

# Key success factors for implementing Business Intelligence in South African public sector organisations

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## **Abstract**

Business Intelligence (BI) has been rated as a key application and technology investment which provides organisations with great value by improving their decision making processes. The public sector provides a case for implementing BI for improved decision making processes as a way of enhancing its service delivery. However, the implementation of BI in these organisations have revealed to be quite a complex task to undertake.

This research paper sets out to explore the implementation of BI in the public sector in South Africa. The research was conducted through two case studies and data was collected by conducting semi-structured interviews and document collection with organisations that are implementing BI. A qualitative thematic analysis method was then used to construct the major themes that emerged from the data.

The study revealed that BI can be used as an enabler of change and improvement in public sector activities. Consolidating structures, systems and processes was identified as a precursor to implementing it, while the use of the BI initiative to support organisational strategic objectives was seen as ensuring executive buy-in. However, the level of skills needed to use BI tools was highlighted as key factor in hindering its use in these organisations. ICT has furthermore more been identified as being an important factor for the promotion of development and equitable access to public services.

## **Keywords**

Business intelligence, public sector organisations

# 1. Introduction

Business Intelligence (BI) has in recent years been rated as one of the top application and technology investments (Luftman & Derkson, 2012). It is a term that describes business systems and applications that organisations use to support their decision making processes. BI tools provide aggregation, analyses and reporting functions on the organisations' data and as such, it facilitates achievement of mission objectives through providing required information or intelligence to the decision makers with regard to the evaluation and control of predefined metrics.

BI furthermore holds value for public sector organisations as it aids such organisations' decision making processes. (Coman, 2009). The decision-making scope of public sector organisations is defined by their strategies and objectives, which focuses on productivity, efficiency, and quality of services (Boselli et al., 2011). However, the implementation of an enterprise wide system such as BI should be carefully considered by such organisations prior to implementation thereof, as it is likely to cause organisational perturbations (Isik et al., 2013).

This research explores the implementation of BI in a developing country. The experiences of two South African public sector organisations that are implementing BI projects have been selected. The research seeks to uncover key factors that affect public sector organisations' BI initiatives. By way of structure, the paper firstly sets out a brief background of BI, and then proceeds to discuss the use of ICT for service delivery. Thereafter related research on BI within South Africa is presented, after proceeding to provide an overview of the research methodology as well as a representation of the findings. Lastly, the paper then provides a discussion and then concludes.

## 2. Background

Public sector organisations in developing countries have been initiating e-government strategies and projects as a way of promoting performance of government and public administrations (Schuppan, 2009). Under the label Information and Communication Technologies for Development (ICT4D), these organisations are stressing the relevance of ICT as a way for it to promote development in the public service sector by improving transparency and accountability (Brett, 2009). However, while e-government can in general contribute to solving administrative issues, there exists a concern that e-government systems which have been developed in industrial countries should not be assumed to be automatically appropriate for application in developing countries (Heeks, 2002; Schuppan, 2009). The focus area in this paper is on the implementation of vendor supplied ICT tools to measure service delivery trends and to manage government resources. As such, BI has been identified as the key tool to leverage ICT to monitor and provision public services.

### 2.1 Defining business Intelligence

Organisations have always had the potential to improve operational intelligence. Depending on the nature of the organisation, it may seek to gain a competitive advantage by gaining lead information or by analysing information to reveal areas of needed attention. BI is a technology that is available to provide information and to supply

organisations with some level of astuteness, and which can be used to gain a competitive advantage or chart a course 'ahead of the curve' (Negash, 2004). BI is also considered as being a multi-dimensional concept concerned with the effective deployment of organisational practices, processes, and technology to construct and analyse an information base to steer and support the organisation (Olszak & Ziemba, 2012). In recent years BI has been considered a key tool for providing comprehensive information for policy makers and government officials (Coman, 2009; Boselli et al., 2011; Moon et al., 2014).

