

Department of Information Systems, University of Cape Town

An analysis of Business Intelligence for improved public service delivery

Thesis submitted in partial fulfilment of the course INF5005W, Master of
Commerce Information Systems

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Abstract

The public sector can be described with different types of public policies and by the services the organisations deliver to citizens. Public sector organisations are implementing e-government projects as mechanisms to enhance public service delivery. However, public sector e-government projects in developing countries are highlighted as challenging.

Awards of achievement for implementing e-government projects have been noted in the South African public sector. Business Intelligence (BI) for improved public service delivery has been identified as a key tool to improve decision-making processes. Implementing BI in organisations has been revealed as complex. The study of organisational factors that influence the initiative for successful BI implementation is suggested.

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

The research objectives were addressed by constructing three frameworks; to describe what organisational factors influence the BI initiative, the factors that influence the use of BI, and a framework describing the process of implementing BI in the public sector. The Design-Reality gap model was applied to identify risk in the BI projects.

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 BI. However, the level of skills to use BI tools was highlighted as key factor in hindering BI use.

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1. Introduction

There is much activity in the usage of Information and Communication Technologies (ICT) in developing countries to improve on public service delivery (Bardhan & Mookherjee, 2001; Cordella & Hesse, 2010; Heeks, 2002; Peignot et al., 2013). ICT projects in government organisations are primarily known as e-government projects, which are projects inherently embedded in combinations of political reforms and organisational changes designed to support and steer a profound transformation in the organisation of the public sector.

However, it is widely believed that weaknesses in information and control systems in developing country bureaucracies have traditionally given rise to service diversions, poor service delivery and corruption inside government organisations (Bardhan & Mookherjee, 2001). Owing to weak supervision and communication systems, government officials lack information about costs and needs of various local communities, and are unable to monitor actual service delivery patterns. This then results in the poor use of resources by the public workers entrusted with service delivery.

In addition to this, service delivery processes contain *elements* that indicate an overall process performance. When reporting on these elements, critical areas of service delivery may be highlighted. It is therefore crucial that senior officials in public service operations manage performance and control service delivery. Processes in most cases may be monitored by assigning a metric to ascertain its effectiveness. There are a number of well-known methods used to create metrics, and one such method is the Business Scorecard method (Kaplan & Norton, 1992). By implementing and monitoring these metrics, organisations gain access to key information allowing them to align their operational (service delivery) performance and business (fulfil citizen needs) strategies.

Business Intelligence (BI) is an ICT tool that allows its users to leverage the best use of their data, summarising and aggregating information. BI tools provide aggregation, analyses and reporting functions on the organisations' data. As such BI 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. Designing and implementing monitor and control systems to generate information on the status of public service delivery is accordingly a possible way of enhancing performance-measuring and accountability in the delivery mechanism (Bardhan & Mookherjee, 2001; Peignot et al., 2013). Users (public workers) can evaluate the costs and needs of citizens, and monitor actual delivery patterns; hence improving service delivery.

This study will focus on ICT (BI) projects within South Africa, a developing country which has suffered from a history of Apartheid. The country is still plagued with the Apartheid legacy, particularly that of inequality and inefficiency (McDonald & Pape, 2002; Alexander, 2010). It is in this context that South Africa presents a good platform on which to investigate ICT solutions to support service delivery in developing countries (Mutula & Mostert, 2010). It is the researcher's intention to conduct in-depth case studies of two public sector organisations in South Africa. These organisations will provide a back drop for analysing the current status of service delivery in South Africa. The research presented in this paper draws on the implementation of BI as an innovation driver in the public sector.

1.1 Research relevance

Poor service delivery in South Africa is reported as being an area of concern, but which has much room for improvement (McGill, 2009; McDonald & Pape, 2002). It is therefore that an analysis of BI for improved service delivery will be of both practical and theoretical benefit. From a practical perspective, the results of the study will offer practitioners an in-depth description of BI project processes which can eventually assist projects to attain their objectives. This will in turn steer BI initiatives in the public sector to be more useful by providing a framework for BI implementation and use. Also, case studies allow the research inquiry to be more flexible and subjects the investigation into the real world context (Benbasat, Goldstein & Mead, 1987). On the other hand, from a theoretical perspective, the case studies which will be used in this research undertaking will provide the information system research-community with rich information on BI application to real-world problems (poor service delivery), particularly in South Africa.

1.2 Research Objectives

The main research objective is to investigate how the implementation and use of BI enables service delivery.

The sub objectives of this study are as follows:

- To investigate what factors affect the use of BI in a public sector organisation
- To investigate what organisational factors affect the BI initiative in a public sector organisation
- To investigate what factors influence the BI project process in a public sector organisation
- To discover BI project risk in a public sector organisation using a research model

1.3 Overview of the study

The researcher has chosen to organise the remainder of this research document as follows. Chapter two provides an overview of literature reviewed. Chapter three discusses the research methodology in depth. The research methodology discusses the research techniques, data collection strategy and

the framework for data analyses. This chapter also includes a discussion on the limitations of the research and outlines how research confidentiality and ethics issues will be managed in the research process. The overview of the case studies is provided in chapter four, after which the analysis of results will be presented in chapter five. Chapter six provides the overall discussion on the research, and presents the frameworks developed this study. Chapter seven presents a use case of the research model adopted in this study. The final chapter details the conclusion, research contributions and recommendations for further research and opportunities.

2. Literature Review

This section reviews the related research to BI within the public sector. A background to the public sector context, decision-making and public service improvement is presented. The next section provides a description of BI as well as discussing the use of BI in the public sector. Thereafter, related research on BI in South Africa and their outcomes are reported on. Finally, an overview of the research model is presented.

2.1 The Public Sector context

The public sector is a complex system which can be described by its political and administrative dimensions that implement different types of public policies, as well as by the services it delivers to its citizens (Peters, 2006). The public sector has distinctive characteristics in terms of its objectives and decision-making processes. One clear difference between the public sector and private sector is that it is not profit driven (Euske, 2003; Roste & Miles, 2005). However, financial matters are still a primary concern for public sector managers. Public sector organisations compete for funding and power, and operate in a political environment which ultimately seek to reach political goals (Jarrar & Schiuma, 2007). The objectives of public sector service delivery focuses on productivity, efficiency, and quality of services.

The revenues of the public sector are allocated according to political decisions (Halvorsen et al., 2005) and the national government funds such public sector activities. The budget allocation in effect defines the boundaries for public sector activities. The content and scope of public sector activities are often not fully understood by citizens (Moller, 2007). The political goals and strategic direction of public organisations are influenced by decision-making processes which are supported by knowledge management and information gathering activities (McAdam & Reid, 2001). Decision-making processes and issues related to service improvement are discussed in sections which follow.

2.2 Decision-making process in the Public Sector

According to Verma (2009) “decision-making is considered as the study of identifying and choosing alternatives based on values and preferences” (Verma, 2009, p4). Information-gathering is an essential part of decision making (Riabacke et al., 2010), where it aids decision-making with the aim of providing clarity on alternatives and reducing uncertainty (Nutt, 2011). It should be noted that uncertainty is however only reduced and not completely eliminated by this method.

Hall (2008) describes the decision-making process in three phases, namely, intelligence, design and choice. Recognising the need for a decision is regarded as the Intelligence phase. The Design phase

constitutes formulating the alternative options and the final stage is when a decision is ready to be made and where the process ends with a choice.

The decision-making scope of public sector organisations is defined by their strategies and objectives (Kloot & Martin, 2000; Bozeman & Pandey, 2004). However, the public sector is also influenced by political considerations (Dillon et al., 2010; Riabacke et al., 2010). Compromise, bargaining and political debates usually form part of the public sector's decision-making process. "The result may not be the most cost-effective, but it is the result of a consensus developed to satisfy most of the constituents' interests" (Boselli et al., 2011, p4).

2.3 Public Services Improvement

Citizens support public sector organisations with their taxes and therefore demand better services (Twinomurinzi and Visser, 2004). It is for this reason that public organisations should focus special attention on cost reduction and service improvement. Service improvement involves concepts such as service quality, effectiveness, and efficiency. Here effectiveness is defined by the public sector's ability to meet their citizens needs. Efficiency is defined as on the other hand, the ability to optimally use resources while reducing waste (Halvorsen et al., 2005).

Service improvement may require several actions such as improving information quality, modifying service processes, and to carry out strategic knowledge management activities (Boselli, et al., 2011). Service quality improvement relies on monitoring and evaluation and there are measurable indicators which are key elements to such monitoring and evaluation. Processes or services cannot be appropriately managed without useful measurements (Pyon et al., 2009). It is therefore challenging to identify public sector performance indicators as they are domain dependent. Complex factors such as citizen perception and service satisfaction influence indicators and are difficult to measure (Jarrar & Schiuma, 2007).

2.4 Background to South African Public Sector Context

There is a widespread sentiment that systems of governance in Africa are a challenge (Heeks, 2003), and this is particularly true for South Africa as well. South Africa is a country with an emerging economy, which has only recently become a democratic country in the early 1990's, after which it overcame the Apartheid regime. Apartheid was a social policy or racial segregation involving political, economic and legal discrimination against people who were not whites, and this formed the official policy in South Africa at the time. The system of legal racial segregation was enforced by the ruling government in South Africa between 1948 and 1994. This means that South Africa would be swamped with inequality and huge disparities between poor and rich for times to come (McGill,

2009). For this reason, successful role of the post-Apartheid government is quite crucial for the development of the country (Moller, 2007). Nation building is a key agenda in the current government's objectives (Moller, 2007). Given this, various South African government agencies have embarked on a number of e-government programmes to facilitate nation building. Examples of these include SARS e-filing, the national traffic information system, electronic processing of grant applications from remote sites, and transport management systems (Kaisara & Pather, 2009). The implementation of e-government has been widely acclaimed in that it provides new momentum to deliver services quickly and efficiently (Henningsson & van Veenstra, 2010; Al-Khoury, 2011). This study will focus on the BI initiatives of the South African government organisations.

2.5 Business Intelligence

Organisations have always had the potential to improve operational intelligence. Depending on the nature of the organisation, it may seek to gain competitive advantage by gaining lead information or analyse information to reveal areas of needed attention. BI is a technology that is available to provide information and supply organisation with some level of astuteness (Negash, 2004). Such BI systems come as standardised software packages from vendors, allowing customers to adapt them to their specific requirements (Yeoh et al., 2008).

BI is also considered 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 & Ziembra, 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). The multi-dimensional analysis capability of BI tools, where multiple data sources are processed to produce key information, aid decision makers to develop government plans and formulate decisions (Coman, 2009). While initiating a BI project, it is emphasised to examine the decision environment and how BI capabilities can be leveraged to achieve optimal BI fit (Isik, et al., 2013). BI in this research is accordingly viewed as a decision support system.

2.6 Business Intelligence for Public Sector

ICT in recent years has presented an opportunity for IT managers and senior officials in the government to change the way organisations leverage and value their information assets (Bitterer et al., 2007). In this research, the focus is on public sector's ability to make use of BI to *understand the citizen* or South African public generally and the ability to *use resources effectively*. These abilities are the key factors in matching services to citizen needs (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) describes benefits that 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

2.7 Related Research Studies

A literature survey was conducted to find similar studies in the research domain. The following studies were highlighted.

A study carried out by Hart, Berkowitz, Ryan & Wapse (2004) was to identify key information system (IS) management issues in South Africa. This study was carried out on a sample of 121 members of the Cape IT Initiative and of the Computer Society of South Africa, from a range of industries, organisations and geographical regions. The study revealed that BI and responsive IT infrastructure issues were prominent overall, and there is accordingly a need for decision and executive support and business intelligence systems among IS managers (Hart et al, 2004). This research was conducted by means of a questionnaire survey, which resulted in quantitative outcomes.

Venter & Tustin (2004) embarked on study that surveyed the adoption of BI in top SA companies. Their research shows that BI plays a key role in management decision making, and is anticipated to increase in importance in the future. Venter & Tustin (2004) suggests there is a need for further study to uncover the role of the BI function in organisations and how it adds value. This could mean that research is required to discover softer issues that may play key roles in the strategy of BI implementation and adaptation.

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 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 needs to be made between how effective an organisation can apply performance management (BI system) in conjunction with a complete set of functional policies, systems and instruments to improve its impact on service delivery.

A number of related studies in the South African private sector were conducted on BI particularly, into the extent of BI use and its success factors. Bijker and Hart (2013) conducted an exploratory study in five organisations in different industries to discover factors influencing the pervasiveness of BI. The research findings identified number factors that influenced pervasiveness of BI, i.e. 'executive buy-in', 'strong business focus and ownership', 'perceived value', 'education, communication and support'. An incremental phased approach when implementing BI and data quality also featured as prominent themes.

Another study within the South African private sector was done by Dawson and van Belle (2013) to investigate the critical success factors for BI within the financial services sector. This study used a mixed method approach using survey and interviews. The research findings identified that the most important success factors were 'committed management support and champion', 'business vision', 'user involvement' and 'data quality'. The researchers also found these factors to be in moderate correlation with similar studies.

2.8 Research Model - Design reality gap model

The researcher intends to employ the design-reality-gap model to uncover BI project risk. To provide an understanding of this research model a brief description is as follows.

The design reality gap model intends to map the gap between the design and reality of information system initiatives, particularly in developing countries. According to Heeks (2002), developing countries tend to take on information systems as is from developed nations without giving much consideration to their local context. This tends to leave users or stakeholders with high risk of project failure.

BI project risk within public sector organisations has been defined on the following factors (Williams & Williams, 2004):

- Strategic alignment – ensuring alignment between strategies, goals and objectives, key service delivery processes and the BI applications required for making processes more productive.
- Continuous process improvement – organisations should have culture of striving towards operational excellence and embracing the use of IT to improve process efficiencies.
- BI and data warehouse readiness – organisations should assess the BI and data warehouse technical readiness so that it can take the necessary steps to enhance its capabilities to acquire, integrate, store, and deliver high quality information to their BI systems.

The dimensions covered in the Design-Reality gap model covers the areas of risk stated above. The model has a theoretical base with consistent empirical support and has been used for adoption, diffusion, and implementation of e-government projects (Macias-Garza & Heeks, 2006). By using this model the researcher intends to uncover BI project risks and process decisions of BI initiatives within South Africa, and how these project decisions are localised and directed to effect improvement of BI use for service delivery.

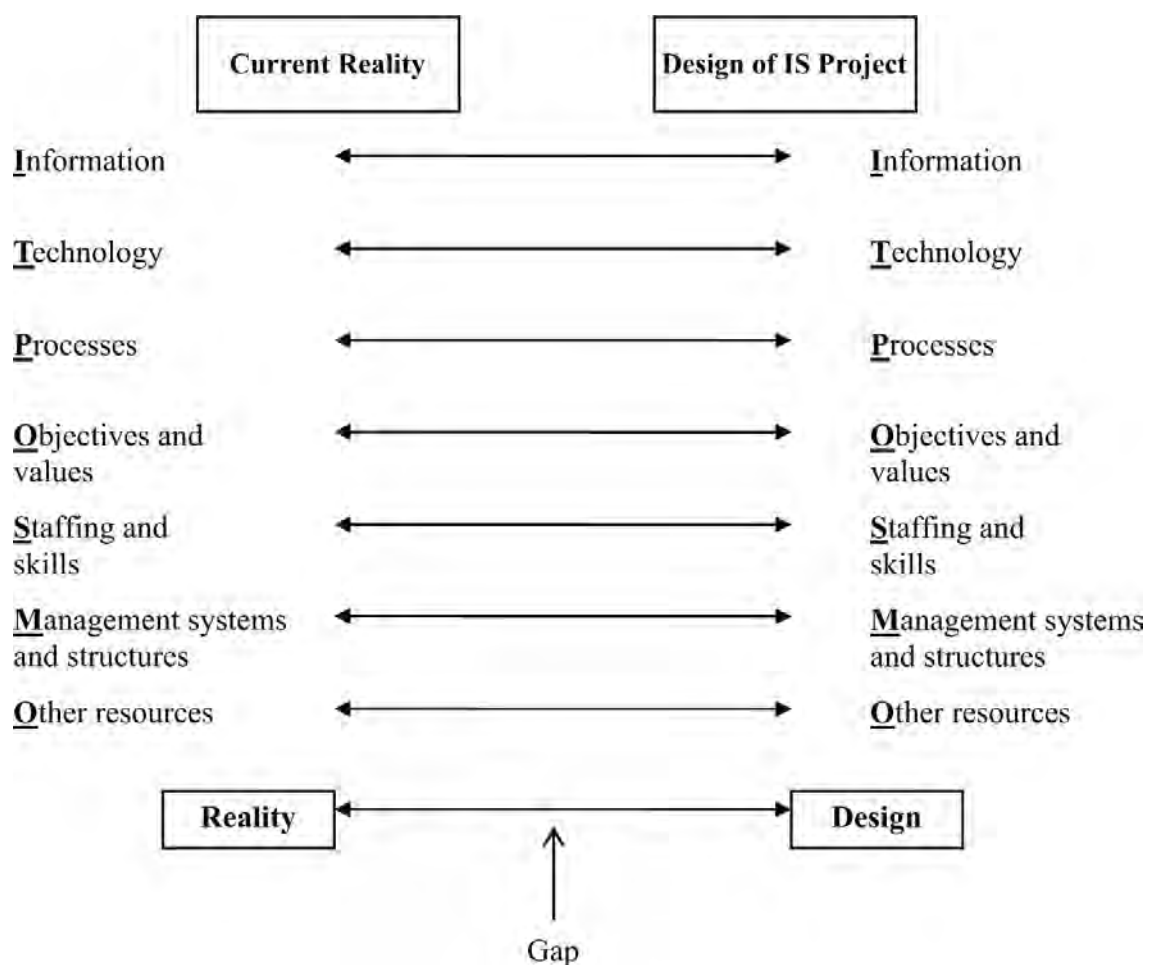


Figure 1: Design-Reality gap model, source Heeks (2002), p.7

2.9 Identified Research Gap

Given the challenges of governing a transformative and growing society in South Africa, however, efforts by the South African government has been criticised for lack of quality service delivery (McDonald & Pape, 2002). Weaknesses in information and control systems have given rise to inefficient service delivery programmes (Bardhan & Mookherjee, 2001). BI initiatives seem promising to hold benefits for public organisations. However, scarce academic literature exists on this important topic. This research undertaking is intended to add knowledge to the IS research body investigating BI initiatives in public sector.

In the papers by Hart et al (2004) and Venter & Tustin (2004), similar research calls were made for deeper investigation into adoption of BI tools. It is mentioned by Venter & Tustin (2004) that there exists research opportunity to investigate organisational factors affecting BI use further, through qualitative research. Maila (2006) conducted a qualitative case study on one public sector organisation, namely DWAF. Maila suggests that further investigation is required that focuses on BI use for improved service delivery in conjunction with organisational factors that influences the BI implementation and use.

This research intends to answer the call for more in-depth research investigating BI use, particularly for improving service delivery. The objective of this research is to investigate how organisational factors affect the implementation and use of BI on service delivery. The research methodology for this study will be discussed in the next chapter.

3. Methodology

This section will go into listing the research questions and then detailing the research philosophy, the research method, purpose and will thereafter describe the research strategy. This will then be followed by the justification and description of the data collection and data analysis methods. Some methodological concerns are then expressed in the next section.

3.1 Research Questions

This study will attempt to narrow the research gap by formulating the research primary question of:

How does BI affect service delivery within a public service organisation?

In order to address the primary research question the following sub-questions were formulated:

What are the organisational factors that influence the BI initiative in a public sector organisation?

What are the factors that affect the use of BI in a public sector organisation?

What are the factors that influence the BI project process in a public sector organisation?

What factors can contribute to BI project risk in a public sector organisation?

