purposes. [AI1, AI2, BI1, BI2, CI1, DI1, DI2, DI3]

R9: Universities highlighted that they have not yet come across SDMs that explain in stages how organisational strategy should be incorporated in SDMs. [AI1, AI2, BI1, BI2, CI1, DI1, DI2, DI3]

R10: Universities complained that the many stages in existent SDMs are not necessarily applicable to just reengineering a system thereby prolonging the BPR process more than it should. [AI1, BI2, DI1, DI2, DI3]

R11: Universities are willing to adopt the use of SDMs or take up newer one mainly for the benefits accrued from them which include traceability of the development process, good record keeping through documentation, accountability of responsibilities and proper organisation of the development process. [AI1, AI2, BI1, BI2, CI1, DI1, DI2, DI3]

On Whether SDMs Play a Role in Preserving the Organisational Strategy

R1: Universities agreed that BPR (mergers) had a serious impact on the previous universities organisational strategy. [AI1, AI2, BI1, BI2, CI1, DI1, DI2, DI3]

R2: Universities agreed that BPR has serious effects on mostly strategic functions of the organisation and to them strategic functions like registration, enrolments, human resources and finance were affected [AI1, AI2, BI1, BI2, CI1, DI1, DI2, DI3]

R3: Universities operational staff explained that they understand that the strategy of any organisation is important and therefore believe in its consideration in the development process. [AI1, AI2, BI1, BI2, CI1, DI1, DI2, DI3]

R4: Universities confirmed that the organisational strategy captures important organisational aspects such as culture, attitudes and values which if not captured properly in the business processes can lead to difficulty in acceptance of developed systems. [AI1, AI2, BI1, BI2, CI1, DI1, DI2, DI3]

R5: Universities emphasised that if strategy was considered during BPR in the SDMs they applied, it would therefore mean that all organisational needs would have been easily captured. [AI2, BI1, BI2, CI1, DI1, DI2, DI3]

R6: MHEIs justified the need for specific SDMs for BPR that accommodate organisational strategy instead of random application of general SDMs which is the current practice. [AI1, AI2, BI1, BI2, CI1, DI1, DI2, DI3]

Conclusion

Discussions in this study revealed that BPR success is determined by its alignment to strategy. In the same light for BPR to be well structured, SDMs are recommended. As reflected in Tables 1 and in the interview results a small number of SDMs out of the thousands that exist are being applied for BPR and out of them only a small number consider the organisational strategy. The use of SDMs for projects appears to be common in South African MHEIs. However, the results also indicate that although SDMs are being applied for Information Systems development, their use is not necessarily targeted to address the impact of BPR on organisational strategy but just as a leverage of the whole development process.

The lack of specific SDMs for BPR puts a limit to what can be achieved in terms of developing Information Systems for BPR

hence the resultant 75% success rate in systems developed for the mergers. The major difficulties encountered by MHEIs with their newly developed business processes as a result of failure to properly capture the organisational strategy include having failure to bridge the gap between developers and users or stakeholders as well as capture change management and other important aspects such as personality diversity, cultural mindsets, attitudes as well as customer relations management which are all important components of the organisational strategy. Overall, the results indicate that SDMs are being applied and are playing a major role in making information systems development processes easier. Based on these highlights of the results presented, the study may therefore summarise that SDMs do play a role in making Information Systems development easier.

After appreciating the contribution of this study, the information specialist involved with SDMs have now been presented with a new task of having to consider developing SDMs that target BPR and assist in capturing the organizational strategy in all its stages.

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