## **2.2 Business intelligence for public sector**

The emphasis of this paper is on public sector's ability to use BI as a mechanism through which it can understand South African citizens' needs generally, and in doing so, to be able to effectively use its resources to address such needs. The ability of the public sector to use BI to identify such citizens' needs is a key factor to being able to match services provided by the sector to the citizens' needs requiring attention (Coman, 2009). Government plans and decisions can be arrived at with the help of detailed multi-dimensional analyses of all the relevant data. Coman (2009) and Boselli et al. (2011) accordingly describes the benefits which BI can grant to government organisations as follows:

- Easy to obtain decipherable and comprehensive information without the need to use sophisticated tools;
- May perform extensive analysis of stored data to provide answers to exhaustive queries;
- Help to formulate more effective strategies and policies for citizen facilitation;
- Enhance policy formulation and enactment;
- Improve service management; and
- Provide clarity on planning and budgeting.

## **2.3 Business intelligence research in South Africa**

The study conducted by Bijker & Hart (2013) focused on the pervasiveness of organisational BI. Their research was conducted at organisations which have established BI programmes between a period of nine and fifteen years, and their research sample seems to have focused mainly on private sector businesses. The study highlighted major themes influencing the pervasiveness of BI such as 'senior executive buy-in and involvement', 'strong business focus and ownership', 'education, communication and support', 'incremental and phased approach', 'information quality, format' and 'availability and perceived value'. As part of their analysis the themes were viewed through the Technology-Organisational-Environment framework, which found that the organisational context as being the strongest influencer of BI pervasiveness.

Furthermore, an empirical study was conducted by Dawson & van Belle (2013) which focused on the critical success factors for BI in the South African financial services sector. A theoretical framework was proposed using the multi-stage model for Data warehousing success (Wixom & Watson, 2001). The focus was on the organisational and project implementation success of BI projects. The authors also looked into a comparison with a European study, which revealed a high correlation particularly with their IT participants. The study identified that the most important critical success factors as being 'committed management support and champion', 'business vision', 'user involvement', and 'data quality'.

In the public sector space, Maila (2006) conducted a case study on the Department of Water Affairs and Forestry (DWAF) which introduced the Performance Management and Development System (PMDS) during April 2001. The PMDS is essentially a BI system that focuses on performance management. Maila's (2006) study attempted to examine whether existing procedures, policies and systems of DWAF support initiatives for organisational performance as well as service delivery. Added to this, the study intended to establish whether the introduction of PMDS has brought any significant improvement regarding service delivery. Maila (2006) concluded that the introduction of performance management in DWAF has not brought about the desired impact on service delivery. The findings demonstrated that the presence of performance management and other supporting systems does not guarantee automatic improvement of service delivery. The distinction however needs to be made between how effective an organisation can apply performance management (BI systems) in conjunction with a set of organisational factors, such as policies and systems, to improve its impact on service delivery.

The study by Lutu & Meyer (2008) at a provincial education department in South Africa revealed gains in implementing BI and its usefulness to improve individual and organisational performance. The authors allude to a possible correlation between the technology fit for user requirements and successful BI adoption and usage.

### **3. Research methodology**

The objective of this research was to determine factors that can assist public sector organisations to be more successful in implementing BI. This study explores the following research questions:

- What are the main factors that influence the BI implementation at public sector organisations?
- What factors influence the BI project process?

The underlying philosophy of this explorative study was interpretivism, as the aim of the study was to gain a deeper understanding of the factors that influence BI implementation within public sector organisations in South Africa. The researchers used the case study method. The research approach was inductive as the researchers adopted the criteria by Klein and Myers (1999) for evaluating interpretive research, and the research timeframe was cross-sectional.

#### **3.1 Research sample**

To explore the implementation of BI at public sector organisations, it was important to obtain data from organisations which have already initiated their BI projects. The researchers used purposive sampling to choose two organisations; a provincial government organisation and a local government organisation. All participants interviewed had a very good understanding and experience of BI implementation. These included participants at the executive and operational levels, as listed in Table 1 below. The organisations also provided documentation on their BI implementations which related to their business case, maturity assessment report and overview of their BI implementation.