3.2 Research Philosophy

There are generally three philosophical forms of research investigation to establish what builds relevant research, namely, positivism, interpretivism and critical theory (Denzin & Lincoln, 1994). Relevant research is built on the underlying presumptions that each of these paradigms represent. The epistemological and ontological presumptions are what differ among them (Myers, 1999). The philosophical paradigm that is selected for this study is interpretivism.

Adopting the interpretive paradigm was intended to create a greater understanding of the 'implementation and use of BI for improved service delivery' through human interpretation (Klein & Myers, 1999). An interpretive study can be conducted either by qualitative or quantitative study or even both. This research was undertaken with a qualitative approach in order to bring out a full understanding of the phenomenon, implementation and use of BI in public service delivery (Orlikowski & Baroudi, 1991; Walsham, 1995).

The researcher adopted the criteria, proposed by Klein and Myers (1999), for conducting and evaluating interpretive research. This allowed the researcher to explore views on the phenomenon and discover new insights which support the existing literature.

3.3 Research Method

This research was conducted through the case study research approach. A case study is an empirical enquiry that investigates a contemporary phenomenon (Yin, 2009). Case studies support the use of existing theories and provides opportunities for generating new theories (Benbasat, Goldstein & Mead, 1987).

The research was conducted in South Africa, and the case study focussed on public service delivery organisations in country. Two public sector organisations have been identified, each having involvement in BI initiatives. Through employing the case study research method, rich and in depth information was collected.

3.4 Research Purpose

The research purpose of this study is mainly descriptive. Descriptive studies aim at relating an intervention (Yin, 1994). The study seeks to describe how the organisational factors influence the attainment and/or the reshaping of project objectives. The study intended to be descriptive as it outlined and described an accurate account of the implementation and use of BI in service delivery organisations.

3.5 Research Timeframe

Due to time constraint of this study the time frame adopted was a cross sectional one. The researcher's reason for choosing this cross sectional study timeframe was to evaluate the implementation and use of BI within public sector organisations as opposed to a longitudinal study where the phenomena is studied over an extended period of time.

3.6 Sample

Sampling methods can be probability and non-probability (Gray, 2009). This research included non-probability purposive sampling, where the sampling was confined to a specific target group (Sekaran, 2003).

This study gained permission from two public sector organisations within South Africa. Each operates at a different regional level, one at municipal level and the other at provincial level. To gain good insight into the use of BI, it was important to obtain data from organisations in the process of implementing BI. To note, the initial intention of the researcher was to include an organisation at the national level, however no responses were given to requests for participation.

The researcher interviewed senior officials to gain information about the phenomenon at a high level. Interviews were conducted with seven participants and three business documents were provided. The participants included users at strategic, tactical and operational levels within BI projects.

Although the sample can be considered low, it is not in breach of achieving generalizability. Interpretive and exploratory research is typically less concerned with obtaining statistically accurate samples, but rather aims to produce a coherent and illuminating description of a phenomenon (Schofield, 2002). Interpretive research provides opportunities for future research to test validity and generalizability (Lee & Baskerville, 2003).

3.7 Research Strategy

There are mainly two accepted data collection and analysis methods in research, namely quantitative and qualitative. Quantitative methods are mainly used to study natural phenomena through instruments such as surveys, laboratory experiments and mathematical modelling (Myers & Avison, 2002). As alluded to by Myers and Avison (2002), the study of social sciences of which information systems research overlaps with in a natural setting, involves several uncontrolled variables whose incorrect measurement may result in misleading outcomes.

Qualitative research methods refer to the kind of research that produces findings not obtained through statistics or other means of quantification. Qualitative research involves extracting quality data from the moulds of data and interpreting it rather than quantifying it. This research method emphasises subjectivity rather than objectivity, context rather than content, and flexibility in the process of conducting the research (Cassell & Symon, 2004). Taking these characteristics of qualitative research and the objectives in this study into consideration, the qualitative method formed the focus of this study.

Qualitative research can take different forms such as action research, ethnography and case study. Case study research is regarded as the most commonly used qualitative research approach in the IS field (Alavi & Carlson, 1992; Orlikowski & Baroudi, 1991).

Case study type research is not without critics. It is criticised for taking too long before producing end results which in most cases are criticised for being massive documents which are more often unreadable. This type of research is also criticised for what other people call lack of rigour as it does not display some statistical properties of rigorous research (Yin, 1994).

As the basis of this study requires a rich context in which the BI initiative will be understood better, a case study type of research seems to be an invaluable method. Aware of the criticisms of this case

study's type of research, the researcher intended to mitigate these. All evidence pertaining to a finding was fairly reported; every case report was composed as immediately as possible after interviews are completed for a particular case as to avoid information decay. This also ensured that each case was succinct to avoid massive and unreadable documents.

As described by Thomas (2006), it is a necessary to uphold the trustworthiness of a research study, and data triangulation is one such method that ensures trustworthiness. Related literature was used to corroborate findings. Another method of data triangulation is participant feedback. It was hoped a survey could be used to corroborate findings, however there was not enough participant feedback.

3.8 Instrument Design

Being a highly descriptive study, the research relied on semi-structured interviews to collect field data. Semi structured interviews have been deemed most appropriate in that they offer a more unrestricted response from the participants. Use of BI in public service delivery organisations is a relatively unexplored field, the research will benefit from a thorough and deep understanding of the phenomenon. Semi-structured interviews were able to offer this type of insight. The open nature of the questions encourage depth and vitality which allow for new concepts to emerge (Dearnly, 2005). In addition, semi-structured interviews assist in the discovery of unique opinions in a particular context. All interviews were conducted in person.

3.9 Pilot Study

No formal pilot study was used in this research process, although feedback was used from initial interviews to improve on questioning in subsequent interviews. Email correspondence with selected organisations was used in order to establish rapport and to pre-emptively inform participants about the nature of questions that was asked. As the type of questions were open ended and broad, it served useful to allow participants to know the kinds of questions in advance. This reduced the risk of the participants being unprepared and subsequently not being able to provide full, detailed and accurate responses.

3.10 Data Collection

The data collection for this study contains two main artefacts for each case study:

- Semi structured interviews, and
- Organisational documents (relevant to BI initiatives).

3.10.1 Qualitative semi structured interviews

The semi structured interview questions were constructed by investigating previous studies (see Appendix A: Interview Questions). These questions were designed to be open ended as to allow the

interviewee to better express the subject matter. This allowed the interviewer to draw on certain concepts raised in the interviews.

Interviews are a part of most qualitative interpretive studies as it seeks to uncover perceptions from participants. There are aspects to be conscious of when conducting interviews. The research aimed to keep the balance between passivity and over direction (Walsham, 1995). According to Rubin & Rubin (1995), qualitative interviewing design is characterised by being flexible, iterative, and continuous, rather than prepared in advance and to lock oneself into a specific scope.

The researcher has tape recorded the interviews. The advantages and disadvantages raised by Walsham (1995) were considered. One advantage is that recorded interviews provide a truer record of what was said as compared to note taking. Tape recording allowed the researcher to return to the transcript for multiple iterations on analysis, and to extract direct quotes. It freed the researcher to be more engaging with the interviewee. A disadvantage to tape recording was that it was time consuming and expensive to do transcriptions.

3.10.2 Review of organisational documents

Organisational documents such as the project initiation and business case documents of the respective organisations were requested. These documents provided the researcher with a general background to the BI initiatives. Also, these documents assisted in selecting appropriate stakeholders of the BI initiatives to interview.

3.10.3 Researcher involvement

Walsham (1995) makes a distinction between an 'outside researcher' and an 'involved researcher'. Outside researchers typically carry conduct research without any involvement in participant environments. An involved researcher however participates in the field. Each approach carries advantages and disadvantages. The researcher provided feedback to companies not only as an empirical study, but also as incentive for company participation. The researcher's involvement can be considered as a hybrid of both outside and involved research approaches. The researcher summarised the research findings (Appendix D) and forwarded these to participants.

3.11 Data Analysis

3.11.1 Interview and document data

A combination of the general inductive approach and thematic analyses was used to analyse the data in this study. The primary purpose of the general inductive method is to allow research findings to emerge from generated themes within the raw data (Thomas, 2006). In Thomas' (2006) approach, this is achieved by:

- Condensing extensive and varied raw text data into a summarised format,
- Establishing clear links between the research objectives and the summary findings, and
- Developing a framework or theory about the underlying structure of experiences or processes which are evident in the raw data.

Thomas (2006) describes the underlying assumptions of the general inductive approach as follows:

1. Data analysis is determined by both the research objectives and multiple readings and interpretations of the raw data.
2. The primary mode of analysis is the development of categories from the raw data into a model or framework that captures key themes and processes inferred to be important by the researcher.
3. The research findings result from multiple interpretations made from the raw data by the researcher who code the data. Inevitably, the findings are shaped by the assumptions and experiences of the researcher conducting the research and carrying out the data analyses. In order for the findings to be usable, the researcher decides what is more important and less important in the data.
4. Different researchers are likely to produce findings which are not identical and might not have common characteristics.
5. The trustworthiness of findings can be assessed by a range of techniques such as
 - i. independent replication of the research
 - ii. comparison with findings from previous research
 - iii. triangulation within a project
 - iv. feedback from participants in the research
 - v. feedback from users of the research findings

The interview transcripts were independently read and reread by the researcher to discover the multiple meanings inherent in the text. The identified text segments in the interview transcripts were be labelled as concepts. Concepts must then be categorised, together with their associated text segments. Eventually, as the process progresses, an initial description of the meaning of each category was developed.

By iterating through this process, multiple versions of the processed interview artefacts can be compared. Once the researcher was satisfied with the categories, the final step in the analysis involved the discovery of links between the different categories, which, in this case, could show

causal relationships between categories. Eventually, a thematic network was created to conceptually display the categories and relationships among them. An indication of this process is displayed in Figure 2.

Initial read through text data	Identify specific segments of information	Label the segments of information to create categories	Reduce overlap and redundancy among the categories	Create a model incorporating most important categories
Many pages of text	Many segments of text	30-40 categories	15-20 categories	3-8 categories

Figure 2: General inductive method, source Thomas (2006), p.6

3.11.2 Thematic analysis

The qualitative data consisting of the transcribed interviews and business case documents were collated forming the primary source data for this research project. The qualitative data was summarised into thematic networks using the thematic network analysis method as presented by Attride-Stirling (2001). The data summarisation was done through coding text segments and aggregating similar themes. This process was done iteratively to avoid redundancy and global enough to be meaningful. The emphasis was on conceptual meanings and discursive themes common across interviews. The thematic network aims to explore the understanding of an issue or signification of an idea (Attride-Stirling, 2001). Applying the thematic networks provides a way of organising thematic analyses of the qualitative data. The main advantage of thematic networks is that it facilitates the structuring and depiction of themes unearthed from the data.

The thematic network analysis was applied in a hermeneutic cycle. The researcher cycled through multiple variations of categories, themes and global themes. The initial outcomes resulted in three thematic networks. The final outcomes were two thematic networks centred on ‘Organisational drive for BI’ and ‘Service delivery culture’.

The analysis discussion is based on the two case studies; the thematic method has been applied by combining both cases. Where similarities have been noted by the researcher, these themes or concepts have been merged. Where clear distinctions of the cases exist, these realities of the organisations have been explained separately.

3.11.3 Synthesis

Data triangulation will be the main form of confirming trustworthiness of the findings. This was done by comparison with previous research. The outcomes from the organisational documents and interview data was iteratively reflected on to reach a close understanding of the true reality, which

developed into three high level conceptual frameworks. Post analysis, the researcher then analysed the data collected using the as the design-reality-gap model as a 'lens'.

3.12 Research Considerations

3.12.1 Limitations of Research

Case study research is known to be criticised for lack of research rigor. The researcher presented a solid research methodology which was interrogated by senior research officers.

The interview process itself also has problems and pitfalls which could impact on the research outcomes (Myers & Newman, 2007). The artificiality of the qualitative interview involves questioning a complete stranger and it involves asking interviewees to respond and give opinions under time and pressure.

The study was also conducted at two organisations, a larger sample can used as part of a further study to confirm the frameworks developed in this research. It was intended that the case studies be done in a cross sectional time frame and not a longitudinal study. A further longitudinal investigation may be conducted to draw out richer concepts and conclusions.

3.12.2 Ethical Issues

Ethical issues are raised as a concern when conducting case study research Walsham (2006). Three aspects are highlighted regarding this issue: confidentiality and anonymity, working with the organisation and reporting the literature.

- Confidentiality were offered to individuals and organisations interviewed. The names and explicit descriptions of individuals or organisations were kept confidential. Any obvious breach of confidentiality needs were looked out for.
- When reporting the literature the researcher attempted to be as objective and impartial as possible.
- Careful note was taken to the language used to articulate the outcomes and results.

Ethical consideration was adhered to and exercised to ensure the research maintains the utmost credibility. Interview consent forms were issued to participants to ensure that they are aware of the ethical issues by taking part in this research. As part of the research policy, interview questions were first submitted to the university's ethics research committee for review and approval.

The interviewees were requested to sign a consent form (see Appendix C) as a proof that they participated in the research voluntarily. An introductory letter (see Appendix B) on a UCT Information Systems Department letterhead detailing the research and requesting permission to

study a case in the organisation was forwarded to each participant. It has been stated that participation is voluntary and that personal details will be kept in strict confidence. The interviewees were made aware that the study is part of a requirement for an award of a master's degree in Information Systems.

The collected data is safe guarded with full anonymity of companies and individuals, and may be used in later publications. Confidential data was not be shared with anyone outside the research team, which comprises of the researcher and supervisor. Furthermore, organisations were forwarded the interview transcripts for review. This not only ensures data accuracy but maintains ethical considerations as well.

4. Overview of Case Studies

This chapter presents an overview of the case studies for this research project. The research project consists of two case studies of public sector organisations, namely, a provincial government and a local (municipal) government. The Republic of South Africa is a constitutional democracy and consists of three structures of government; national, provincial and local governments. It was the intention of the researcher to conduct three case studies, each case at a specific government level. However, due to no response from the national government organisations contacted, only a provincial and local government organisation was part of the study.

4.1 Provincial government

There are nine provinces in South Africa and each provincial government is bound by laws and policies at national level, but can develop their own laws and policies within this framework. The provincial governments in South Africa therefore work in co-operation with the national government to create policies for and provide services to the people of their respective provinces (Steyler & Fessha, 2005).

Every province has a Legislature, which is elected in provincial elections that are held with national elections, every five years (Steyler & Fessha, 2005). A Premier is elected by the Legislature and appoints Members of the Executive Council to be the political heads of each provincial department. The provincial government is divided into departments which see to the specific functions of the province. The provincial government (PG) in this study consists of 13 departments. The departments are as follows:

- Department of Agriculture
- Department of Community Safety
- Department of Cultural Affairs and Sport
- Department of Economic Development and Tourism
- Department of Environmental Affairs and Development Planning
- Department of Health
- Department of Human Settlements
- Department of Local Government
- Department of Social Development
- Department of Transport and Public Works
- Department of the Premier
- Provincial Treasury
- Department of Education

The province has 12 strategic objectives which it aims to use to deliver an open opportunity society for all citizens. Each department is specific, shares the provincial strategic objectives, and also has their own department specific objectives.

- Creating Opportunities for Growth and Jobs
- Improving Education Outcomes
- Increasing Access to Safe and Efficient Transport
- Increasing Wellness
- Increasing Safety
- Developing Integrated and Sustainable Human Settlements
- Mainstreaming Sustainability and Optimising Resource-Use Efficiency
- Increasing Social Cohesion
- Reducing Poverty
- Integrating Service Delivery for Maximum Impact
- Creating Opportunities for Growth and Development in Rural Areas
- Building the Best-Run Regional Government in the World

The provincial government has a huge drive by its executive leadership to make use of empirical evidence for decision making. It is for this reason that Business Intelligence has been identified by the organisation as a key ICT tool to enhance the strategic decision making processes of the organisation. Therefore the provincial government organisation has been selected as a case study in this research project.

The provincial government operates with a central ICT department that services all 13 departments. The central ICT department is housed within the Department of the Premier as a professional support services unit. A business case and IT Governance Maturity assessment documents were provided by the PG ICT department for this case study.

4.2 Local government

The Department of Local Government is responsible for co-ordination, monitoring and support of municipalities in each province (Steyler & Fessha, 2005). Local government organisations within South Africa experienced fundamental changes as part of post-1994 reforms (Pretorius & Schurink, 2007). Nationally there are 284 municipalities within South Africa that each govern on a four-year term basis. They can either be metropolitan municipalities or district or local councils. They run local affairs in line with the principles of co-operative governance of National and Provincial government and are subject to legislation passed down by both these legislatures. The seven largest local municipalities in South Africa are known as Unicitys. The local (municipal) government that participated in this research is also regarded as a Unicity and uses a mayoral executive system. The mayoral executive system allows for the exercise of executive authority through an executive mayor,

where the leadership of the municipality is vested in this individual. The executive mayor must establish a mayoral committee. The mayoral committee consists of councillors appointed by the executive mayor to serve on the mayoral committee (Steyler & Fessha, 2005).

From this brief description it is clear that local government within South Africa is a complicated mix of co-operative governance between national, provincial and local authorities. The complexity of this co-operation would be amplified through any change in the political affiliation of any of these government bodies.

The service delivery sectors of the local government (LG) in this study are divided into 12 departments, each with focused and clear roles and responsibilities. They provide organisational support, services and infrastructure to residents across the mandated region. Each is responsible for its own planning and budget in accordance with the local government's overall strategy.

- Office of the City Manager
- Internal Audit
- Community Services
- Corporate Services
- Economic, Social Development & Tourism
- Finance
- Health
- Housing
- Safety & Security
- Strategy & Planning
- Transport, Roads & Major Projects
- Utility Service

It is widely seen that at the municipal level is where government meets citizens' direct needs (Pretorius & Schurink, 2007). Therefore municipal organisations are critical to public service delivery. In order to meet the needs of its residents and provide a foundation for growth and development, the local government has developed several important plans, frameworks and strategies.

- Service Delivery and Budget Implementation Plan
- Annual and quarterly reporting
- Local Government Turnaround Strategy
- City Development Strategy
- Integrated Transport Plan
- Spatial Development Framework
- Infrastructure Asset Management Plan
- Events Strategy
- Economic and Human Development Strategy

The LG strategic planning and operations are heavily dependent on critical information to inform key decision makers to plan and carry out operations. The LG has for over a decade been implementing an ERP system to underpin all its operations in all its departments. The organisation is already at a phase of transacting on the ERP system, and its BI and performance management implementation is being developed in stages. The LG provided the researcher with a document detailing an overview of its ERP and BI implementation.

4.3 Respondents and Documents

The information of respondents is listed in Table 1.

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

Table 1: Respondents

The documents provided by the organisations are detailed in Table 2.

Case	Document	Code
Province	Business case	Business case
Province	IT governance maturity assessment report	Audit report
City	Overview of BI implementation	BI Overview

Table 2: Documents

5. Analysis

This chapter presents the detailed analysis of this study. The analysis is presented with the use of the thematic networks discovered. The thematic networks discussed here are ‘Organisational drive for BI’ and ‘Shifting to a Service Delivery Culture’. The analysis is also supported by quotes from interviewees. Each quote is given a case code and interviewee code. Finally the summary of the chapter is presented including a table of categories, themes and global themes.

5.1 Organisational drive for BI

To understand the purpose of implementing BI at the organisations, respondents were asked what influenced the decision to adopt BI, as well as how BI fits in the organisation’s strategy. From the analysis, BI was found to be a crucial part of assisting organisational strategy and improving operations. Five key themes on the context of BI in the organisations emerged; these were ‘undergoing organisational consolidation of structures, processes and data’, ‘organisational strategy underpinned by BI’, ‘business as key stakeholder of BI’, ‘cultural change and conforming to standards’ and ‘external environment’. These themes are represented under the global theme of ‘Organisational Drive for BI’, which is shown in Figure 3.