Case	Position	Area	Code
Provincial government	IT Governance Officer	IT	GO
Provincial government	Senior Director	IT and Non-IT	SD
Provincial government	Senior Manager (IT strategy)	IT	SM
Provincial government	ICT Service Delivery Manager	IT	IM
Local government	Programme Manager	IT and Non-IT	PM
Local government	Executive Officer	IT and Non-IT	EO
Local government	Implementation Lead	IT	IL

Table 1: Participants

### 3.2 Data collection and analysis

Semi-structured interviews were conducted using open ended questions which allowed the researchers to ask the participants additional questions, allowing them to elaborate and provide further detail on their responses. The list of questions were derived from BI and IT assessment literature, specifically Design-Reality Gap model (Heeks, 2002).

Participation in the research study was voluntary and approval was obtained from the participating organisations beforehand. Full confidentiality was observed throughout the study.

A combination of the general inductive approach and thematic analysis was used to analyse the data. The interview transcripts and organisational documents were independently read and reread by the researchers to discover the multiple meanings inherent in the text. The result of this cycling was to code major concepts in the text, and aggregate these into themes. Eventually thematic networks were formed to conceptually display the themes and relationships among them. The themes were then centred on global themes to form the thematic networks, the final outcome of which was two thematic networks centred on 'Organisational drive for BI' and 'Service delivery culture'. The thematic analysis has been applied by combining data from both organisations.

## 4. Findings

During the data analysis nine major themes emerged; 'undergoing organisational consolidation of structures, processes and data', 'organisational strategy underpinned by BI', 'cultural change and conforming to standards', 'business key as stakeholder of BI', 'external accountability', 'business process improvement', 'staffing and skills', 'utilising BI' and 'tools and technology to enhance BI use'. Each of these themes are multifaceted and have multiple categories. Table 2 displays the themes uncovered in this study and the associated global themes.

Themes	Global Themes
Undergoing organisational consolidation of structures, processes and data	<b>Organisational Drive for BI</b>
Organisational strategy underpinned by BI	
Cultural change and conforming to standards	

Business key as stakeholder of BI	<b>Shifting to a Service Delivery Culture</b>
External accountability	
Business Process Improvements	
Staffing and skills	
Tools and Technology to enhance BI use	
Utilising BI	

Table 2: Themes and global themes

#### 4.1 Undergoing organisational consolidation of structures, processes and data

Before the transition to democracy in April 1994, government structures in South Africa were based on apartheid racial divisions (Lewin et al., 1998). Embedded in the government's (prior to 1994) structural divisions was that administrative functions were duplicated for each race group among local, provincial and national levels of government. This resulted in fragmentation in terms of legislation, policy, and programmes and led to inefficient and wasteful operations. Such inefficiency and fragmentation was confirmed during the researchers' interviews, where a participant stated as follows:

“You have taken an organisation from 38 municipal entities, to 7 municipal entities [then] to one municipal entity but the [previous circumstance] was that there were seven ways of doing things, seven systems” (PM).

Moreover, the need to improve organisational maturity and restructuring was raised as a further major concern effecting these public sector organisations post 1994. Activities such as integration of systems and processes, and consolidating processes using methodology (e.g. COBIT framework) was used to achieve this.

#### 4.2 Organisational strategy underpinned by BI

At both public sector organisations the strategic objectives are mainly transversal in nature in that it is interdepartmental. By this it is meant that an objective is only ever achieved through the cooperation of more than one department acting together. The organisational strategy then demands that departments share and integrate information for them to deliver on the required objectives. This was clearly expressed to the researchers in the following quote received at the provincial government interviews:

“What drove [the need for BI] was the transversal objectives and the requirement for consolidated information, for decision making information which we don't have” (SM).

Furthermore, the organisational and ICT strategy convergence was highlighted as a way of improving the direction and steering of ICT projects. This was effected at both public sector organisations by using a strategic planning system such as Balanced Scorecard at the executive and management levels. The BI solution underpins strategy and “*bridges the gap between operations and strategy, by strategically [taking] what the organisation wants and we use the tool to pull along an organisation operationary. That's the way BI underpins the strategy of the organisation*” (PM).

### **4.3 Cultural change and conforming to standards**

Implementing BI at the public sector organisations was found to be quite challenging. A huge factor was that the organisations underwent macro level organisational restructuring, deduplication of business processes, where people had different ways of completing the same work. According to an interviewee at the local government:

“It’s the organisation or change of getting everybody to adopt the same business process that’s the challenge, and which takes the time” (EO).

A formal change management process needs to be adhered to when implementing BI (Yeoh & Koronios, 2010). Process improvement activities and change management programmes roll out was highlighted as key activities to ensure user participation and buy-in. However, while the ability to sustain the cultural change and process improvement changes were also raised as concerns. The business ownership of the change management programme was raised as key to successful BI implementation. This was expressed by an interviewee at the provincial government:

“The client department should take ownership of it, and drive the change management. Otherwise it’s not going to succeed” (SD).

### **4.4 Business key as stakeholder of BI**

The requirements of decision support and experience of executive officials were raised as factors influencing the decision to adopt BI. In South Africa the executive management of public sector organisations is determined by the outcomes of voting for political leadership. The political leaders heading the organisation’s legislature determine how the public sector organisation is run, the management style and set the priorities of the organisation. The background and experience of the executive leadership was mentioned and the experience they added in directing the operational side of the organisation.

“But you need to contextualise it. They come from where they had an [ERP system]. And they had the luxury of that [integrated systems and BI] and now coming here [to the provincial government], different departments, different and disparate systems, not one composite view of what is going on in that sphere in this whole thing” (SD).

Moreover, examples of previous BI projects which have either stalled or failed were also mentioned. In these cases the BI projects were either run by the IT department or vendor-centric solution, and not as a business initiative. The participants at the provincial government raised this to demonstrate the importance of business as the key stakeholder for BI.

### **4.5 External accountability**

External accountability was considered to be a further important consideration in this context, as the hierarchical nature of government was seen to influence the BI project. This was so because the provincial and local government are part of the hierarchical structure, and both such structures report to national government.

South African government agencies are monitored via a performance management system, which can be sourced via BI systems. However, the South African performance

management system in its current state has been raised as an area of concern. *“I don’t think that the country has even come close to solving the performance management and the monitoring and tracking or stuff like that”* (EO).

Furthermore, it is important to note that political party influence is inherent to South African government agencies, as political campaigning is seen to influence the usage of BI.

“You must understand you got those two audiences, especially in the public sector. Certain people have always seen information can be used against them and therefore respond in that manner and they want to hide and suppress [that] information. Other people see information as being [a] liberating and powerful tool to try and shape their agenda, their story or their response” (EO).

The Gini index is a measurement of the income distribution of a country's residents, which is widely believed to influence the disparity of the socio-economics of a society (Ogwang, 2000). The imbalance in citizen demands due to the Gini coefficient in society, was raised as a concern in this study. This could possibly create a bias in BI outcomes. Furthermore the influence of the Gini coefficient problem on the government BI systems, was to not *“draw blind conclusions based on what the numbers say”* (EO), as the reality of the citizens might not be truly reflected in the statistics and reports of the organisation.

#### **4.6 Business process improvement**

Before drawing the link between BI and public service delivery, *“the most important aspect that needs to be considered is the business process that enables service delivery”* (EO).

Having automated and structured business processes was raised as the key prerequisite to BI. Once the organisation manages to formalise, simplify and automate its business processes, and these processes are transacted on, the data produced can be mined to produce ‘intelligence’. Structured processes can more easily be integrated with BI and further enhances process support (Bucher & Gericke, 2009).

#### **4.7 Staffing and skills**

Another major issue of concern is that the *“labour force [of the organisations] are not sophisticated IT users”* (PM). A shortage of BI skills has been noted at both public sector organisations, and the mismatch between the levels of staff skills and BI analytical tools can be demonstrated in the local government example with incoming councillors. Councillors who are in charge of sub-council areas are key users of BI, and these are individuals who would manage service delivery to direct needs of citizens in their particular locations. However, these councillors are assigned their positions through municipal electoral voting, and as such, the person in the position of councillor could change every fourth year, depending on the election outcomes. With the change in appointment also comes a loss of experienced skill. To give an indication of the skill set of incoming councillors the South African Local Government Authority has released a report with statistics that *“92 percent of incoming councillors are not PC literate and that is a big problem because we all understand the value of ICT to underpin operations, economic development and to drive efficiency”* (PM).