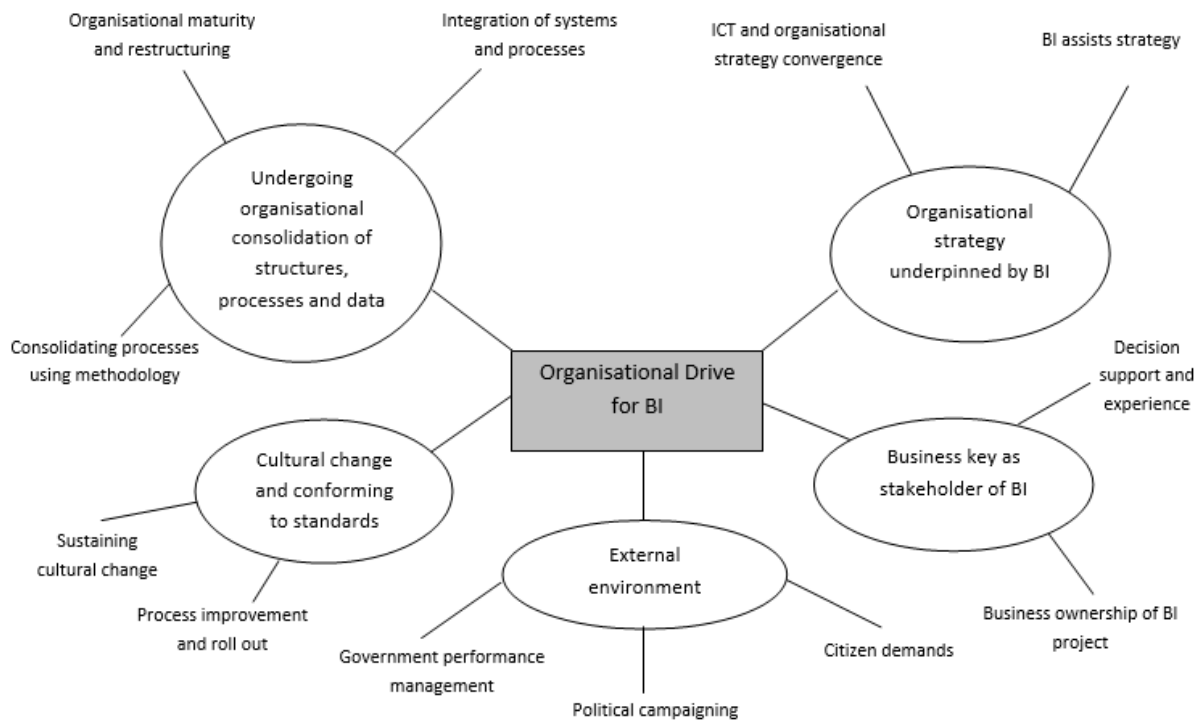


Figure 3: Organisational Drive for BI

5.1.1 Undergoing organisational consolidation of structures, processes and data

A common thread in both cases was that the organisations are in a developmental state, while at the same time being put under pressure to deliver in its current environment. The theme 'undergoing organisational consolidation of structures, processes and data' explains the categories of organisational development revealed in this study. To add to the context of the organisations in the study, related information from the literature was used to supplement.

Organisational maturity and restructuring

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.

The case of the local government in this study, prior to 1996, there were about 38 different local government administrative structures with little metro level co-ordination (Lewin et al., 1998). With regards to service delivery, great inequities existed between well-resourced White suburbs and severely under-resourced Black and Coloured suburbs (Barron et al., 1996). Some participants alluded to the challenging circumstances of their organisations. Two key issues of concern regarding the past and current circumstances for implementing BI in the government organisations were duplicated and unstructured business processes and disparate systems. As explained by one participant regarding the issue of business structure and business processes.

"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. 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, City)

This statement was in reference to getting the organisation to work in a uniform way, by identifying that each structure or department had their way of operating. The organisation was thus restructured at the macro level to de-duplicate systems and processes. Having simplified and uniform business processes is quite important to public sector organisations, not only to service the citizens equally but to monitor progress uniformly.

Integration of systems and processes

The other issue of concern as a result of the divided structures of the previous modus operandi, were disparate legacy systems. The issue of disparate systems is not only due to legacy systems but also from “later system implementations” (SD, Province). For public service executives and managers to make informed decisions, they require relevant information to support their decisions. At times the information required is obtained through a condensing of different data sets in different departments or systems.

An example can be taken from the interview with the members of the PG, where they have explained the drive for BI adoption and circumstances they have to deal with in building BI solutions for decision making. Firstly the drive for BI is emanating from the executive level.

“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, Province)

To explain the circumstances of the PG with regards to disparate systems, a PG participant noted:

“We got a lot of operational systems or departmental systems. We’ve got 350 systems in the province. So if we [want to] now look at the BI solution that will take all of those systems, we’ve got 61000 and odd data elements. So different varying data elements, so you [want to] try and consolidate that and come up with a BI solution for that you look at data quality, you look at data cleansing, you look at your master data management, and suddenly it becomes a ten/fifteen year project” (SM, Province).

Consolidating processes using methodology

The current status of the issue of disparate systems, particularly in the PG, is a huge challenge, as compared to the LG, due to the size of the organisation, and complexity and sparseness of information. The PG and LG has taken different routes on their organisational development and restructuring regarding business processes, systems and BI.

Local Government

The LG organisation has to a large extent restructured their organisation post 1994. This is done with the intention of streamlining administrative operations, having uniform and “simplified business processes” (EO, City). They have taken the 38 different municipal agencies and merged them into one organisation, a Unicity. The information technology implemented at the LG, is an ERP

(Enterprise Resource Planning) system, which incorporates systems or modules for all the departments of the LG. It took the LG organisation about “7 to 8 years [to get] the back office more efficient” (PM, City). The LG “investment to date [is] all at the bottom in automating business processes and the organisation is transacting” (EO, City). The focus of the LG organisation (w.r.t business maturity) is on empowering its “managers to manage and drive out efficiencies” using BI (EO, City).

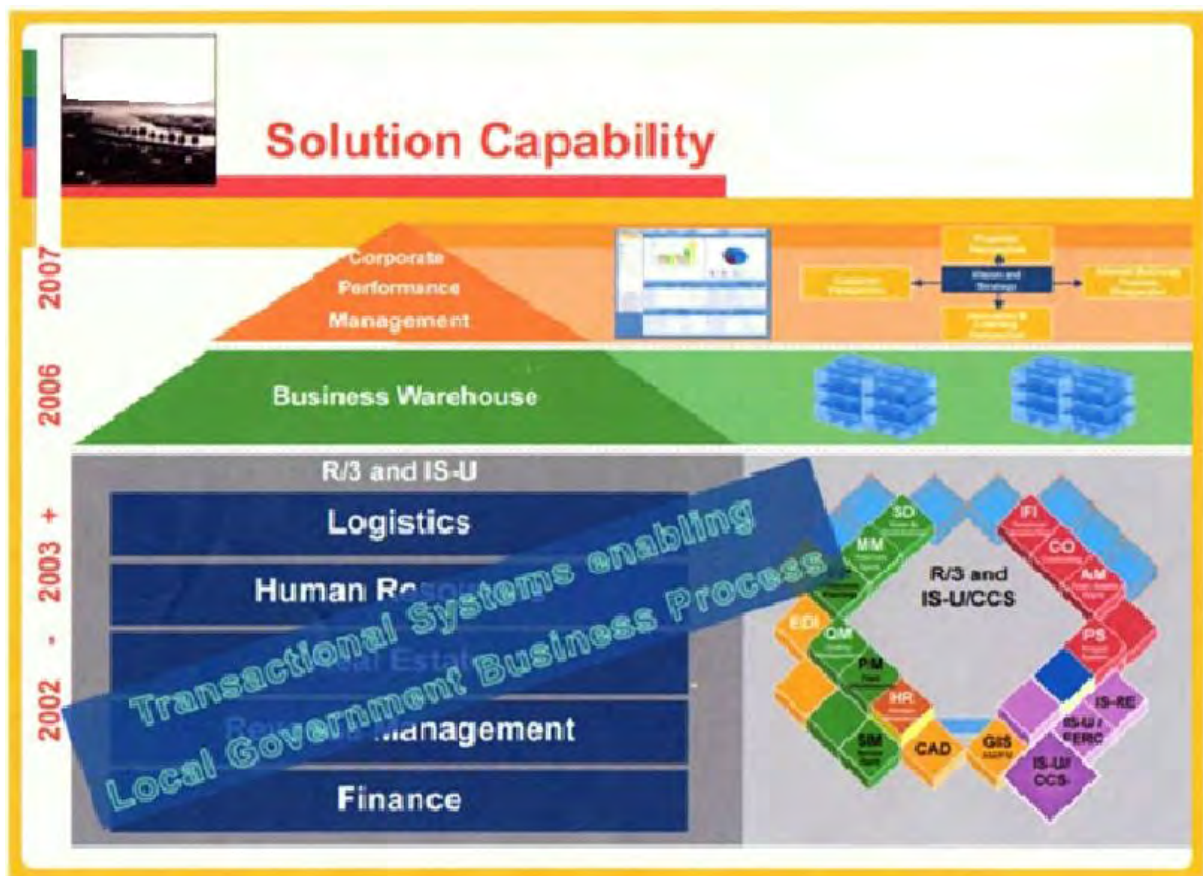


Figure 4: Local government Solution Capability (BI Overview, City, p. 1)

Figure 4 displays the ERP implementation at the LG. On the left is an estimated time line on stages of the ERP implementation. The transactional systems enabling LG business processes is the beginning of the implementation, these transactional systems include logistics, plant management, human resources, finance, etc.

Once business processes were ‘hard coded’ and transactional systems were implemented to a certain degree of success, the business warehouse was built on top of the transactional systems. The business warehouse is built on OLAP technology, which feeds into their corporate performance management system. This system then provides the executive and management level of the organisation with information regarding trends, reporting and drill down information. It should be

noted that the business warehouse is built in phases, as the underlying information systems capabilities are developed.

Provincial Government

On the other hand, in the larger PG, the reality is different in that the organisation's maturity level, in terms of systems and processes is undergoing development, as "different departments are at different levels of maturity" (SM, Province). The PG is reliant on its IT environment to support critical areas of business operations, within 13 departments with over 350 applications (Audit Report, Province). The organisation has largely been audited using the COBIT framework. The IT governance maturity level is assessed iteratively through an IT governance improvement life-cycle. The audit report obtained from the PG assessed the processes and procedures of the organisation that is supported by IT. To give an indication of the level of maturity of business processes, each process is measured on a qualitative maturity model. The levels of maturity used in the audit report are described in Table 3.

Level	Description
5 - Optimised	Processes have been refined to a level of best practice, based on the results of continuous improvement and maturity modelling with other organisations. IT is used in an integrated way to automate the workflow, providing tools to improve quality and effectiveness, making the enterprise quick to adapt.
4 - Managed	It is possible to monitor and measure compliance with procedures and to take action where processes appear not to be working effectively. Processes are under constant improvement and provide good practice. Automation tools are used in a limited or fragmented way.
3- Defined	Procedures have been standardised and documented and communicated through training. It is however left to the individual to follow these processes, and it is unlikely that deviations will be detected. The procedures themselves are not sophisticated but are the formalisations of existing practices.
2-Repeatable	Processes have been developed to the stage where similar procedures are followed by different people undertaking the same task. There is no formal training or communication of standard procedures and responsibility is left to the individual. There is a high degree of reliance on the knowledge of individuals and therefore errors are likely.
1 - Initial	There is evidence that the organisation has recognised that the issues exist and need to be addressed. However, there are no standard processes but instead there are ad hoc approaches that tend to be applied on an individual or case by case basis. The overall approach to management is disorganised.
0 – Non-existent	Complete lack of any recognisable processes. The organisation has not even recognised that there is an issue to be addressed.

Table 3: Provincial government qualitative maturity model (Audit Report, Province, p. 4)

Most of the business processes assessed are either directly related to IT governance or have a major influence on IT governance. The outcome of the audit was that the PG processes are mostly operating at level three, with few processes operating at level four such as:

“Monitor and Evaluate IT performance – There is formal criteria in place against which corporate services is measured with defined metrics” (Audit Report, Province).

And a few processes operating at level two, such as:

“Change management – Change management framework in place, but it is not consistently enforced across all areas of business (It has been identified that there are pockets of excellence and some poor areas of the business in this regard)” (Audit Report, Province).

It should also be noted that the initial audit assessment of the PG was at level one. Since then the organisation has noted that it is imperative to implement sound IT governance as IT has become so prevalent in modern organisations (Business Case, Provnice).

5.1.2 Organisational strategy underpinned by BI

From both case studies senior management provides guidance through annual (and on-going) strategic planning, setting the scope for activities of the organisations. All departmental initiatives and strategic directions need to align to that scope. This can be considered a top down approach. The LG and PG set out strategic objectives every term, some of the strategic objectives are department specific and others are transversal or interdepartmental. These strategic objectives effectively support the strategy of the governmental organisation.

ICT and organisational strategy convergence

However, a two way approach is in place for IT strategic planning. Each department owns their IT strategic plan and can be aggregated into the organisational IT strategic plan. Both organisations run a central IT department which services each organisation. "IT has become so prevalent and pervasive in all aspects of the business that is it imperative to implement sound IT governance as an enterprise-wide approach" (Audit Report, Province). Information systems at the organisations were considered as enablers to business, but have now become pervasive in the sense that they are built into the strategy of the business. IT has become an enterprise wide part of doing business and therefore needs to be governed from an enterprise view perspective, not as if it were just an IT function. Both organisations depend on IT to function and be transformed to operate at the 'next level'. "We all understand the value of ICT to underpin operations and to drive efficiency" (PM, City).

It was also noted to keep the ICT and organisational strategy in sync, which is an ongoing activity. "Having a strong business strategy, the ICT strategy might suffer, and having a strong ICT strategy the organisational strategy might suffer. It would be ideal to keep them in sync, as the gap shouldn't widen" (IL, City).

BI assists strategy

A dominant BI tool used in both cases is the executive dashboard. The executive dashboard provides a holistic view of the organisation, in terms or progress on projects, in terms of KPIs and is basically the corporate score card at the executive level.

PG departments develop annual performance plans (APP) that are aligned to the departmental strategic plans and ultimately support the provincial strategic plans. With regards to the LG, a similar

process is used, the organisational strategy is contained in the Integrated Development Programme (IDP), and all line department objectives must correlate to that strategy. Both organisations adopt the Balanced Score Card (Kaplan & Norton, 1992) methodology to develop Key Performance Indicators (KPI) in order to monitor progress both at organisational (executive) level and departmental level. The APP and IDP are measured in terms of score cards that contain elements that can be monitored.

Provincial government APPs are “loaded into the executive dashboard, the projects need to report on a monthly basis, from that you can actually see all the projects for the province, and how we’ve progressed” (SD, Province). The dashboard provides a composite view on provincial activity and information at different levels, allowing drill down information. The premier of the province “actually takes that report to manage [the] managers” (SD, Province). What is also key is that part of the executive content is viewable by the citizens; this keeps information transparent to the citizenry.

The LG executive dashboard is used in a similar way, in that corporate performance is monitored and reports strategically on organisational activity and milestones achieved. However, the executive dashboard at the LG is built on a hierarchical structure of its ERP system. The different departments run ERP modules, e.g. human resources, finance, logistics, etc. These modules provide the organisation with information systems to transact while doing business. These transactional systems are then in fed into the ERP business warehouse (BW). The BW provides the foundational data to consolidate, and report on the corporate performance score cards. The executive dashboard is meant to “give high value information, in a graphical display” (PM, City). 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, City).

5.1.3 Cultural change and conforming to uniform 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. A formal change management process needs to be adhered to when implementing BI (Yeoh et al., 2008). The difficulty of change management experienced is described in the following categories.

Process improvement and roll out

“By now asking these individuals to conform to this business process, was probably as difficult as teaching an old dog new tricks. He is set in his own ways, not up to learning, he is very comfortable.

So the typical challenges that come with change management in general [were] definitely felt on the project” (PM, City).

“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, City).

What was also common in both cases is that change management with regards to BI implementation should be owned and driven by business. Business ownership of running with change management is quite key to successful BI adoption, not only the initial implementation but also to sustain the changes implemented (Williams & Williams, 2004).

Sustaining cultural change

Process change and improvement requires buy-in from users during implementation. In this study participants raised concern that post-implementation change management was still a factor to successful adoption.

“To sustain that change you need senior management, and management intervention, and sometimes it’s the problem exactly there” (EO, City).

The participants also alluded to cultural shift in the workplace due to the nature of the output of BI information as BI output contains information that allows monitoring of work output.

“Their visibility of what they are able to deliver, there will have to be a change management process” (SD, Province).

The cases in this research project revealed that the organisations departments are at different levels of BI adoption. The participants maintained that it would be the responsibility of the departments coming on board to drive the BI initiative, also the change management process will have to be driven by business itself, not IT.

“It shouldn’t be an IT system that now gets enforced onto [business], the client department should take ownership of it, and drive the change management. Otherwise it’s not going to succeed” (SD, Province).

Having an adequate business-oriented change management effort was deemed critical by the participants. Successful adoption is achieved through enhancing the four aspects of change management; process, strategy, technology and people (Bucher & Gericke, 2009). The strategy needs to be clearly articulated to the individuals and ensuring that “the minds and hearts of the

people” (PM, City) are won. And “just through technology added to [the process to] assist” (PM, City).

5.1.4 Business key as stakeholder of 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 organisations are 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 to the operational side of the organisation.

Decision support and experience

The analysis revealed that the political leadership at the organisations hugely influenced the decision to implement a BI system. Both organisations’ political leadership are seeking decision support systems to enhance their decision making processes. During the interviews the PG participants mentioned that the current political leadership had previous experience with ERP systems and BI systems, due to their exposure to BI capabilities is also what influenced adopting a BI solution.

“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 PG], different departments, different and disparate systems, not one composite view of what is going on in that sphere in this whole thing” (SD, Province).

Business ownership of BI project

Business ownership is quite key in delivering BI solutions. The analysis of this study has also highlighted the effect on the organisation or departments where BI solutions were implemented without business taking full ownership of the BI adoption.

- IT centric solution

Within the department of health within the PG, a BI project was initiated through the then head of the IT department. The outcome was that the project has not yet managed to get off the ground as the project is not owned by business.

“In the Health [department] it’s not being used at the moment yet. Health’s project sort of started a few years ago, and because Health has such a lot of information they got stuck in the data cleansing side. All the patients information, and trying with the payments side of things, trying to cleanse it and make sure that it is correct. They have not progressed beyond that, but I can tell you partly

because BI in the department of health was not started off as a business initiative. It was the then head of the IT for the department that said, 'we've got BI, and BI can do lots for you'. And then he sold BI to them. So the business never said that we have the need for it, they had the need for it, but they never took ownership of it. So, at the moment business is still trying to get their head around what am I going to do with this BI. So that's why BI in that department it didn't kick off" (SM, Province).

- Vendor centric solution

In another case, the Education department at the PG has recognised that they have the need for BI. The Education department then sourced a vendor for a BI solution. However, the implementation and ownership of the project was put onto the vendor. This led to the current solution being a partial fit to their requirements.

"The [Education] department said that we've got the need. They then went out, got the system in place. For the past, I think three or four years running. The BI solution was delivered to a certain degree. The vendor is still responsible for operational [support]. So if somebody says that I now have a BI requirement they got to go to the vendor to actually do the reporting. So the one thing they have done is that they have asked for us to do an assessment to see whether it is actually delivering what they wanted, because they are seeing reports. They don't have the capacity to go in and ask question and to drill down. BI is implemented in [the Education department]. The department themselves are now asking 'is it giving us the value that it should?'" (SM, Province).