To mitigate the skills issue BI training is accordingly regarded as essential. Both organisations found it useful to present BI from a central support structure. This central



support structure is composed of individuals who have the task of influencing the organisation's staff to adopt improved business processes which includes the use of BI. The staff members identified by the local and provincial governments for the BI centre of excellence are the key business users or super users, these are people who:

- Have relations extensively throughout the business;
- They are trusted in the business;
- They are competent with business domain knowledge; and
- They have good business sense.

With regards to BI implementation both organisations are dependent on contractors and external vendors for their BI system. For example, the local government implementation team consists of 50% contractor staff and 50% permanent staff. As both organisations are dependent on contractors and consultants to assist with their BI implementation, knowledge management has been raised as a concern. To mitigate the risk of losing the required skills the organisations encourage setting up close "*relationships between [government] staff and contractors so as to encourage knowledge sharing*" (GO).

#### **4.8 Tools and Technology to enhance BI use**

The public sector organisations invested in BI solutions from leading software vendors, and as such the issue of BI system fit or mismatch was raised. The route taken was to configure and 'localise' the BI solution to fit the local needs of the organisation. One participant interestingly responded that it might not be a system mismatch but rather a culture mismatch. However, system mismatches are noted by participants, as these mismatches required local improvisations to ensure that the system suited local needs. One example is given that the challenge in South Africa especially "*in the service delivery space we still hamstrung by old ways of doing things*" (PM).

The service request system records citizens' calls to local government, which are related to water, electricity, storm water, pot holes, etc. The service request system implementation has been achieved by "*completely bastardising the plant maintenance system to give us this service request processes*" (PM). The service request process provides the local government with data, on top which their BI system extracts strategic reports.

Negative aspects of BI technology have been shared by the organisations. The factor that would completely erode the use of BI is the time it takes for reports and dashboards to load. The workaround to mitigate losing user confidence in the BI solution is that the most used reports have been stored statically to accelerate access for strategic purposes.

Another concern revealed by the analysis was the quality of data entering into the transactional systems and BI systems. All participants agreed that if "*garbage is fed into the system garbage [will be produced]*" (GO). However, data quality has come up as part of business ownership which can limit the potential for invalid data to be entered into systems. By limiting the access to such data elements to individuals based on roles and responsibilities to an extent ensures data quality.

The BI implementation strategy adopted at the organisations "*is as and when the need arises for strategic decision making*" (SM). The organisations developed a BI framework to

ensure modular implementation of the BI solution and focus on areas that will add the most value to the business.

#### 4.9 Utilising BI

The BI tools implemented within these public sector organisations were divided into two segments. The first segment being the dashboards and graphical display of information which is intended to reveal high value information and allow users to observe trends in the data. The second segment is that of reporting, where strategic reports on objectives allows for drill down, which allows users “to navigate [their] way all the way down into the line department” (PM).

One common theme was the emphasis on coupling BI and geographical information systems (GIS). The link between BI and GIS was found to be quite useful in the public sector, as these solutions have provided the organisations with valuable information on implementing policies or improved predictability of service trends. An example is given by a participant at the provincial government:

“the role of the violence and the shebeens (unlicensed establishments selling alcohol) in [the provincial government locality] where they’ve plotted the shebeens, mapped in [the data], and then we looked at the areas of high violence” (SD).

The analysis also revealed that participants have the perception that BI provides an objective version of the truth, however “[users still follow their ‘gut’ feeling]” (PM). Although the statistics might say one thing, the users would still apply their discretion, as they deem fit.

### 5. Discussion: Factors influencing the BI project process

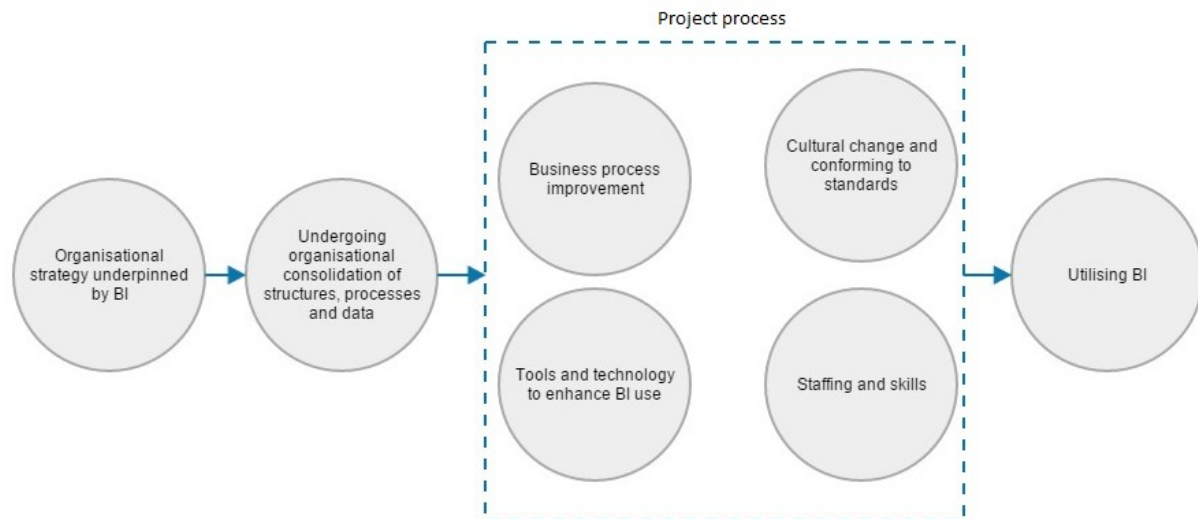


Figure 1: BI implementation project process framework

Figure 1 displays the factors that influence the BI implementation process at the public sector organisations dealt with in this study. Examples of the effect of BI on service delivery and influence on organisational processes are described in this section. The researchers have placed the themes in a linear process which displays the implementation of BI at public sector organisations.

## 5.1 Organisational strategy underpinned by BI

The formulation of the organisational strategy in the case studies had transversal objectives. This resulted in the need for consolidated information across departments which aided decision-making processes. The participants in the study raised the need for consolidated information as the primary requirement for BI, which was reflected as follows:

“In the department of the province I can tell you what drove it was the requirement for consolidated information for decision making information which we don’t have. So, the highest level from the premier, from the director general of the province to say that we’ve got to make decisions but we don’t have information to base our decisions on. So, that is the drive for BI” (*SD*).

Another benefit for the BI implementation process was that as the need for BI was raised by the organisational executive, this led to the executive officials being the key stakeholders in the implementation process. Support from senior management and executive officials was regarded as a key success factor to a BI implementation project’s success (Dawson & van Belle, 2013; Olszak & Ziemia, 2012; Yeoh et al., 2008).

One of the findings of this study revealed that the need for consolidated information is what builds the case for BI or decision support systems, as a result of the organisation’s strategy. The researchers therefore deduce that the BI systems and processes need to be derived from the organisational strategy, so as to improve the likelihood of executive buy-in.

## 5.2 Undergoing organisational consolidation of structures, processes and data

Given the context of the organisations as discussed in section 4.1 above the need for organisational reform was highlighted. Participants also raised the concern of duplicated processes and data sources, and disparate systems. The structuring of the organisation is managed in correspondence to the organisational strategy, which then dictates the reforms in systems, processes and data (Melchert et al., 2004). The organisations in this study regularly implemented an assessment model to determine the maturity level of its key business processes and supported information systems, this then steers the organisation to an optimum level of process automation.

“Many service departments and line departments had their own way of working. Some guys were on spread sheets, some used clip boards, [and] others were on the back of a cigarette box” (*PM*).