These cases demonstrate that due to lack of *business ownership* and *management driving* the BI project, the solution provided might not be a fit, or even a partial fit. This puts emphasis on business driving the process of initiating and implementing a BI solution.

5.1.5 External environment

South African public sector organisations are structured hierarchically, in that national government department oversees the national policies, the provincial governments report to national government and also oversees provincial policies. The local governments oversee their districts and deliver on local services and report to provincial government and national government as well.

Government performance management

The performances of governmental organisations in South Africa are reviewed using a performance management system (PMS). The PMS is quite crucial in that it allows service delivery outputs to be measured and monitored. PMS was a theme that arose in the interviews. However, PMS rose as

being an issue of concern in the South African public service as the PMS itself is still undergoing development. Most of the PMS reporting is directed to National Treasury department instead of the National Presidency.

“I don’t think that the country is even come close to solving the performance management and the monitoring and tracking or stuff like that” (EO, City).

The implementations of PMS in the participating organisations have been noted as being part of their BI implementation. BI reporting is used and can be further enhanced for performance management. Incorporating BI into the PMS is a part of the BI design at both the PG and LG.

Use of BI for political campaigning

South African public sector organisation leadership is basically comprised of political party members. The objectives of the political parties are then inherently part of the public sector organisations objectives during the party’s term (Steyler & Fessha, 2005). This political involvement also affects the BI implementation and use. The LG participant revealed that in his years involved with the organisation, there are two perceptions of BI. BI can be used to enhance service delivery and assist with decision making, or it is something that needs to be hidden away as it shows the areas of where the organisation is performing poorly. This represents a concern as the dilemma of party politicking then affects the use of BI on service delivery and transparency of public sector organisations. Examples of how party politicking affects BI use are illustrated in the quote below.

“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 liberating and powerful tool to try and shape their agenda, their story or their response” (EO, City).

Citizen demand

Given South Africa’s mixed society, the culture of communities and expectations of citizens are different. These societal phenomena have been noted as having an effect on how the government organisations operate and deliver to their citizens.

What was found to be a challenge, was given South Africa’s “landscape because of the Gini coefficient of have and have not’s, servicing an affluent suburb [for example], working on a water duct on a [mansion] on a cliff is very different to a township” (PM, City). These are completely different conditions, and that is more of a challenge for us when building systems to [enable service delivery]” (PM, City).

Another influence of the Gini coefficient problem, on the government BI systems, was to not “draw blind conclusions based on what the numbers say” (EO, City), as the reality of the citizens might not be truly reflected in the statistics and reports of the organisation.

The experienced of the public sector organisations are described in the following quote.

“There are these cultural differences, and say you take [this city] and its different areas, there are areas that people are used to complaining, and they believe that it is their right to complain and they have the resources to complain. And when there are other areas where people who don't know that it's their right to complain or demand a service level, and the only way that they know of doing that is by toy-toying in the streets or by getting it to breaking point before they action anything. So in those cases where you look at the stats coming in [do not reflect reality]” (EO, City).

5.1.6 Summary

The context of the organisations and degree of organisational restructure for business improvement has an influence on the how BI is implemented in the organisation. Prerequisites of BI are successfully adopted streamlined and non-duplicated business processes and a stable ICT infrastructure to support processes (Bucher & Gericke, 2009). The organisations in this study are in a developmental state, where activities are currently underway to improve business processes and developing systems to support organisational strategy. The strategic objective of the organisations are to have an integrated service delivery operation. BI has been identified as a key tool to inform processes and for management to evaluate processes and drive out efficiencies by using consolidated information to inform decision-making processes. Participants have stressed that for BI projects to be successful, ownership of these projects need to be successfully led by business management. Change management is considered an issue of concern when adopting BI in these public sector organisations, and also sustaining the changes implemented. The culmination of the organisation's drive must be communicated through a well-developed change management strategy, coordinated ICT and organisational strategy and business management ownership of the BI implementation. An important outcome of the organisational drive for efficiency is an improved service delivery operation and culture. The next thematic network explores the themes and concepts uncovered regarding an improved service delivery culture.

5.2 Shifting to a Service Delivery Culture

The analysis revealed that a recurring theme is a shift in culture due to business process improvement and implementing BI. The shift in culture is initiated at the management level, where BI provides information for decision support. However, to use the BI solutions require sophisticated users to interpret its analytical information. The themes that are part of the shift to a service delivery culture are: ‘business process improvement’, ‘staffing and skills’, ‘utilising business intelligence’ and ‘tools and technology to enhance BI use’. The second thematic network is centred on the global theme ‘Shifting to a Service Delivery Culture’ shown in Figure 5, which explores the adaptations the organisations undergo in implementing BI.

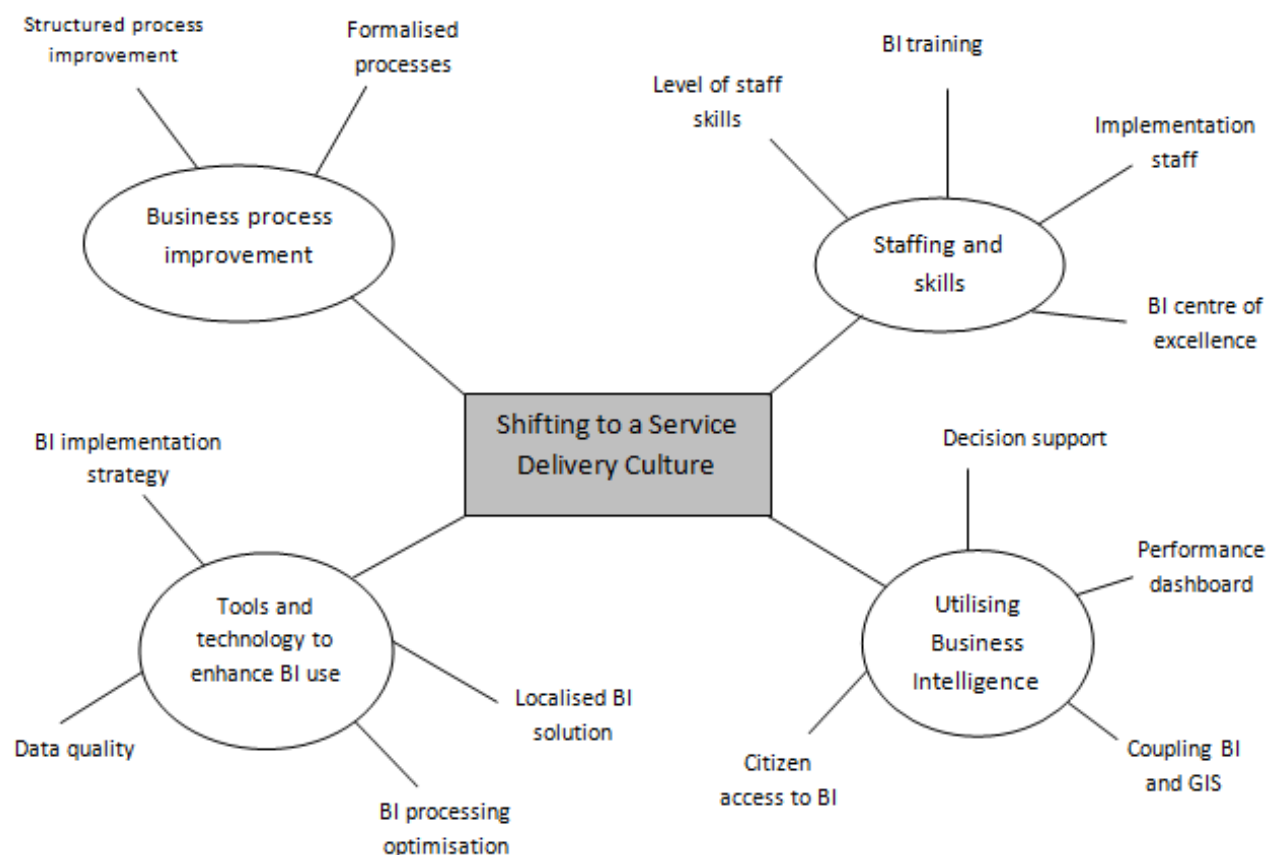


Figure 5: Service Delivery Culture thematic network

5.2.1 Business process improvement

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, City). As explained by respondents the main issue of concern at South African government organisations is that the current status of business processes at government organisations is considered “a mess” (GO, Province), or ‘ad hoc’ in terms of service delivery, “it’s all very responsive to, you know, whoever screams the loudest, that’s where the action will take place” (EO, City).

Structured process improvement

With regards to service requests from citizens to the LG organisation, it was stated:

“If you get the business process right, then the stuff downstream becomes a lot easier, but if you don’t have an electronic automated business process that’s guiding all the work requests into a single channel, and ensuring that people execute against that channel then you [are] not going to have any intelligence” (EO, City).

Once the organisation manages to formalise, simplify and automated its business processes, and these processes are transacted on, the data produced can be mined to produce ‘intelligence’. “Business process improvement is to develop processes through a structured manner” (Business Case, Province).

Formalised processes

Reforming the government organisations from its previous method of operation where departments and government structures were duplicated due to government policies came as a pertinent issue. Enterprise wide governance maturity of business processes is taken on as continuous enterprise wide projects at both organisations. The governance framework COBIT is used extensively by both organisations to reach their desired level of maturity. The organisations are externally audited every two years in order to assess their progress on conforming to industry standards.

5.2.2 Staffing and skills

Another major issue of concern is that the “labour force [of the organisations] are not sophisticated IT users” (PM, City). A shortage of BI skills has been noted at both organisations.

Level of staff skills

The quote below describes the current reality at the LG, and how they desire to implement BI.

“In an organisation where our users are not all that sophisticated, we got 27 000 employees of which maybe a good 21 000 of them are blue collar workers, they don’t necessarily access the BI system but producing analytics is the analytics. [For] them to use in an intuitive fashion is definitely something I want to do. So taking business intelligence, putting it out on a kiosk IN A DEPO and getting an individual [to] seeing how many? What the organisational trends [are]” (PM, City).

As described by the participants the reality in public sector organisations is that processes were not always automated, most processes have a legacy of being paper based or bureaucratic type

processes. “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, City).

The LG has noted that councillors in charge of sub-council areas are key users of BI. These are individuals who would manage the service delivery to direct needs of citizens in their particular locations. However, these councillors are assigned their position through municipal electoral voting. 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 reporting 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, City).

To demonstrate the extent of the level of use of BI at the councillor level, the LG EO participant stated:

“There is one councillor, that I was knocked over when he showed me in a presentation, and he was showing the now exec mayor, how he uses the BI tool in his ward and how he tracks the complaints and how he puts it in his excel, and the trend line, and how he gives the ward guys hell one month because they falling behind compared to where they were last month. And he was using it. But he’s one councillor. But he is probably one in 200 who was using it so aggressively” (EO, City).

BI training

What both organisations have done to introduce BI to their staff is to initially train staff on the concepts of BI. There are dedicated BI trainers which conduct BI classrooms and planning. The BI classroom program sets out the BI orientation and actual ‘point and click’ training.

“We call it ama-click-click and show them where to click. We have online material that teaches you how to navigate your way through BI reports. [Our lead trainer], who has worked in the logistics [department]. It’s a lot of planning, and his taking account, holding their hands, being there as a crutch” (PM, City). The BI induction and training program is also presented to the executive managers, such as the executive committee members and politicians who are the prestigious users. It should be noted that super users are part of the BI support staff.

Implementation staff

With regards to BI implementation both organisations are dependent on contractors and external vendors for their BI system. For example, in LG the implementation team consists of 50% contractor staff and 50% permanent staff.

The BI implementation at the PG is not as mature and developed as at LG. The PG participants has noted that there was a challenge to find the correct skills to assist them with the BI implementation even from the strategy side. A PG participant stated:

“BI skills are a problem. And generally IT skills are a problem, BI skills obviously is something. We went out twice on tender for somebody to assist us. The first time we didn’t get much of a response to assist us on the strategy side. The second time we got a response and there was actually only one person who could assist us on the strategy side. So it’s limited the BI skills” (SD, Province).

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, Province).

BI centre of excellence

Both organisations found it useful to introduce 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 LG and PG 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
- Competent with business domain knowledge
- And have good business sense

With regards to the redevelopment of the LG, an ERP support centre has been introduced. The ERP support centre plays a major role in business process optimisation, change management and technology innovation. The ERP support centre is made of 140 people, the majority of which have been seconded from business, with only 30-40 people being IT staff. The ERP support centre plays the role of change agents in the organisation to readily advise on best practice. As previously mentioned, business ownership has been key in employing uniform business processes and adopting

BI. Having the ERP support staff who are key business users, being the enablers of change ensures that business gets BI delivered not as an IT function but as a management tool to be employed by the business.

PG government has taken a similar stance, in that for BI to be adopted in business it required that a BI competency centre be setup. The BI competency centre is composed of a “core group who understands BI, and become the advocates for BI, especially those people who have their tentacles in the other departments. Get that core group to understand what it’s about. And then you roll it out from there” (SD, Province).

5.2.3 Utilising Business Intelligence

In both case studies the BI tools provided are divided into two segments. The one 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 other segment being the reporting, where strategic reports on objectives and allowing for drill down, to allow users “to navigate [their] way all the way down into the line department” (PM, City).

The uptake of BI has been very slow initially, as individuals began to realise that there is value that can be derived from BI reporting, “that is not necessarily [retrospective], that they can start to make more informed decisions, and they started warming up to the application” (PM, City). The other desired aspect is having more user friendly BI tools, so that less sophisticated users are able to interact with the BI system.

Performance dashboards

As previously mentioned, the level of ICT competency of public sector staff is a cause for concern. An innovative method that the LG has implemented was to strategically pre-populate and package BI tools to fit the users’ requirement. This is done by “pre-populated reports for [users] so [they] don’t have to go to excel and sort and colour code and all of that. What do you want to see? Well I want to see service trends by service district, I want to see service trend by ward, by political party, and so what [LG has] decided to do was to pre-package these reports and these dashboards” (PM, City).

Coupling BI and GIS

The analysis revealed that in both case studies the spatial enablement of data is key in analysing trends within their data warehouses. “So GIS is just the spatial enablement of the BI side. So there is a strong linkage there” (SD, Province). Coupling BI and Geographical Information Systems (GIS) has

already provided the organisations with valuable information on implementing policies or improved predictability of required service trends.

An example is given by the PG, “the role of the violence and the shebeens in [the PG locality] where they’ve plotted the shebeens, mapped in [the data], and then we looked at the areas of high violence” (SD, Province). However, while mentioning this example another participant noted that the solution was cumbersome and slow, due to the disparate systems and incompatibility of data.

“See it took them a while to get that because they didn’t have [integrated] systems, they had to go departments and some of it was of it was on spread sheets and some of it was in systems but they had to go to the departments, consolidate it, come up with this picture which took them quite a while, and [with a] BI type of solution you should be able to get it a lot quicker” (SM Province).

Another example can be taken from the LG, when service requests are put through to the organisation and the calls are geo-coded. This allows management in “control centres to view the information graphically, and immediately reveals ‘hot spots’ as they occur” (EO, City).

Decision support

Within the organisations decisions are largely made irrespective of BI, “a lot of the time we make decisions in the absence of facts and our decisions are [informed by the perceptions]” (PM, City). Adopting BI has created a shift in culture of decision making, however, it is not a standard. While describing the impact BI has had at the LG, PM participant mentioned BI “gives us the ability to spot trends and in spotting those trends we can make more informed decisions” (PM, City). Managers now have the ability to plan in advance, which now means that in “delivering services it is not retrospectively questioned by the customer. [The managers] would have always been on the back foot, retrospectively applying the solution. Now they are ahead of the curve, it is not meant that they should be, but [it] definitely lessen the effort needed, and that in itself translates into an improved service delivery” (PM, City).

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, City and SD, Province). Although the statistics might say one thing, the users would still apply discretion. It should be noted that BI gives users “[the opportunity to test a suspicion or to test what they know, or to collaborate or to nullify a certain thing] and assist in making an impartial decision” (PM, City). BI does prompt management to think further, to spot trends and “start giving root-cause analysis” (PM, City).

Citizen access to BI

On the other hand, BI produced information could prove to be quite useful when government organisations make it available to citizens. The PG presents components of its executive dashboard to citizens and allowing 24/7 interaction through its website. This allows transparency of government organisations as key project information is readily available to its citizens via its website.

5.2.4 Tools and technology to enhance BI use

Both organisations have chosen to implement vendor developed BI solutions to meet their requirements. The vendors selected are chosen due their reputation as a world class supplier of software. The organisations have objectives of being the country's best run local government or provincial government respectively, therefore the technology selected was quite crucial. Investing in a technology is a huge risk, as future operations need to be considered. However, selecting a reputable technology vendor allows the dependency to guide the organisation to best practice. The vendors being world class BI suppliers have standard industry processes.

Localised BI solution

The other concern raised in the interviews was that adopting software solutions from first world contexts is in some circles considered a system mismatch given the South African context being a third world country (Heeks, 2002). One participant gave an interesting response in that it might not be a system mismatch but rather a culture mismatch. However, system mismatches are noted by participants, 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, City).

The service request system that records citizens' calls to LG, 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, City). The service request process provides the LG with data, on top which a BI system extracts strategic reports. This demonstrates that it is possible is to implement 'Western/Northern industrial applications', and to not implement blindly, but "by tweaking the system to optimise it to suit local needs and at very minimal costs" (PM, City).

BI processing optimisation

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. This has been

a major concern for both organisations that “some reports took almost up to four hours to load” (PM, City). The LG 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.

What the LG has also implemented is technology that allows for the reporting templates to be embedded into the architecture of the BI solution. This technology works off (software) “business objects that allows user experience to be more responsive” (IL, City). The LG also implemented a business warehouse accelerator to optimise its top 10 strategic reports. However, it is something desired that all report generation should be real time and in memory, if it is affordable.

Data quality

Another concern revealed by the analysis was the quality of data entering into the transactional systems and BI system. All participants agreed that if “garbage is fed into the system garbage” (GO and IM, Province) will be produced. However, data quality has come up as part of business ownership and limiting the potential for invalid data to be entered into systems. It is the onus of business to ensure that correct data is fed into the system. Data quality is recognised as a challenge when implementing a BI solution (Negash, 2004). LG recommends that limiting the access to data elements to individuals based on roles and responsibilities to an extent ensures data quality.

BI implementation strategy

The PG and LG have taken different routes on the BI implementation strategy. The LG has adopted BI as part of its overall organisation redevelopment and modernisation. After optimising business processes and setting a uniform manner for the organisation to operate, transactional systems have been incorporated as part of everyday transacting. The BI implementation now has a place by implementing the business warehouse on top of the transactional systems. The LG corporate performance management system now feeds off the business warehouse as well as dashboards and reports. The LG however implements BI in a phased approach through demonstrating the value of BI by prioritising the high value areas of its organisation.

The PG has up to now mainly focus on finalising its BI strategy case, and BI planning and frameworks for implementation. As the PG has not taken the route of radical redevelopment of its organisation, it’s BI implementation “strategy is as and when the need arises for strategic decision making” (SM, Province). It has been noted that departments are at different levels of BI maturity. The PG has spent about four years developing its strategic and implementation planning. It has now secured a vendor to implement its centralised BI solution.

The PG has two main objectives for its BI solution.

- Consolidate and integrate its operational and departmental systems
- Build BI solutions on its framework that would allow the consolidated work to aggregate into the provincial business warehouse.

5.2.5 Summary

To benefit from BI, the match between analytical skills required and BI tools came out as key and were innovatively harnessed in these case studies, particularly the LG. The fact that business needs to take ownership in development and roll out is quite evident, due to the BI advocacy teams comprising majority business domain staff. Two issues of concern for successful BI adoption in the public sector organisations are as follows:

- BI is of little use if the business processes are not formalised and automated
- Ensuring that the intended BI users have sufficient analytical ICT skills

As revealed by the analysis to successfully produce a service delivery culture and implementing BI in the context of the case studies rests on the following building blocks:

- Business processes need to be formalised
- Train users on BI concepts and BI systems
- Work towards BI tools that match staff skills
- And create a centre of excellence to influence BI adoption and advise on best practice

5.3 Chapter Summary

Chapter 5 presented an overview of the analysis of this study and provided details of the thematic networks produced. The thematic networks were discussed and formed the basis for the axial coding. The final list of themes and category counts are presented in Table 4. The categories and themes are organised by global themes.

Categories	Count	Themes	Global Themes
Organisational maturity and restructure	6	Undergoing organisational consolidation of structures, processes and data	Organisational Drive for BI
Integration of Systems and Processes	25		
Consolidating processes using methodology	12		
ICT and organisational strategy convergence	9	Organisational strategy underpinned by BI	
Strategic planning system	14		
BI assists strategy	15		
Process improvement and roll out	7	Cultural change and conforming to standards	
Sustaining cultural change	14		
Business ownership of BI project	28	Business key as stakeholder of BI	
Decision support and experience	9		
Government performance management	7	External accountability	
Political campaigning	9		
Citizen demands	6		
Structured process improvements	17	Business process improvement	Shifting to a Service Delivery Culture
Formalised processes	10		
Level of staff skills	17	Staffing and skills	
BI training	9		
Implementation staff	8		
BI centre of excellence	10		
Decision support	22	Utilising BI	
Performance dashboard	9		
Coupling BI and GIS	5		
Localised BI solution	7	Tools and Technology to enhance BI use	
Vendor dependence	9		
BI processing optimisation	8		
BI implementation strategy	4		
Data quality	10		

Table 4: Final list of themes

It should be noted that the themes and categories in this research study does overlap with previous BI research studies. In particular reference to the research conducted by Bijker and Hart (2013) and Dawson and van Belle (2013) which investigated critical success factors in the South African private sector, this research has revealed the following major themes in agreement.

- Organisational strategy underpinned by BI,
- Business key as stakeholder of BI,
- Business process improvement and
- Cultural change and conforming to standards

Bijker and Hart (2013) finds that the organisational factors to be strongest influencers of BI. However, the researcher has noted that in contrast the factors 'Undergoing organisational consolidation of structures, processes and data', 'Staffing and skills' and 'Utilising BI', showing as prominent themes in this research study which could indicate a particular reference to the public sector in South Africa. These themes represent the nature of the organisational environment developing towards a more streamlined and cohesive agency with consolidated processes and data, and also putting emphasis on the up skilling of public workers to better perform operations through the use of BI. The link between BI and GIS adds value public sector service delivery operations. The next chapter discusses the research findings and resulting frameworks.

6. Discussion

6.1 Introduction

The analysis has led to a number of findings being derived in this research, which have practical importance to BI projects in the public sector. This chapter seeks to summarise and discuss these findings in relation to the research objectives and the research questions. The main research objective is to explore how BI is implemented and used to enable public service delivery. To answer the research questions, the researcher has employed the axial coding of the thematic networks. The resultant relationships that were discovered present an understanding of the research outcomes. The research questions and related themes are presented next.

Research questions:

1. What organisational factors influence the BI initiative in a public sector organisation?
2. What factors affect the use of BI in a public sector organisation?
3. What factors affect the BI project process in a public sector organisation?
4. What factors can contribute to BI project risk in a public sector organisation?

The fourth research question will be addressed in the next chapter.

6.2 Organisational factors influencing BI initiative

This section describes the organisational factors that influences the BI initiative. The key themes that are raised from the analysis in this section are: 'external environment', 'organisational strategy underpinned by BI', 'business key as stakeholder of BI', 'undergoing organisational consolidation of systems, processes and data', and 'cultural change and conforming to standards'.

6.2.1 External environment

The researcher's understanding of how organisational factors influence the BI initiative within a public sector organisation within South Africa, originates from the function of the organisation. Figure 6 depicts the influence of the external environment has on the organisation. The South African government has provided a framework for people-centred public service delivery, namely, Batho Pele (Republic of South Africa, 1997). This initiative strives toward moving public servants to become service oriented, to pursue excellence in service delivery and to commit them to continuously improve service delivery. It also sets the principles for transforming service delivery with regard to consultation, service standards, access, courtesy, information, openness and transparency, redress and value for money. These principles are required since it is argued that a

transformed public sector organisation needs to be measured against its commitment to continuous service delivery improvement (Twinomurinzi & Visser, 2004).

The public sector organisations in this study are mandated by the South African National government, to serve the citizens in their regions. With the provincial governments focusing on policy creation and local governments focusing on providing services. The PG and LG are held accountable by the national government through implementing a PMS. An example of reporting to national government is demonstrated in the following quote.

“The departments have to submit the tender information on a monthly basis to the [national] treasury” (SD, Province).

Coupled with the need to continuously improve, the South African context also includes the need for public sector organisations to see to the ever-changing demands of citizens.

“you have a certain capability to respond to service requests, the demand is this big, but we only have [limited resources]” (EO, City).

As previously mentioned the South African public sector organisations are in development phase, and seeking to transform to meet citizen demands. The executive leadership formulate the key strategies and focus areas of the respective organisations. It should be noted that the executive leadership are largely affiliated to the political party in term at the organisation. This is seen as influence on steering key strategic operations of the organisation. E-government projects require strong political leadership in order to succeed (Heeks, 2003b). However, continuity of leadership in South African governments has been raised as a concern for e-government projects (Matavire, et al., 2010).

“BI as a management tool, where both, at a political level and at an administration level KPIs and dashboards have been built” (EO, City).

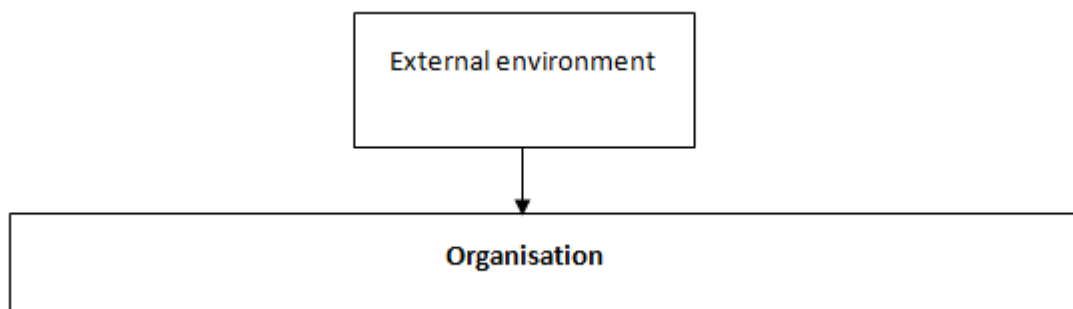


Figure 6: Organisational factors influencing BI – Build 1

6.2.2 Organisational strategy underpinned by BI

At both organisations the strategic objectives are mainly transversal in that it is interdepartmental, where an objective is only ever achieved through the cooperation of more than one department. The organisational strategy then demands that departments share and integrate information for them to deliver on the objectives. Figure 7 displays the alignment of BI and organisational strategy.

As mentioned by a participant at the PG:

“What drove it was the requirement for consolidated information, for decision making information which we don’t have” (SM, Province).

BI can be used to develop effective service management strategies (Li et al., 2008). The BI concepts, methods and processes value is not to only improve business decisions but also support the realisation of an organisation’s strategy (Olszak & Ziemba, 2003).

During the interviews specific reference was made on how organisational strategy influences BI adoption. The responses from the interviews were quite clear that due to adopting transversal strategic objectives, in both case studies, this has been a catalyst for integrating departmental information and thus driving the need for BI type systems.

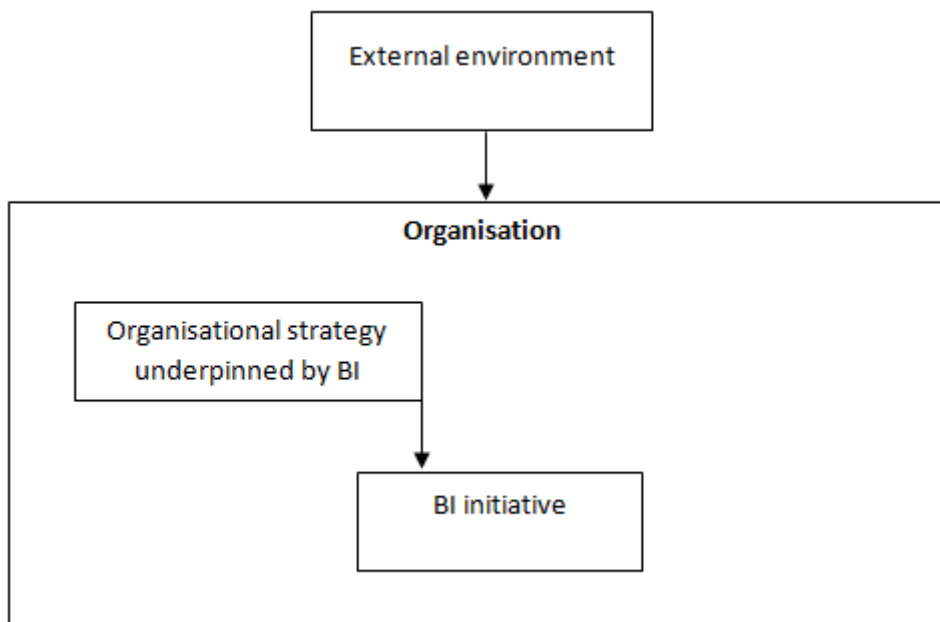


Figure 7: Organisational factors influencing BI – Build 2

6.2.3 Business key as stakeholder of BI

The need for consolidated information was raised as the major drive for implementing BI at both organisations. This need originates from executive level and management level, coupled to this all the interviewees stressed the importance of business ownership of BI projects and project

sponsorship being steered by business. Figure 8 displays the influence of business ownership on the BI initiative. If business domain managers do not own the BI project, it might not result in success or it might be a partial success. Literature relating to BI strategy stresses the importance of having an executive level sponsor for BI (Williams & Williams, 2004) who is responsible for ensuring that BI is supported, as well as promoting BI and its potential for adding value within the organisation (Venter & Tustin, 2006; Yeoh et al., 2008; Bijker and Hart, 2013).

Respondents raised that a major influence for BI to be successfully implemented at the organisation, is that the project needs to be management driven. Added to this, BI was found to continuously be in the top three requirements by departmental executive leadership. It should be noted that BI is also recognised as a top requirement for IT executives in industry (Luftman & Derksen, 2012).

“Each of the departments [compile] a strategic ICT plan and [identify] the key things that they need, it comes out of the process of looking at the strategy of where they want to go. And it’s just about all departments, BI was in the top three of the things that they want” (SM, Province).

From the documents provided by the organisations, a specific concept highlighted was the enterprise wide approach to developing solutions within the organisations should be advocated at the senior business level.

“Cabinet and Director-Generals need to drive [the] enterprise wide approach” (Business Case, Province).

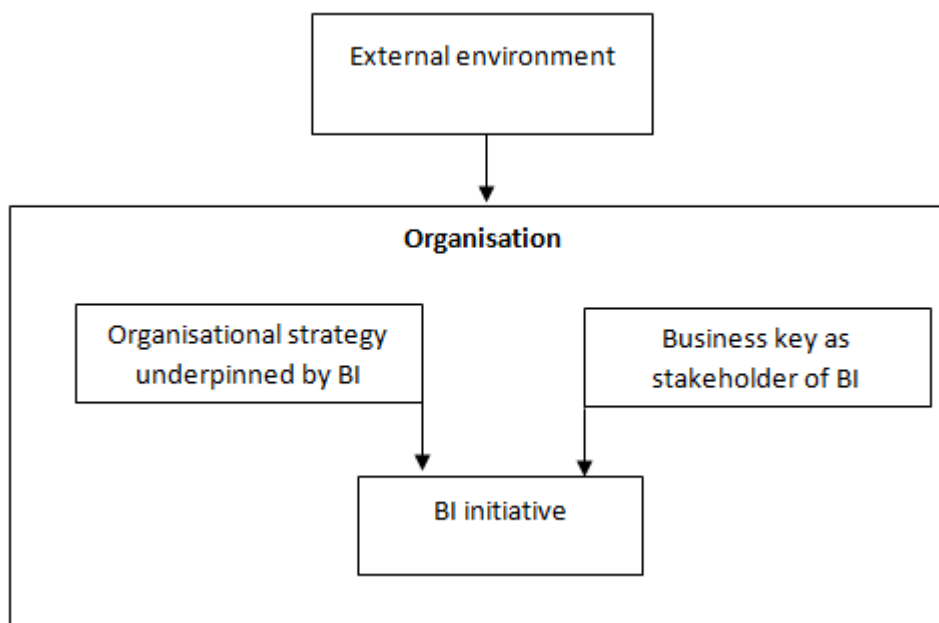


Figure 8: Organisational factors influencing BI – Build 3

6.2.4 Undergoing organisational consolidation of systems, processes and data

System integration and data consolidation is a pertinent component of BI implementation (Negash, 2004). However, this has been raised as an area of concern within the case studies. Post 1994, the South African public sector organisations were driven to reform, and develop the organisations to be unified, and lead to an efficient public sector operation (Twinomurinzi & Visser, 2004). Enterprise wide application integration is considered a key requirement to building BI systems (Melchert et al., 2004). BI and process automation initiatives are usually organised as separate projects that are not properly coordinated, this normally leads to misalignment of strategic management and operational process execution (Melchert et al., 2004). The issue of disparate systems arises from legacy systems, as well current disparate system implementations, particularly at the PG. The PG and LG have taken different routes in overcoming this obstacle.

LG has gone the route of implementing an enterprise wide ERP system which covers all their departments. This wall-to-wall implementation has taken the LG about a decade to implement.

“in essence we use [ERP] as our backend system, and this component of an end-to-end business process is something that we have through [ERP], and into business warehousing for the bulk reporting and the executive dash boards fits on top” (EO, City)

In the case of the PG there exists no one particular system or ERP that encapsulates all departmental systems. The reality at the PG is that there are disparate systems. The PG interviewees explained that given their current situation it would take them 10-15 year project to develop well-integrated information systems that services all provincial departments. The strategy that they have implemented was to develop a provincial government business warehouse, included in the strategy is to have each departments BI architecture and implementation standardised to roll up into the provincial business warehouse. This provides them with the platform to implement BI where and when the need arises.

“we got a lot of operational systems or departmental systems, we then need to come up with an integrated BI solution, firstly within departments, and then secondly across the province” (SM, Province).

Figure 9 includes the BI requirement of consolidated of organisational structures, processes and data.

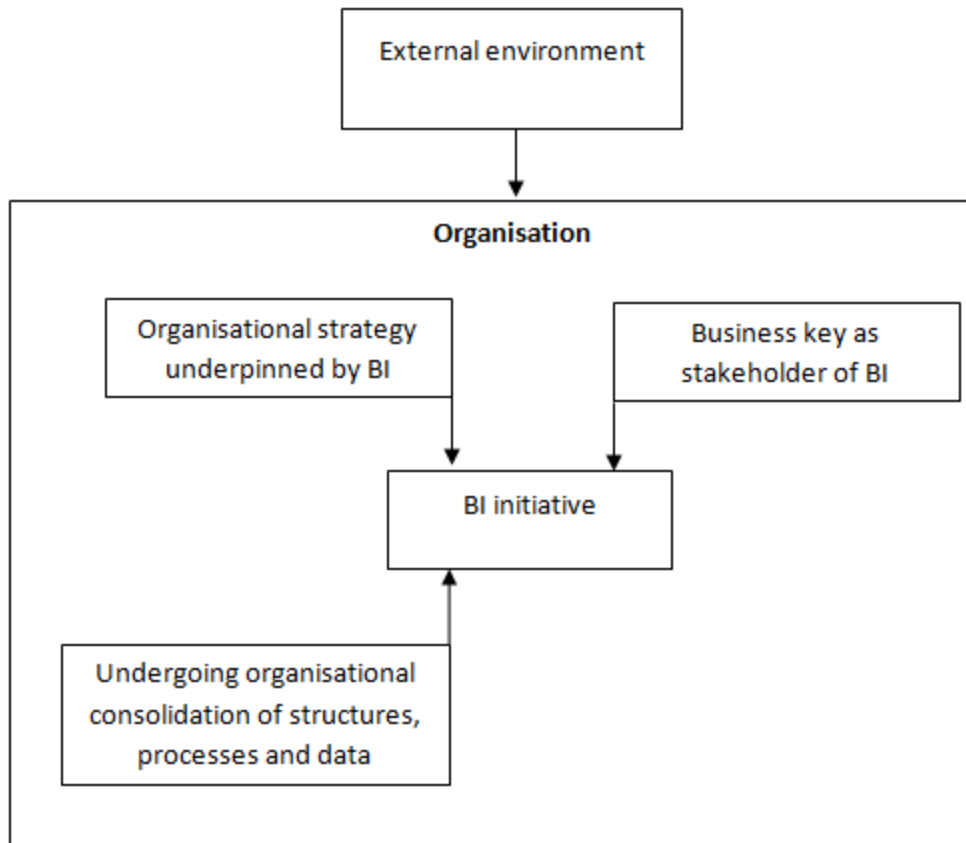


Figure 9: Organisational factors influencing BI – Build 4

6.2.5 Cultural change and confirming to standards

The public sector organisations set out to transform from initially being separate government entities, to single entities that service citizens equally. Based on this, the public sector organisations in this study have gone through phases of unifying duplicated government entities. Introducing change into an organisation will ultimately impact on one or more of the following parts of how the organisation operates (Atkinson, 2007).

- Processes
- Systems
- Organisation structure
- People, roles and culture

Grover et al. (1995) emphasises the importance of addressing business process change implementation within the broader context of organisational change. This holds true for the cases in this study. As highlighted by respondents at both organisations, introducing BI is challenging, in that people had to accommodate a new way of working. In some instances where BI was introduced it formed part of new standardised ways of working at the organisations. As part of the change management strategy, “diversity training” (IL, City) was recommended in the South African context

A formal change management strategy is required when implementing BI (Olszak & Ziemba, 2003). Yeoh et al. (2008) stresses on the importance of business user-oriented change management strategy in BI projects. Given the context in which the organisation are transforming, e.g. unifying seven departments into one, will now require an overhaul of systems, processes, roles and organisational structure. Kettinger et al. (1997) suggests that business process change should be accompanied with change management strategies which focus on the contextual factors of management support and technical competence.

To implement change is one issue, but sustaining the change was also a concern. Aladwani (2001) stresses that organisations need to implement strategies that promote the infusion of new initiatives. Therefore it is important to first understand the causes of resistance and then develop strategies to address them. Given the nature of BI it would ultimately result in a culture change as stated by the PG participant.

“There's going to be a culture change [due to BI] because people don't like to be watched and monitored” (SD, Province). Figure 10 includes the aspect of cultural change within the BI initiative.