As the organisations are seeking to develop and improve on their methods for service delivery this inherently requires change and finding new ways of working. The researchers

has selected themes which would best suit the project process, which are 'business process improvement', 'tools and technology to enhance BI', 'staffing and skills' and 'cultural change and conforming to standards'. These themes were selected as they are considered to form the core of the organisations development of BI for service delivery improvement, and were also highlighted in previous studies (Williams & Williams, 2004; Yeoh et al., 2008; Bijker & Hart, 2013). These themes are also in conformity with the IT Project Partnership Framework (Atkinson, 2007) which suggests that project success is pivoted around the relationship between processes, people, culture and systems.

### 5.3 Business process improvement

The public sector organisations in South Africa are described as being in a developmental state. The structures in the organisations operate at different maturity levels, some using automated systems or spread sheets or using a paperwork system. The participants expressed the idea that some business processes are still unstructured and not yet automated. Before drawing the link between BI and service delivery, "*the most important aspect that needs to be considered is the business process that enables service delivery*" (EO).

To be able to implement BI, automated business processes are considered to be the most important prerequisite (Bucher & Gericke, 2009). Without an automated and uniform business process, it becomes difficult to derive the necessary intelligence. The need to implement governance programmes and building capacity to implement business process improvement projects was raised as a key prerequisite to the BI implementation at the public sector organisations. Heeks (2002) suggests an incremental approach to deploying business process improvements especially in developing country organisations.

### 5.4 Staffing and skills

One of the important considerations to improve the drive at the public sector organisations was developing staff skills. The participants in this study have revealed that public sector workers in South Africa generally did not have exposure to analytical tools. The participants mentioned that the gap between BI analytics and producing BI analytics has been challenging. This was expressed as follows:

"So the skill that managers have in public sector is not really necessary a skill to use the numbers and what do the numbers say and to use BI tools" (EO).

For this reason, the researchers recommend that while training should initially focus on educating staff on BI concepts, there should be a further concentration on analytical and numerical skills as well. Staff development should form part of the change management strategy for implementing BI, and one of the strategies developed by the public sector organisations in this study was to form a BI competency centre. The BI competency centre is considered as being a key element for driving out BI in the organisation (Hostmann, 2007).

With regards to the BI development teams, vendor dependence was raised as an area of concern. This was mitigated by setting up implementation teams in such a way to facilitate knowledge sharing. The facilitation of knowledge sharing would eventually lead to up

skilling of internal staff and lessen the need for external consultants (Ko et al., 2005).

## 5.5 Tools and Technology to enhance BI use

The BI systems implemented within the organisations in this study are supplied by leading BI software vendors. The organisations have undertaken to purchase a BI system and then to customize it to suit its local needs. As public sector employees are not geared to analytical skills, BI tools can be tweaked to enhance BI use and derive more value. The BI tools should be constructed more intuitively for intended users in order to bridge the gap between users and BI analytics (Guster & Brown, 2012).

The service request system implementation, on the other hand has been achieved by configuring the plant maintenance system which now provides the local government with data, on top of which a BI system extracts strategic reports. This demonstrates that it is possible to implement 'Western/Northern industrial applications', and to not implement such applications blindly, but "*by tweaking the system to optimise it to suit local needs and at very minimal costs*" (PM).

The researchers' analysis further revealed that one particular concern raised by the organisations was that lengthy BI report processing eroded the benefits communicated in the business case for BI. To mitigate the risk and enhance BI use, mechanisms can be put in place to render high value reports with advance in-memory tools and improve processing performance.

The incremental roll out strategy of the organisations also demonstrated how BI can be implemented at public sector organisations. The BI system should be deployed in quick win scenarios with core business processes, which will allow its value to be more easily demonstrated. This strategy also ties in with the Heeks (2002) model for low risk IT project roll out.

## 5.6 Cultural change and confirming to standards

The use of BI has been described at both organisations as a significant driver of change. It creates a culture where officials now draw on analytics that prompt business to think a bit further, and drives the maturity of the business to the next level. This allows officials to avoid thinking retrospectively, and can aid them in making more informed decisions.