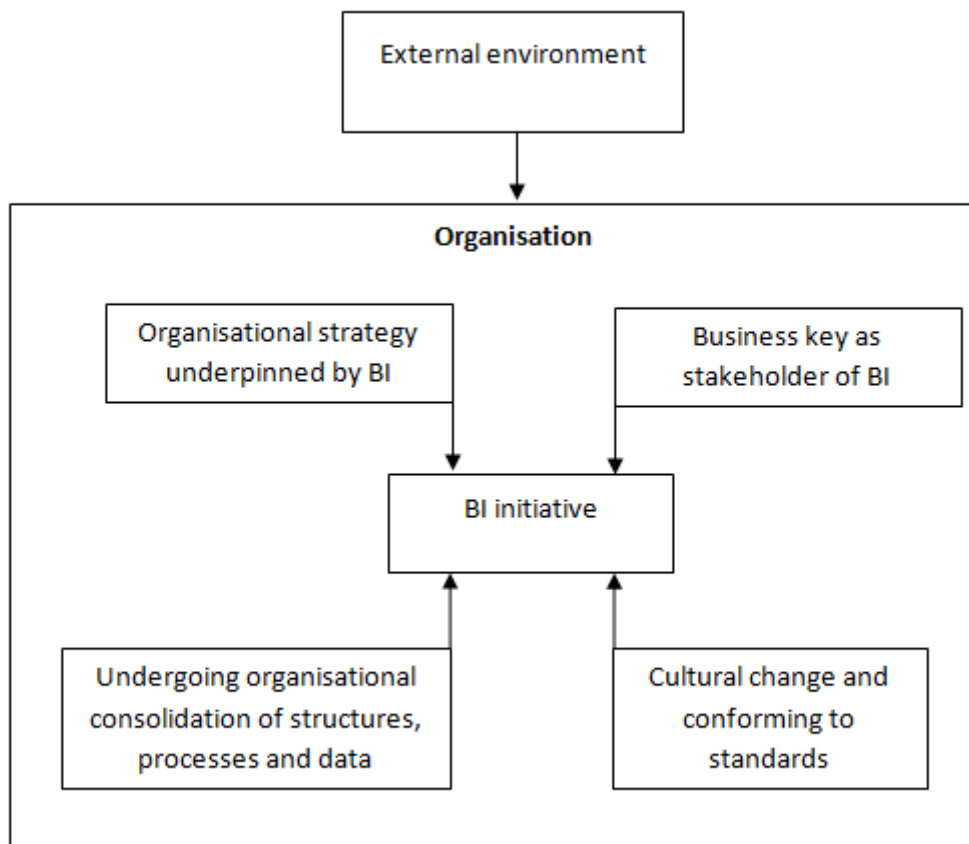


Figure 10: Organisational factors influencing the BI initiative

6.2.6 Summary

The diagrams of the organisational factors that influence the BI initiative were integrated into a final model referred to in this study as the 'Organisational factors influencing the BI initiative' as shown in Figure 10.

Figure 10 shows that the BI initiative is a result of the public sector organisations drive to improve service delivery, through operating optimally and efficiently. With the major factor being the executive and management need for key information for decision-making.

The external influences on the organisation are the mandated function by National government, its responsibilities to citizen demands, lastly the political influence in the nature of the public sector. These were found to affect the BI initiative.

The organisational strategy, which in the cases of this study are largely transversal, are driven out by the executive and management staff of the public sector organisations. It must also be understood that South African public sector organisations are largely in developmental states. Transforming the organisation and leading its operations to efficiency would require business process change and improvement. Another organisational factor of public sector organisations is that the existing systems were/are disparate within and among departments

The public sector organisational factors of BI in this study clearly display that BI within a public sector organisation, particularly in South Africa, should not be simply viewed as an IT. The BI project should be driven from executive and management staff to ensure that its implementation and organisational fit is closely linked to the organisation's core strategy.

6.3 Factors that influence the use of BI

This section discusses factors that influence the use of BI within the organisations that were evident in this study. The key themes that raised from the analysis in this section are: 'business key as stakeholder of BI', 'business process improvement', 'staffing and skills', 'tools and technology to enhance BI use' and 'external environment'.

6.3.1 Business key as stakeholder of BI

The business ownership theme was emphasised to successfully encourage BI use. Figure 11 represents the influence of business ownership on BI use. Business ownership of BI to deploy as a management tool can be seen as an overlapping theme in the previous section. The core need for BI stems from management requirement of information for decision making, but then also the BI project needs to be owned by the business domain as well. The key concern raised by respondents is that the BI technology should not be driven by IT, as explained by a participant.

“The client department should take ownership of it, and drive [BI project]. Otherwise the [BI project is] not going to succeed. People are going to capture garbage onto the system and then ultimately the system will not become as efficient and effective as it should be.” (SM, Province)

Examples were presented by respondents on cases that lack business ownership which resulted in partially successful BI implementations, or stalled projects. Having the business domain owning the BI project, improves the potential for the BI system to fulfil business requirements (Bijker and Hart, 2013). This provides evidence that business ownership of the BI project affects usefulness of the BI system.

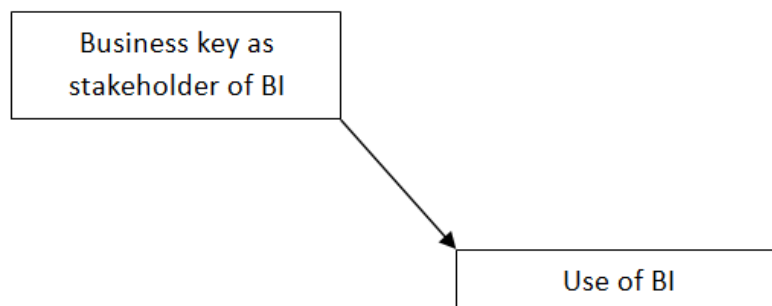


Figure 11: Factors influencing BI use – Build 1

6.3.2 Business process improvement

Inherent to organisational transformation is business process improvement and which rarely happens without systems redesign (Bucher & Gericke, 2009). Business process improvement is “the most important aspect that needs to be considered as the business process that enables service delivery” (EO, City). Figure 12 displays the influence of business process improvement on BI use.

Business process improvement is seen as a key requirement to the BI implementation at the public sector organisations. Without uniform business processes that is automatically transacted on in the organisation, no functional intelligence can be mined from the resulting data.

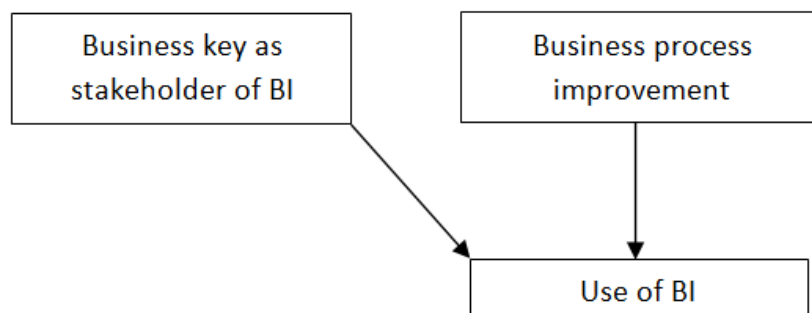


Figure 12: Factors influencing BI use – Build 2

6.3.3 Staffing and skills

The general public sector worker skills at the organisations were not geared to analytics and numerical interpretation. It has been highlighted that the nature of work at the organisations has been largely bureaucratic and there is now a need to move to more evidence based decision making.

BI training should be raised as core aspect within the change management strategy (Yeoh et al., 2008). The organisations identified that standard vendor BI tools were found in some cases to be complicated for intended BI users. This was one area where they seek to improve. The influence of staffing and skills is shown in Figure 13. The following concepts are highlighted.

BI Training

From the interviews at both organisations, particular emphasis has been put on the targeted users of BI. These are the executive leadership, management staff, and in particular at LG, the councillors. Emphasis was put on enabling managers to manage resources and drive out efficiencies to improve service delivery. Dedicated channels for feedback and support (Bijker and Hart, 2013), and competency centres (Williams & Williams, 2004) are key elements to BI support and ongoing training.

The respondent from the LG also identified that even though councillors intend to use the BI tools and see the benefit, however, due to lack of skills were unable to. As a workaround the LG has created as part of their support team, officials to assist councillors in using the BI tools.

Centre of excellence

A major change like BI would not only require change management but obtaining trust was a key aspect that was raised by the respondents. A key theme raised by respondents of both organisations is that advocacy of BI should be centralised, and developed into a BI competency centre. The BI competency centre should include a mix of business and IT staff (Olszak & Ziemba, 2003) As for the case of the LG, some of the business domain experts were seconded to form part the of the organisation's support centre. These individuals had expert power in the organisation and were trusted in their respective business domain. This central structure was then used to advocate BI in the organisation as a 'centre of excellence'.

"The super users stayed [in the support centre], they never left and what they doing is that they got the relationships in the business, and they are trusted in the business, and they are now the change agents, in fact they are the guys that know the business well" (PM, City).

Implementation staff

With regards to BI implementation, both organisations depend on a compliment of external contractors and permanent staff. The implementation team at both organisations has been made up of *super user* staff, IT staff and consultants. Both organisations stressed the importance of having a cross functional team for the BI solution implementation.

When implementing BI, particularly within the South African public sector, it could be challenging to get the correct skills and human capital to develop BI systems, which hampers the project's success. Staff with insufficient skills developing the BI solution could lead to an inferior system, or an implementation that does not meet the organisations requirements. This impacts the effective use of the BI system. The technical considerations for BI are quite crucial to the success of the project. Depending on the implementation skills available within an organisation, setting up close working relationships with vendors, especially in long term BI projects is recommended (Bijker & Hart, 2013).

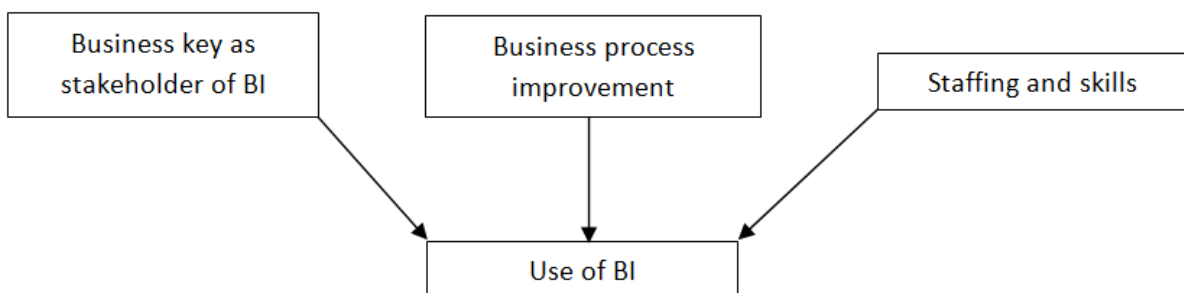


Figure 13: Factors influencing BI use – Build 3

6.3.4 Tools and Technology to enhance BI use

As mentioned in section 6.2.4, part of BI prerequisites are consistent data with maintained integrity, and integrated information systems. Integrating information systems to reach this requisite level of maturity, the LG and PG has taken different routes. The LG has implemented an ERP system and the PG has opted to build a standardised architecture for data integration. Figure 14 shows the influence tools and technology have on BI use.

Having BI data consolidated into one central repository allows for easier management of master data. Where this was a previously a major concern at both organisations when reporting had to be reconciled, where global variables, e.g. number of electrified houses, was mismatched between departments. A central data warehouse allows for consistent reporting, which is crucial for service delivery (Coman, 2009).

BI and GIS

Another theme raised in the analysis of this study, was the spatial enablement of BI data. Having BI data depicted in a geographical information system allows the BI users view the data in a more realistic and comprehensible view. This is particularly useful in the public sector environment, as their responsibilities are usually directed at a specific geographic location.

The examples provided in section 5.2.3 concur that a spatially enabled BI system proves quite useful, even for policy making decisions as well. The respondents also raised that having a formal BI system in place that is plugged to a GIS system, should reduce the turnaround time for users to derive their required information. Given the nature of public sector organisations work, BI coupled with GIS adds great value to users' solution set for decision making and information distribution (Posthumus & Bank, 2008).

BI processing optimisation

Technical infrastructure required to underpin the BI systems, was raised as an important element to consider when implementing BI. A key concern raised with regards to the performance of BI system, is that poor system responsiveness can erode all benefits that a BI solution can bring to the public sector organisations. Poor system responsiveness not only increases the turnaround time to produce useful information, it also reduces the systems credibility with the BI users. This could lead to users ignoring the benefits of the BI system.

“Government data is in large volumes. Excel pivots is not sufficient, the requirement is for more powerful tools” (IM, Province).

As a work around the organisations are able to either improve their hardware as at the LG with implementing in-memory computing and business warehouse accelerator, which was however very costly. This allowed them to strategically select reports for processing and business is now able to get reports out much faster. However, their real-time BI for high process reporting is removed. Another optimisation technique was to improve the system architecture by implementing business objects within the data warehouse. Azvine et al. (2005) suggests focusing on service oriented architectures to implement real-time BI.

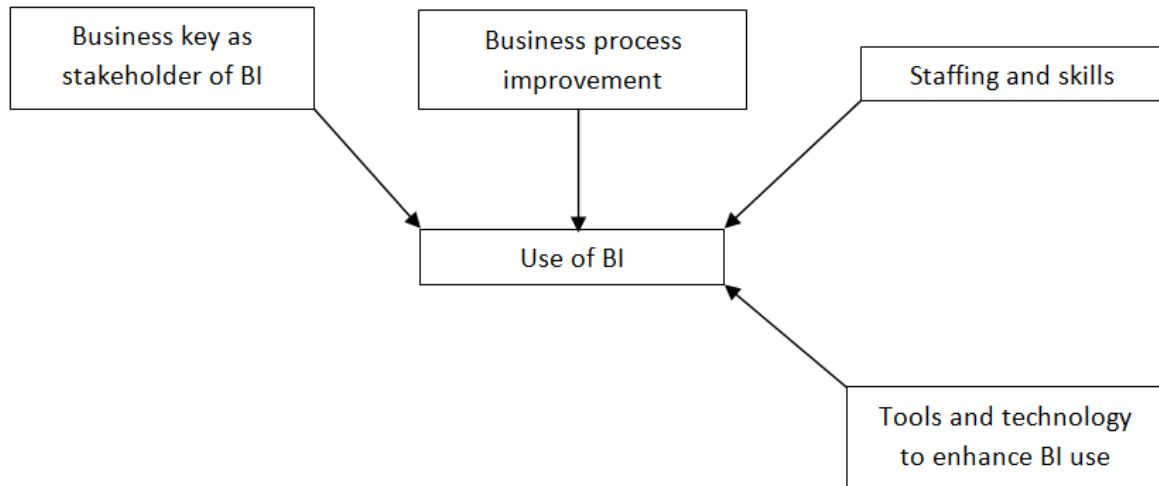


Figure 14: Factors influencing BI use – Build 4

6.3.5 External environment

Another theme that had influence on the effective use of BI was the dilemma of having political leadership. The external environment influence on BI use is included in Figure 15. As the South African public sector organisations’ executive leadership are mainly politically affiliated, this sets a predicament for senior officials with regards to performance data, particularly unfavourable information. Should negative outcomes be disseminated or should it be hidden, so as not to put the politically party in disrepute? The opinion of the EO participant of the LG demonstrates this quite clearly.

“You must understand that especially in the public sector. Some guys say don’t show the people anything. Take away this BI stuff because it might embarrass us, it might show that we are only doing that little work. While others say no, show them that I am doing that amount of work. I can think of two executive mayors I had, one says put it under the bucket and put the lights off and make sure no one can see it, and the other says no it will get out and make it visible, but just make sure that I get to see it first, and the latter response is actually quite a good response, because then you can start [preparing], because you know bad news is coming so then you can prepare for it and you can even off set the bad with some good” (EO, City).

The political influence within public sector organisation could possibly lead to suppressed use of the BI system. This would unfortunately also impact on service delivery where extra attention is required. However, the alternative to this would be that BI could allow public sector organisations to improve transparency and prepare in advance for negative outcomes.

As a mitigating factor to the political influence, a respondent raised the need for improved governance and compliance which exists in the hierarchical nature of government. The compliance requirement should dictate what elements must be reported.

“[Reporting] governance should be used to manage abuse of political campaigning” (IL, City).

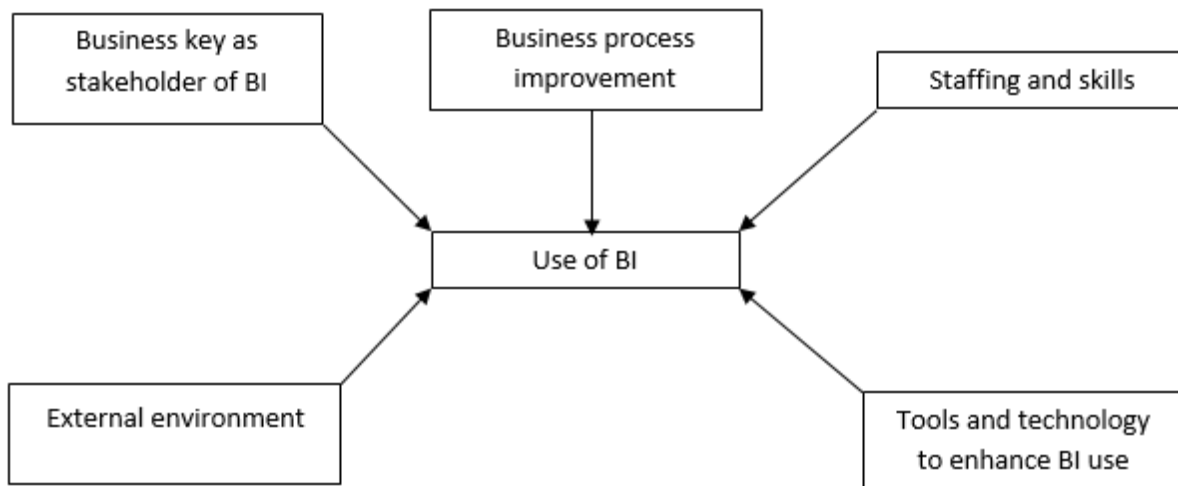


Figure 15: Factors influencing BI use

6.3.6 Summary

Figure 15 displays the themes on the usage of BI, referred to in this study as the ‘Factors influencing BI use’. The business ownership of BI is seen as the major factor for successful implementation, as this also impacts on BI adoption and use within organisations, where senior staff members have to demonstrate the use of BI. The change management strategy also has to be owned by the business domain, for it to be effective, whereas the role of IT would be to facilitate the change process. A major concern at these public sector organisations is that general staff skills are not equipped to use analytical tools. Both organisations demonstrate that incorporating BI concept training and demonstrating BI value would increase likelihood of successful BI adoption. The participants have also raised the concern of poor system responsiveness as a weakness in winning over user acceptance, even though there are major benefits to implementing a BI system.

LG and PG have provided ways to mitigate risks with regards to BI adoption, such as creating a BI competency centre that consist of trusted individuals in the business domain, and IT staff that would that be involved with rolling out the BI system and provide on-going support.

To mitigate poor system responsiveness the LG advises to strategically speedup reporting times of popular reports within the organisation. However, the cost for producing in-memory reports was seen as out of budget for their project.

Another added benefit to a BI system, was to combine BI and GIS, to present a graphical view of data. This empowers public service workers and was seen to improve the decision-making process, particularly in disaster situations.

Political influence on applying and distributing BI sourced information was raised as both a concern and benefit to the executive leadership. Influence to suppress negative information has been said to occur, whereas officials have also called for information to be forwarded so as to pre-empt any disrepute for political officials. The next section will delve into the how BI is implemented in the public sector organisations and its effect on service delivery.

6.4 Factors influencing the BI Project Process

This section describes the factors that influence the BI implementation process at the public sector organisations in this study. Examples of the effect of BI on service delivery and influence on organisational processes are described in this section. The researcher has placed the themes in a linear process which displays the implementation of BI at the public sector organisations. The framework for BI implementation is shown in Figure 16.

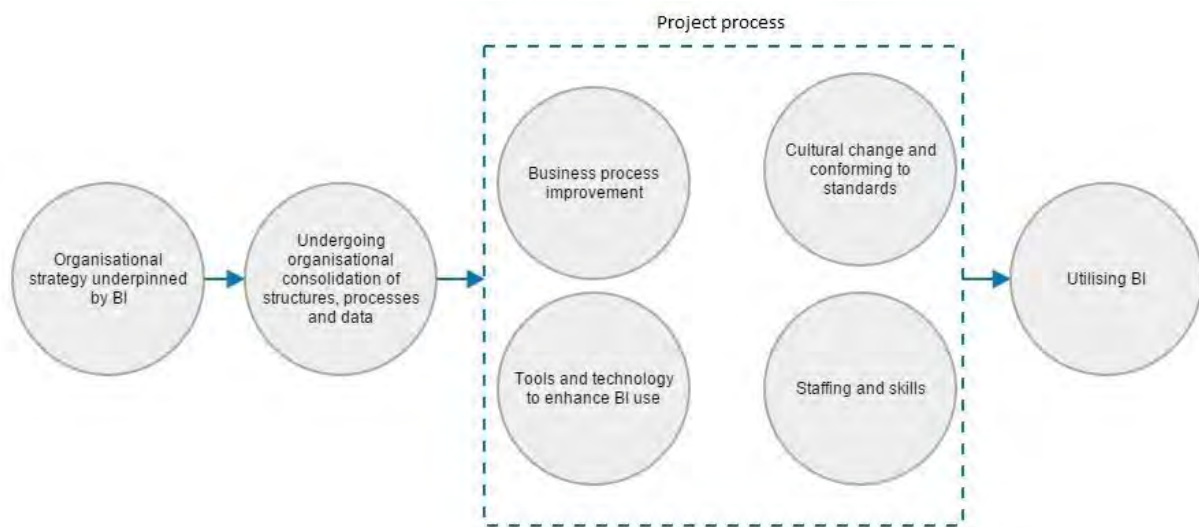


Figure 16: Framework for BI implementation in a public service organisation

6.4.1 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 aid decision-making. The participants in the study raised the need for consolidated information as the primary requirement for BI.

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 are regarded as a key success factor to a BI implementation project's success (Yeoh et al., 2008; Olszak & Ziembra, 2003).

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 researcher therefore deduces that the systems and processes implemented need to be derived from the organisational strategy, so as to improve the likelihood of executive buy-in..

6.4.2 Undergoing organisational consolidation of structures, processes and data

Given the context of the organisations as discussed in section 5.1.1 the need for organisational reform was highlighted. Participants also raised the concern of duplicated processes and data sources. The structuring of the organisation is managed in correspondence to the organisational strategy, which then dictates the reforms in systems, processes and data. The case studies in this study implemented a regular organisational assessment model to determine the maturity level of its key business processes and supported information systems. The organisations have undertaken to implement sound ICT governance.

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 researcher 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 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.

6.4.3 Business process improvement

The public sector organisations in South Africa are described as being in a developmental state. The structures in the organisations are operating at different maturity levels, some using automated systems or spread sheets or using a paperwork system. The participants described that some business processes are still unstructured and not yet automated. To implement business intelligence, automated business processes are considered the most important prerequisite (Bucher & Gericke, 2009). Without an automated and uniform business process makes it difficult to derive intelligence. Implementing 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.

6.4.4 Staffing and skills

As part of the improvement drive at the public sector organisations developing staff skills is one the key aspects of change. This study has revealed that public sector workers in South Africa generally did not have exposure to analytical tools. The participants revealed that the gap between BI analytics and producing BI analytics has been challenging. Training should focus initially educating staff on BI concepts, and then to concentrate on analytical and numerical skills. Staff development should form part of the change management strategy for implementing BI.

As previously mentioned, one of the strategies developed by the organisations in this study was to form a 'centre of excellence' or BI competency centre. The BI competency centre was raised as a key element for driving out BI in the organisation. The vendor dependence was raised as an area of concern, which is mitigated by setting up implementation teams in such a way to facilitate knowledge sharing. This would eventually lead to up skilling of internal staff and lessen the need for external consultants.

6.4.5 Tools and Technology to enhance BI use

As previously mentioned, the BI systems implemented at the organisations in this study are vendor supplied. The organisations have undertaken to purchase a BI system and then to customize it to suit local needs.

The analysis revealed that one particular concern raised was that 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.

With the development of public sector employees which are not geared to analytical skills, the BI tools can be tweaked to enhance BI use and derive value. The BI tools should be constructed more intuitively for intended users in order to bridge the gap between users and BI analytics.

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

6.4.6 Cultural change and confirming to standards

The use of BI has been described at both organisations as a significant driver of change. BI outcomes can be used to highlight areas for potential improvement.

“It is that element that of putting a formal business process in place that is the most important I think, and then on top of that you can use that with BI to drive a behavioural change” (EO, City)

Creating a culture where officials now draw on analytics that prompt business to think a bit further drives the maturity of the business to the next level. This allows officials to avoid thinking retrospectively but aid them in making more informed decisions.

6.4.7 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 provide organisations with geographical information to better view data and empower officials to manage resources more effectively.

A benefit raised particularly at the LG, is BI provides its management with the opportunity to spot trends and “used as the mechanisms to bring about change” (EO, City).

Analysing trends using BI tools could alleviate the demand on the public sector organisation, which already operates under the situation where demand outstrips supply, by allocating resources more effectively. “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 KPIs 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, and also to drill down to activities within each section. The PG participant has explained how the executive dashboard has influenced decision making at their organisation.

“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 doing things, because now all the departments need to (be) loaded, (so that) citizens can see information, and I do think decisions get made on what's on the dashboard" (SD, Province).

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.

Citizen demands

Especially at the LG level where citizens are able to push through service delivery request, BI reporting provides mechanisms to manage citizen demand. The reality of the South African context is however a dilemma for users of the BI system, as cultural bias might influence the data. This would require officials to have a deep understanding of the locations they are responsible for, and for them to intuitively feedback with an appropriate response. This reality also provides the government an opportunity to create an equal responsive society, to provide mechanisms in previously disadvantaged areas to forward requests.

An example of managing citizen expectations is demonstrated in the next quote.

"And now that we have got that the kinds of intelligence that you can extract, you can use to start and comprehend and anticipate service delivery problems. In a famous story of the executive mayor, who before going to public meetings took this service request system and said what are the people complaining about in area X, and [the mayor] looked and saw that the majority of the complaints related to roads problems. So [the mayor] then said to the director of roads that 'I have this meeting, but that I am not going alone, you going with me'. [The mayor] got there, and sure as hell, because that was the topic of the day they climbed into the roads issues, and [the mayor] could very easily say that I brought the man responsible for it, there he is and he can respond, and [the mayor] stepped back looking good, and he then was placed in the firing line" (EO, City).

The example demonstrates how BI can used to inform public officials about citizen concerns, and allows the officials to pre-emptively prepare for citizen expectation.

6.5 Participant Feedback

From the research feedback received, participants highlighted that the elements in the frameworks was a good reflection to what they experienced. From the likert scales 'Organisational factors influencing the BI initiative' received an average of 'strongly agree'. 'Factors influencing the use of

BI' received an average of 'agree'. The 'BI implementation process' framework received an average of 'strongly agree'. With regards to the 'BI implementation process' framework the IL participant at the City noted that it was "key to find the right balance of the elements in the project delivery as individual elements are always in conflict".

6.6 Chapter Summary

This chapter presented the research findings to address the first three research questions. The resulting frameworks were discussed to provide an understanding of how BI is implemented and used in the South African public sector. The themes in Table 4 were used to construct the research frameworks.

The intended use of BI does hold value for the public sector organisations. The BI implementation was still in development at both organisations for this study. The existing implementations show opportunity for further benefit at the respective organisations, to empower officials with analytic information. Not only does the benefit of BI lie in reports and analytics but also as an enabler of change. As the organisations are in a developmental state, the benefit derived from BI can be used to improve organisation maturity levels through monitoring and evaluation. Officials are now able to predict demands, more cost effectively respond to requests, and make use of BI and GIS to drive out organisational performance. BI has resulted in a "step increase in service delivery" (PM, City).

It must be noted that BI adoption rate has been quite slow among the public sector managers, and that not all decisions are based on BI supplied information, decision makers still apply their "gut feel" (PM, City). BI has not yet been established in either organisation as the standard means for decision making. A factor that contributes to this could be due to the level of staffing and skills and also the success of the change management strategy implemented. The next chapter presents the application of the Design-Reality model as a lens to uncover BI project risk.

7. Design-Reality Model – Analysing Project Risk

7.1 Introduction

To better understand BI project risk in public service delivery, the researcher undertook to examine the case studies using the Design-Reality model (Heeks, 2002). This chapter addresses the research question on what factors can contribute to BI project risk. The seven frames in the Design-Reality model is used to analyse this risks associated with the BI projects.

The Design-Reality model can be used in different modes (Macias-Garza & Heeks, 2006). It can be used *pre hoc* that is before an e-government project, to predict the likelihood of the project succeeding and to identify key sources of risk. It can be applied *post hoc*, that is after an e-government project has been completed, in order to analyse reasons why the project succeeded or failed. In this study, the researcher intends to use it *durante hoc*, during the projects implementation and combining both backward-looking (post hoc) and forward-looking (pre hoc) components that would identify risks and courses of action for the BI project at the organisations.

The essence of the framework is to understand various gaps between the design of the e-government project and the current realities of the implementation context. The design reality gap model is thus the gap between where the project is now and where the design wants to get the project: the larger the gap the more risk is associated with project failure; the smaller the gap the more it is associated with project success (Lessa et al., 2012).

The Design-Reality gap model is based on seven dimensions that are necessary and sufficient to analyse IT related projects, specifically for e-government. The dimensions are: information, technology, objectives and values, staffing and skills, management systems and structures, and other resources (ITPOSMO).

7.2 Information

The information dimension indicated the information used in the e-government application. Information requirements within the design are compared to the information currently being used in the organisation.

The information requirement that drives the need for BI is mainly a requirement for consolidated information. This comes about as legacy systems as well as newly implemented systems are disparate at these public sector organisations. The concerns raised with regards to data feeding into the BI systems are data cleansing, data integrity, and deduplication of data sources.

Data cleansing

If “garbage” data is fed into the system, “garbage” information is expected to be the output. This risk has already been raised as a factor that contributed to a BI project being stalled at the PG.

The LG has highlighted mechanisms that they employ to reduce the likelihood of data cleansing becoming an obstacle to their BI project.

- Provincial government – high
- Local government – medium

Data integration

Data integration is a pivotal prerequisite when implementing BI, as data sources need to be consolidated in order to produce information for transversal objectives.

The PG has highlighted that their information systems are largely disparate, and require intervention to consolidate information. They plan to achieve data integration through their standardised architecture initiative, which would allow departmental information consolidation and interdepartmental information consolidation.

The LG has implemented a wall-to-wall ERP solution that encompasses all their departments. This process has taken them nearly a decade to implement. They are now able to transact, and are now building integration tools and reporting systems.

- Provincial government – high
- Local government – low

Information maturity

It must also be stated that formal information maturity models exist that are recommended for BI initiatives. The information maturity level of the organisation impacts BI and needs to be understood before embarking on BI initiative. As proposed by Davis et al. (2006), the Information Evolution Model is a tool that can be used to assess information maturity in terms of infrastructure, process, culture and people, whereby maturity is viewed as an evolutionary state. The organisations evolve from an operational level, i.e. individual data sources used to address day-to-day issue, to an innovation level where growth is driven by creativity and ideas.

Both organisations are regularly audited using governance frameworks that include information and operation maturity assessments. The study has revealed that this has benefit to both organisations.

- Provincial government – medium
- Local government - low

7.3 Technology

The technology dimension indicates the hardware and software required by the application. The BI technology at both organisations is procured from vendors. This allow implemented systems to influence the organisations processes towards best practice.

User friendliness

It was identified that there is a gap between required skills to manage BI tools and the general public sector skills. This poses a risk to the organisation of possible failure of the BI initiative. However, training and up-skilling of officials has been emphasised at both organisations. Interim workarounds was to develop pre-packaged reports and interfaces that allow officials to derive benefit from the system without performing the complicated analytics.

- Provincial government – medium
- Local government - medium

Digital divide

Another concern raised in this study was the inequalities in the South African context. Here we find that cultural differences in communities influence the citizen interaction with public sector organisations. Heeks (2002) also raises the concern that implementing imported systems, particularly developed nations systems in developing nations, and has the risk of mismatch. The cultural mismatch was specifically realised at the LG, where they found that the citizen requests pushed through the service request system, were not reflective of the actual demand.

The issue highlighted is that the service request system is built on the assumption that all citizens have access and is aware of forwarding service request via email or telephone.

This concern not only has risk on the mismatch between system and citizen interaction but also the BI information extracted then becomes inaccurate as well, where resources are now pooled to specific communities.

- Provincial government – high
- Local government – high

The LG has confirmed that they are currently investigating alternatives to alleviate this information bias, by attempting to bring about cultural change and implementing mechanisms where possible. Examples were given such as rolling out public telephones that link directly to the municipal call centre.

7.4 Process

The process dimension considers the work processes undertaken in the organisation. This is done to compare processes needed for successful implementation of the e-government system, to the real situation.

Both organisations identified that a major prerequisite for BI, was to have simplified and formalised business processes on which the organisations operate. Without this consistency of a standardised business process makes it challenging to mine intelligence. Some of the most important elements of a BI initiative is to have well a defined business problem and processes (Yeoh & Koronios, 2010).

Regular process maturity assessment has been identified as mechanism to ensure continuous improvement at the public sector organisations. The concern raised was sustaining the new changes was challenging.

As raised by the Senior Director participant at the PG, “In essence it would be ideal but in reality [the PG has] limited business processes solidly sorted out. So, in terms of the ideal it would be to look at the core business processes, and then say let’s build BI on top of that.” Business process maturity of the organisation is still a major concern for the PG BI project.

- Provincial government – high
- Local government – medium

7.5 Objectives and values

This dimension considers the objectives and values that key stakeholders need for successful implementation of the e-government application, compared to current real objectives and values.

The key stakeholders at both organisations receive their mandate from the organisation’s key strategic objectives. It was raised in the study that the transversal strategies of the respective organisations are the key driver for BI at the organisations. This finding demonstrates that there is executive and senior management buy-in.

- Provincial government – low
- Local government - low

In relation to BI adoption among users, both organisations indicated to implementing a BI centre of excellence or competency centre. The BI competency centre would be responsible for advocating BI to business, and will be comprised of trusted individuals of the business domain. These individuals should then be able to demonstrate the benefits of BI to the rest of the organisation.

- Provincial government - medium
- Local government - medium

7.6 Staffing and skills

The staffing and skills dimension indicates the staffing numbers and skill level/types required in/by the organisation.

At both organisations the option of build versus buy for a BI solution, was to buy a system and then to configure it to suit local requirements. Central IT is present at both organisations, and the responsibility of BI implementation falls with the IT department.

BI implementation skills have been raised as a key concern at both organisations, as the skills are rare to find. In both cases external consultants are employed to compliment the internal staff. It has also been noted that the external consultants play a dual role in that training of internal staff is part of the agenda for external consultants.

- Provincial government – medium
- Local government - medium

On the other end of the staffing spectrum, the skill level of staff that make use of the BI system was identified as lacking. In this regard, a strategic and comprehensive change management strategy was identified as key to successfully adopting BI at the organisations. The analysis of this study has also identified that due to the skill level of public employees not being suitable to comprehending analytical information, this resulted in a slow BI uptake. The researcher identifies that as both the LG and PG has intended to implement a comprehensive change management strategy, this can be seen as a way to mitigate the gap between required BI user skills and actual user skills.

- Provincial government – high
- Local government - high

7.7 Management systems and structures

This dimension indicates the management systems and structures required by the organisation.

The BSC (Kaplan & Norton, 2008) is a strategic planning and management system that is used by organisations to bridge the gap between strategy and actions, and engage a broader range of users in organisational planning. The BSC is extensively used at both organisations to monitor and manage its department heads and executive leadership. This management framework also forms the basis of the executive dashboard at both the LG and PG.

The BSC model was designed for Western countries that operate within a capitalist system (Khomba et al, 2011). “African countries differ from Western developed countries in respect of aspects such as their infrastructure, markets and customers, sources of capital, government interventions, literacy levels, and socio-cultural frameworks” (Khomba et al, 2011, p2). The original Balanced Scorecard model therefore cannot be reconciled fully with an African environment that is more community-based and socialist in nature. Khomba et al. (2011) proposes that the review and design of a better corporate planning and performance measurement system is required, that might include perspectives on relationships and culture, stakeholders, value creation, and corporate conscience.

An example of this mismatch can be seen from the service delivery request system implemented at the LG, where retrospectively the LG had to implement mechanisms to alleviate the cultural bias.

In the case of Brackertz and Kenley (2002) the BSC was adapted to measure facility performance in local governments. The result was a service balanced scorecard that takes into account community, services, building and financial perspectives.

The importance of business ownership of the BI initiative has been one of the key findings of this study. This theme also overlapped with business ownership of change management and essentially seeks to have the business domain drive the BI project. The realisation of this was not yet found at the PG. The PG has a Central IT committee responsible for IT strategy alignment at the organisation, this committee is intended to be headed by a senior business executive, to ensure that governance of IT is ‘owned’ by the business. However, the chief IT director heads the business domain forum.

- Provincial government – medium
- Local government - medium

7.8 Other resources

Under the dimension other resources, issues such as time and money required to successfully implement and operate the new e-government system is investigated.

Both organisations have indicated that there is no real limiting factor with regards to the budget to implement the BI project. Having a centralised IT department makes it easier to standardise hardware and software systems, and also more cost effective. One issue highlighted was that advanced processing hardware required at the LG was identified to be out of budget, this limitation did hinder the real-time BI of larger processing reports.

- Provincial government – low
- Local government – low

The duration of the BI project at both organisations was identified as being time consuming. Much of the prerequisite work; business process improvement, data cleansing and data integration is expected to take each organisation a few years. The LG being a smaller organisation is understandably more advanced in its BI development. PG has opted to take the route of implementing their BI on 'quick-win' milestones.

- Provincial government – medium
- Local government – medium

The method of proof of concept was raised as mitigation to risk on time and money. To implement a proof of concept before initiating a project, allows reasoning and justification of resources and time. "It is crucial to prove the technological fit at a department before having a failed project, and also provides a quicker way of realising value [among users]" (IL, City).

7.9 Chapter Summary

The application of the Design-Reality gap framework overlaps with much of the study's findings. The risks highlighted such as change management strategy and required BI skill has been confirmed in this chapter. The application of the framework also provides insight into other issues raised, such as management system where there is a possible mismatch of strategic framework implemented. A key outcome is that the organisation can identify key risks and severity to the impacting on the BI project's outcome. A summary of the case studies risks are listed in Table 5.

Misalignment factor		Provincial government	Local government
Information	Data cleansing	High	Medium
	Data integration	High	Low
	Maturity	Medium	Low
Technology	User friendliness	Medium	Medium
	Digital divide	High	High
Process	Business process maturity	High	Medium
Objectives and values	Executive and senior management buy-in	Low	Low
	Middle management and officials buy-in	Medium	Medium
Staffing and skills	BI implementation staff	Medium	Medium
	Required BI user skills	High	High
Management systems and structures	Management systems	Medium	Medium
Other resources	Budget	Low	Low
	Duration	Medium	Medium

Table 5: IPTOSMO factors and associated risk ratings

Applying the design-reality gap model on the case study reveals that PG has high risk on data cleansing, data integration, information bias, business process maturity, and the necessary BI skills required for use. Whereas in the case of the LG, the information bias and required BI user skills are rated as high risk. Using the Design-Reality gap model allows the organisations to now make more informed decisions on how to proceed with their BI initiatives.

8. Conclusion and Further Research

This chapter presents the conclusions drawn from the study. The research questions are revisited and findings are summarised. Finally, the contributions and recommendations for further research are presented.

8.1 Conclusion

What are the organisational factors that influence the BI initiative in a public sector organisation?

The external environment in which public sector organisations operate was found to influence the BI initiative. Public sector organisations are mandated to develop policy and ensure proper service delivery for citizens. The BI initiative was found to hold value in assisting public sector organisations in their mandate. Reporting within the hierarchical structure of government also adds to the case of implementing BI type systems. Political campaigning inherent in the South African governments was found to have influence on the outcomes of BI, however, governance should be strengthened to mitigate this.