However, changes in business processes and systems is normally accommodated with a change management strategy. This is clearly emphasised when implementing decision support systems (Wixon & Watson, 2001), which was confirmed by one of the participants: "*to sustain that change you need senior management, and management intervention, and sometimes it's the problem exactly there*" (EO).

## 5.7 Utilising BI

The major drive for BI at the public sector organisations is the need for consolidated information. Interviewees indicated that their BI implementations have held benefit in aiding decision-making processes. The spatially enabled BI systems also provides an organisation with geographical information to better view data and empower officials to

manage resources more effectively. Given the nature of public sector organisations work, BI coupled with GIS adds greater value to users' solutions set for decision making and information distribution (Posthumus & Bank, 2008).

A benefit raised particularly at the local government is that BI provides its management with the opportunity to spot trends and “*used as the mechanisms to bring about change*” (EO). Analysing trends using BI tools could alleviate the demand on the public sector organisations, especially as it already operates under the situation where demand outstrips supply, by allocating resources more effectively. One of the participants expressed as follows:

“Then the maintenance programs can be adjusted because it is much cheaper to go and do proactive maintenance as opposed to being reactive. So you know you see pot holes appearing in the roads, perhaps it's time to do something else as opposed to having to fix up the pot holes all the time. You see blockages and blockages all the time at the same location, so perhaps it's time to put a maintenance team in that pipe and to clean out that roots as to what is causing that blockage so you don't have to go back to clean it all the time“(EO, City).

Respondents of both organisations praised their implementation of an executive dashboard. The dashboard has been implemented to house key performance indicators on the organisations' key strategic objectives. Each organisation develops strategic projects which are monitored regularly. The dashboard provides the executive leadership with information for each project, and allows them to manage heads of departments, as well as to drill down to activities within each section. A provincial government participant has explained how the executive dashboard has influenced decision making at their organisation as follows:

“[When] we look at the project dashboard, It is where all your projects that you have for the year is loaded. Then you need to report on [it on] a monthly basis. From that you can actually see all the projects for the province, and how we've progressed. Now that information you get it at different levels, and the premier actually takes that report to manage [the] managers. Its information that has been brought together, and that you have a composite view of what's going on. That has in essence changed the way that we're doing things, because now all the departments need to (be) loaded, and I do think decisions get made on what's on the dashboard” (SD).

The executive dashboard is therefore a management tool that allows executive leaders to steer their departments and influence strategic thinking. This would effectively influence service delivery.

It must be noted that the BI adoption rate has been quite slow amongst the public sector managers, and that not all decisions are based on BI supplied information. Decision makers still apply their “*gut feel*” (PM) in their decision making processes. BI has not yet been established in either organisation as the standard means for decision making. Factors that could contribute to this are the level of staffing and skills, as well as the success of the change management strategy implemented.

## 6. Conclusion

This study has identified key factors for the implementation of BI in the South African public sector organisations. The factors discovered were seen to overlap with previous BI studies, of particular note should be given to the South African private sector. The common factors were on executive buy-in, strong business ownership, and training and support.

The major factors uncovered in this study was that executive buy-in needed to be ensured, which can be achieved if the BI strategy assists the organisational strategic objectives effectively. Business ownership of the BI project and empowering BI users were also raised as key factors.

The researchers have further also noted the need for organisational maturity, as well as the gap in staff skills which acts as a major hindrance to BI projects in the public sector organisations in this study. Closer management and evaluation of these factors could improve BI implementation and use.

When reflecting on the topic of ICT4D and implementing ICT to promote development, the researchers notes that there does exist a gap between the systems implemented and the accessibility by the majority of citizens. Particularly in the South African context, not all ICT services are fairly accessible to citizens. Participants in this study have noted that it is challenging to build service request systems for societies with a high Gini index. The concern should be raised that e-government projects should place more emphasis on ICT4D which can promote equal access and can reduce the digital divide.

Future research can focus on validating the BI implementation project process framework. Applying action research in a longitudinal study might be more useful in order to explore the implementation of BI and related technologies in public sector organisations, with the effect of equitable access to services for citizens.

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