South African government organisations are undergoing a development phase, which inherently requires changes and improvements to current systems and processes in place. Work is underway to bridge the gap between the organisational strategy and operations. BI is highlighted as an enabler to bridge the gap between strategy and operations (Olszak & Ziemba, 2003). The transversal strategy also stimulated the need for BI type systems. Executive buy-in and business ownership of the BI projects is quite crucial to BI project success as confirmed in previous research (Yeoh et al., 2008; Bijker & Hart, 2013; Dawson & van Belle, 2013). Furthermore, a business oriented change management strategy (Olszak & Ziemba, 2003) also featured in related studies.

The analysis resulted in the formation of the 'Organisational factors influencing the BI initiative' framework, shown in Section 6.2. This framework describes the organisational factors influencing the public sector organisations BI initiative.

What factors affect the use of BI in a public sector organisation?

Business ownership of BI has been raised as the key theme to ensure users adopt the BI technology. Implementing and user acceptance of structured business processes was revealed as a major prerequisite for BI in the South African public sector. Without structured processes, data cannot be captured consistently which leaves little value in BI. One key category was that a BI competency centre was needed to advocate BI within the organisations. The driver for this was that the value of BI needs to be demonstrated by trusted individuals within business. A mix of super users and IT staff should be included in the competency centre (Olszak & Ziemba, 2003). Dedicated training and

support is suggested for users in BI projects (Bijkr & Hart, 2013). Configuring BI tools to narrow the gap between staff skills and tools was highlighted in this study.

The political influence in the organisations was also raised as a factor on the use of BI. Two contrasting motivations were identified in the study. Some individuals seek to suppress the BI produced information as this might negatively affect the political party within organisation, or it could be used strategically to pre-empt any dissatisfaction.

The factors influencing BI use were summarised in Section 6.3, this resulted in the framework of 'Factors influencing BI use'.

What factors influence the project process of BI in a public sector organisation?

To address this research question, the researcher has selected the core themes which describe the BI project process. The organisational strategy was raised as a key determinant for BI type systems. Another influence on the BI implementation was the maturity of organisational structures, processes and systems. An incremental approach to business process improvement and implementing the BI technology was suggested. The themes 'business process improvement', 'staffing and skills', 'tools and technology to enhance BI use', and 'cultural change and conforming to standards' reflected the project process of the BI initiatives. These four themes need to be managed in unison to effect the desired change. This was supported by the research feedback received from participants.

Examples were detailed by participants on how BI systems were used to effect change within their organisation. Of particular importance was the executive dashboard for driving key projects. This can be seen as a top-down approach to driving the BI project, which is suggested for an enterprise approach to BI implementation (Olszak & Ziemba, 2003; Williams & Williams, 2004).

The core themes of the project process of BI were presented in Section 6.4 and resulted into the 'Framework for BI implementation in a public service organisation'.

What factors can contribute to BI project risk in a public sector organisation?

To assess the risk of BI projects, the researcher employed the Design-Reality model to assess seven factors, namely, information, technology, processes, objectives and values, staffing and skills, management systems and structures, and other resources.

The assessment revealed that risks with regards to staffing and skills, information bias and business processes were key areas of concern. The Design-Reality model provides a mechanism for project evaluation. The feedback on risks can improve management and control of the BI project and steer it closer towards project success.

How does BI affect service delivery within a public service organisation?

The aim of the study was to explore how public sector organisations use BI to improve service delivery. As described by Venter and Tustin (2004) there exists research opportunity to investigate organisational factors affecting BI use. The objectives of this study were therefore to explore how the introduction of BI enables service delivery, and what are the organisational factors that influence the initiative.

The multiple case study approach allowed themes and concepts to be unearthed from the data collected via interviews and document collection. BI applied in the public sector organisations demonstrated value in providing information for decision making, visualising information in disaster situations, aiding in citizen relationship management and being a catalyst of change in the organisations.

It was also identified that using BI was not yet the norm at both organisations, with the major obstacle to adoption being the BI users' skills mismatch and possibly sustaining implemented changes. Demonstrating the value of BI and implementing BI in an incremental approach was raised as methods for promoting BI.

8.2 Research contributions

Developed theories are placed in different levels (Llewellyn, 2003). The theoretical contribution of this research is discussed in light of Llewellyn (2003) level four theory classification scheme. The fourth level of theorising explains social and organisational phenomena in their settings.

The analysis of this study resulted in the formation of two thematic networks in Chapter 5 that describe the themes, as listed in Table 3. These themes were deemed as affecting the business intelligence initiative at the public sector organisations in South Africa. The thematic networks were centred on 'Organisational drive for BI' and 'Shifting to a Service Delivery Culture'.

The causal relationships were identified in the axial coding of the thematic networks. The research findings resulted in three frameworks, as presented in Chapter 6. These frameworks contribute to understanding how a BI initiative is implemented in a public sector organisation in South Africa, and what are the key determinants to successful implementation. The contribution of this research is therefore the theory itself, which contributes to the understanding of implementing BI in the public sector, particularly in South Africa.

The researcher also undertook to apply the Design-Reality model as a lens in analysing the case studies. This analysis had some overlapping themes as raised by the causal relationships, also new risks were identified.

The practical contribution of this study is that public sector organisations can use the factors and frameworks developed to influence successful BI implementation, particularly in the public sector. It is hoped that this study will provide researchers and practitioners alike with some new perspective into factors that promote the implementation and use of BI, and improved performance for the organisation.

8.3 Opportunities for further research.

Opportunities for further research exists in using the frameworks discovered in this study, and investigating any correlation or new factors that affect BI implementation in public service delivery or other industries.

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Appendices

Appendix A: Interview Questions

What organisational factors influenced the decision to adopt BI?

What are the challenges and considerations both technical and organisation you need to factor in when going through Business Intelligence project process?

How is Business Intelligence used in the organisation? Process level or functionally implemented.

How has BI affected the way decisions are made at the organisation? Strategic, tactical and operational levels.

Has change management taken place? If so, how has it impacted on the acceptance of the BI system by users?

How has user training ensured that the complexity of measures (BI outputs) available make it less difficult rather than more difficult for service outlet managers to manage?

Appendix B: Introductory letter



Department of Information Systems

Leslie Commerce Building
Engineering Mall, Upper Campus
OR Private Bag, Rondebosch 77001
Tel: 650-2261
Fax No: (021) 650-2280

Dear Participant,

Request to participate in a research study

I am a student at the University of Cape Town in the Faculty of Commerce, Department of Information Systems, studying for master degree. One of the requirements of this degree is a research project in the Information Systems field. My study seeks to describe the use of Business Intelligence for improved service delivery.

I would like to request your organisation to grant me permission to study one of your Business Intelligence projects. The study will involve interviewing some of the people who participated in the projects as well as those who are/were affected by the project. I will also involve studying some of the documents related to the project such Project Initiation documents, Business case documents and/or stage gate reports.

Should my request be accepted, please let me or my supervisor (contact details indicated below) know when the study may begin.

Please be advised that the results of the study will divulge neither the organisation's particulars nor those of individual participants. Your organisation will have a pseudo name for the purposes of the analysis. Results of the interviews will be treated in strict confidence and so will the information sourced from documents.

If at any stage you feel uncomfortable with your participation in this research, you will be at liberty to opt out.

I thank you in advance.
Yours Faithfully,

M. Kaashief Hartley

If there are any queries, please direct them to:

Researcher:
Kaashief Hartley
e-Mail: Kaashiefh@gmail.com
Cell: 083 436 3881
OR
Supervisor:
Dr. Lisa Seymour
Senior Lecturer
Department of Information Systems
University of Cape Town
e-Mail: Lisa.Seymour@uct.ac.za
Phone: +27 (0)21 650 4259

Appendix C: Consent form



Department of Information Systems

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Tel: 650-2261
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Consent Form

This _____ is _____ to _____ certify _____ that
_____ of

_____ (Address) in my sound state of mind have committed my organisation to participate in this study by permitting KAASHIEF HARTLEY to study one of Business Intelligence projects in this organisation. He may interview some of the participants of the project and study some documents related to the project process on condition that the organisation and individual particulars will be masked in the results of the study and that the study is for academic purposes and not commercial.

Signature _____ Date _____

For any enquiries, please feel free to contact:

M. Kaashief Hartley
e-Mail: Kaashiefh@gmail.com
Cell: +2783 436 3881
OR
Supervisor:
Dr. Lisa Seymour
Senior Lecturer
Department of Information Systems
University of Cape Town
e-Mail: Lisa.Seymour@uct.ac.za
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Appendix D: Research Feedback



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Research Feedback

This document forms part of the research project on an analysis of Business Intelligence (BI) for improved public service delivery. This research is conducted on two public sector organisations namely, Provincial government and Local government organisation. Using interview feedback and related documents the researcher has developed three models which aims to describe the factors influencing the BI initiative within the public sector, particularly in South Africa.

An overview of each research model is provided. The researcher kindly requests of you to provide feedback and comments (in agreement or in contrast) which could add value to the research study. A likert scale and space for comments are provided in each section.

If there are any queries, please direct them to:

Researcher:

Kaashief Hartley

e-Mail: Kaashiefh@gmail.com

Cell: 083 436 3881

Supervisor:

Dr. Lisa Seymour

Department of Information Systems

University of Cape Town

e-Mail: Lisa.Seymour@uct.ac.za

Phone: +27 (0)21 650 4259

Themes or factors discovered

The themes in the table below represents the dominant themes that emerged from the interviews and documents provided by the two participating organisations. The overview of each theme provides a brief description of the underlying concepts.

There are nine themes listed. Kindly provide a rating on the level of importance for each.

1 – not important	2 – little importance	3 - important	4 – very important	5 – critically important
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Rating	Themes	Overview
	Undergoing organisational consolidation of structures, processes and data	Improving organisational maturity and restructuring was raised as a major concern to effect on the organisations post 1994. Activities such as Integration of Systems and Processes, and Consolidating processes using methodology (e.g. COBIT) is used to achieve this.
	Organisational strategy underpinned by BI	The organisational and ICT strategy convergence was highlighted to improve direction and steering of ICT projects. Using a strategic planning system such as Balanced Scorecard, is used at the executive and management level. BI was revealed as a key tool to assist the organisation's strategy.
	Cultural change and conforming to standards	Process improvement activities and change management programmes roll out was highlighted as a key activity to ensure user participation and buy-in. Sustaining the cultural change and process improvement changes was raised as a concern.
	Business key as stakeholder of BI	Business ownership of BI projects is as a key enabler of project success. The requirement of decision support and experience of executive officials was raised as factors influencing the decision to adopt BI.
	External accountability	The hierarchical nature of government was seen to influence the BI project, as provincial and local government are part of the hierarchical structure where both structures report to national government. The government agencies are monitored via the performance management system, which is linked to BI outcomes. Inherent to South African government agencies is political party influence. Political campaigning is seen to influence usage of BI. The imbalance in citizen demands due to the gini coefficient in society, was raised as a concern. This could possibly create a bias in BI outcomes.
	Business process improvement	Having automated and structured business processes was raised as the key prerequisite to BI. Implementing successfully adopted formalised processes enables intelligence to be derived from BI.
	Staffing and skills	The mismatch between the levels of staff skills vs BI analytical tools was raised as concern. To mitigate this BI training is regarded as essential. Setting up a BI 'centre of excellence' is recommended. Building teams of external consultants and internal implementation staff for the BI implementation projects is common.

	Utilising BI	BI tools is used predominantly in decision support and performance/executive dashboard. Coupling BI and GIS is found to be quite useful in public sector.
	Tools and Technology to enhance BI use	<p>On implementing BI systems, participants raised 'localising' BI solution to be relevant.</p> <p>There is a high degree of vendor dependence.</p> <p>The BI implementation strategy is done via an incremental approach.</p> <p>BI systems processing optimisation was raised as concern, particularly with large data sets.</p> <p>Data quality of transactional systems was also raised as a concern influencing BI projects.</p>

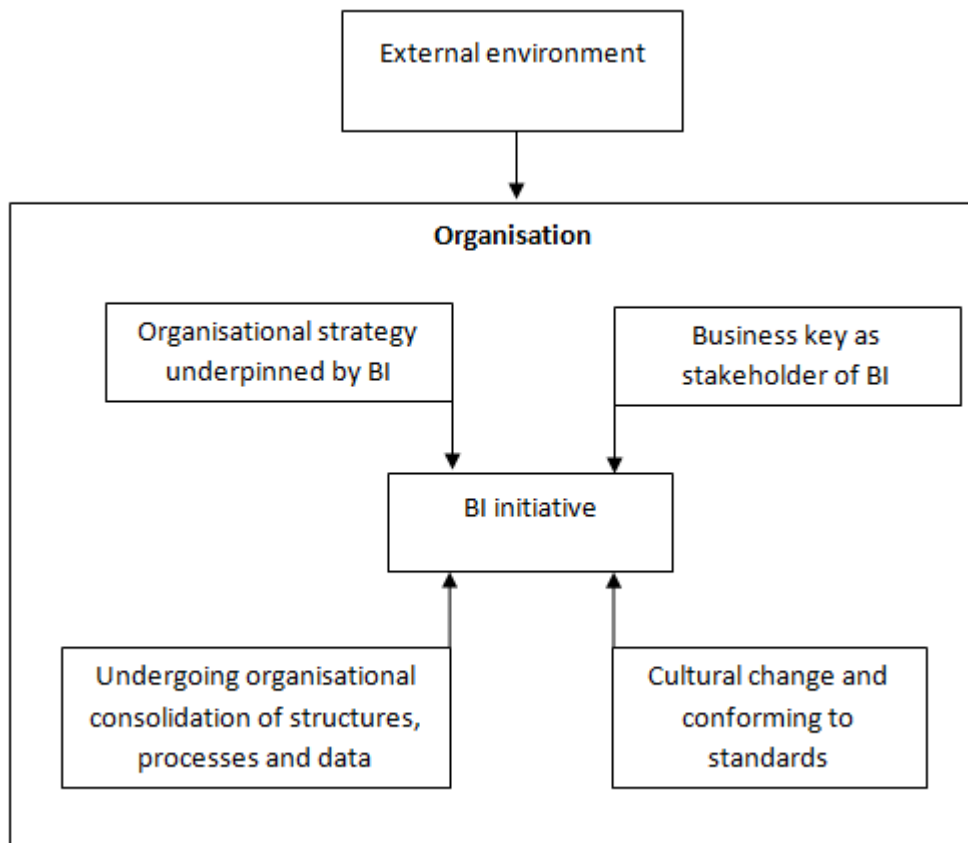
Are there any other factors that influence BI projects at your organisation? If so, kindly provide specific detail below.

Factor	Description

Organisational factors influencing the BI initiative

The diagram below represents the factors influencing the BI initiative. Kindly provide a rating on the likert scale with regards to the representation of organisational factors influencing the BI initiative.

1 – strongly disagree	2 – disagree	3 - Neutral	4 – agree	5 – strongly agree
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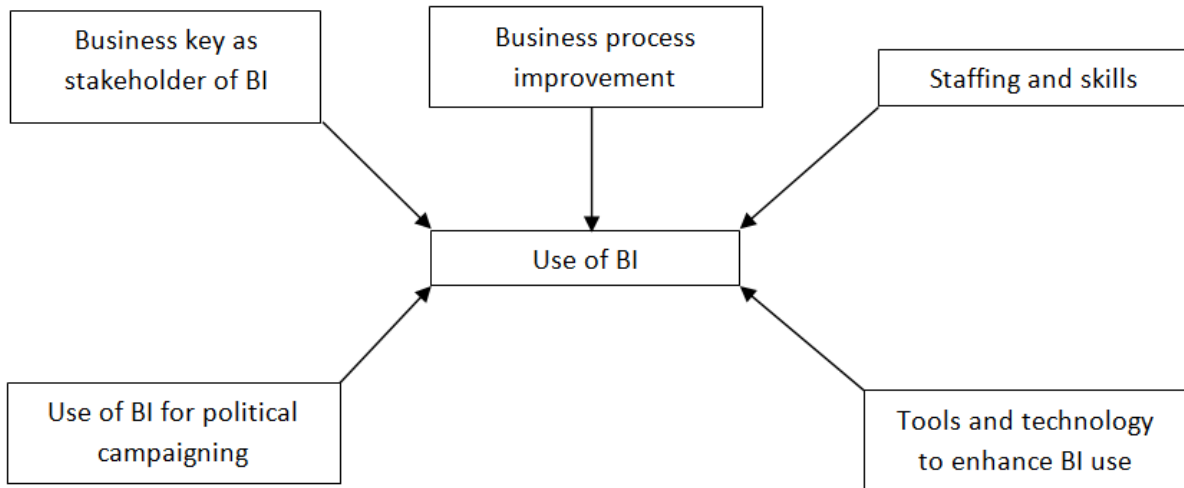


Comments or suggestions.

Factors influencing the use of BI

The diagram below represents the factors influencing the use of BI. Kindly provide a rating on the likert scale with regards to the representation of factors affecting the use of BI.

1 – strongly disagree	2 – disagree	3 - Neutral	4 – agree	5 – strongly agree
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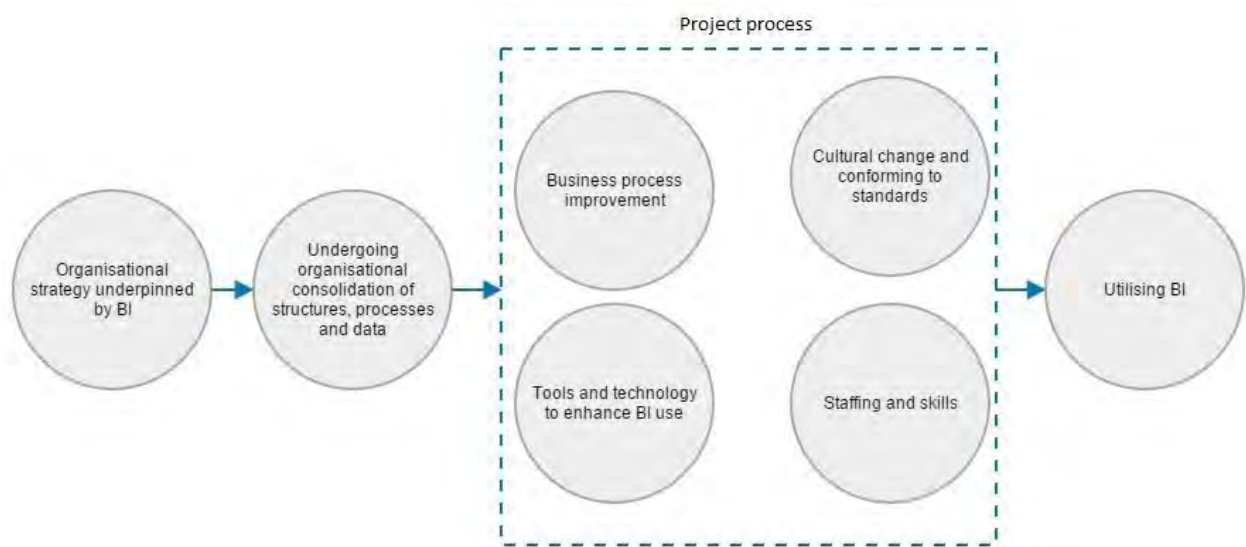
Comments or suggestions.

BI implementation process

The diagram below presents the resulting BI project process, which includes larger organisational activity. The researcher placed importance on the activities highlighted in the dotted line. It should be noted that this process would be applied in an incremental approach to BI projects.

Kindly provide a rating on the likert scale with regards to the BI project process.

1 – strongly disagree	2 – disagree	3 - Neutral	4 – agree	5 – strongly agree
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Comments or suggestions.

Thank you for participating in this research study. Your feedback is greatly appreciated.