Gordon Institute of Business Science
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Understanding the adoption of business intelligence in decision-making within the IT distribution industry

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ABSTRACT

Demand visibility in the distribution supply chain is obscured for IT distributors because there is limited sight of the end-consumer. Therefore, it is important that distributors collect and analyse reseller data to obtain valuable insights. This assists in adding value to the supply chain. However, few South African distributors have adopted business intelligence (BI) which enables this analysis. Consequently, the objective of the study was to understand how senior management used BI to drive evidence-based decisions.

The exploratory study employed qualitative methods to explore the adoption of BI among senior management in the South African distribution industry. A predominantly inductive approach was used to interpret the interview results. These insights created the basis on which the conceptual model of evidence-based decision-making was built.

The findings were that critical success factors of BI adoption supported and extended the existing literature. Though the consistent adoption of BI was lacking, evidence was found in support of the information processing capability of BI. The presence of senior management's absorptive capacity played a direct role in the successful adoption of BI. These provided further evidence that data-driven decisions required a combination of management's ability to synthesise data and capitalise on the opportunities presented in the data. Data, used effectively, allowed for improved demand visibility within the distribution channel.

KEYWORDS

Business Intelligence, Decision-making, Absorptive Capacity, Critical Success Factors

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

Lori Grevler

6 November 2017

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Chapter 1. Research Problem and Purpose

1.1 Research Title

Understanding the adoption of business intelligence in decision-making within the IT distribution industry

1.2 Research Problem

1.2.1 Introduction

Technology has changed rapidly and consumers' behaviour has evolved with those changes (Theodosiou, Kehagias & Katsikea, 2012). Organisations are endeavouring to keep up with the magnitude of these changes because their economic viability depends on it. Many of these organisations form part of the value chain within the consumer technology ecosystem and their viability is dependent on the value they are able to add throughout the chain (Bellamy, Ghosh & Hora, 2014). Therefore, due to the constant change in the technology trends, these organisations require more information in order to increase the speed with which they respond to these changes (Theodosiou et al., 2012; Bellamy et al., 2014; Kim, Akbar, Tzokas & Al-Dajani, 2014).

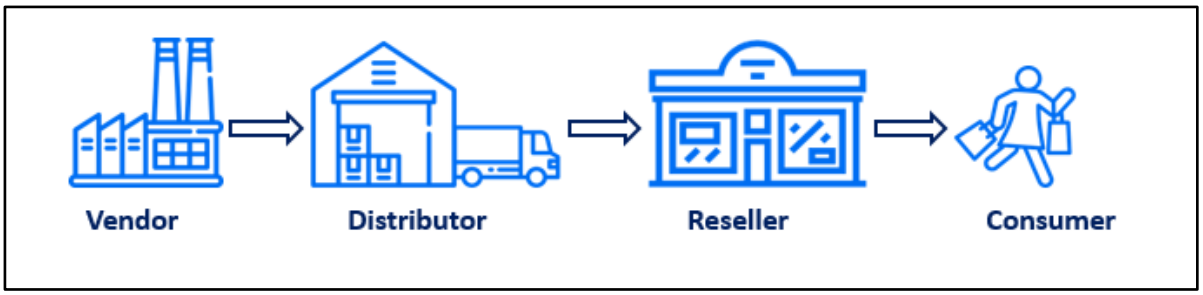
Amongst the organisations with the capacity to monitor and react to information are the technology distributors, serving the role as intermediary between the vendor and consumer. More importantly, technology distributors are able to access this information through the use of analytical systems that help transform this information into insight. It is this transformation of information into insight that has become increasingly important in ensuring better decision-making is implemented throughout the organisation (Deng & Chi, 2012; Acito & Khatri, 2014; Larson & Chang, 2016). In this regard, the classical enterprise systems are outperformed by the systems and applications oriented towards business intelligence (BI). Gartner views BI as a broad term that includes "applications, infrastructure and tools that enable access to and analysis of information to improve and optimise decisions and performance" (Larson & Chang, 2016, p. 701). This has been demonstrated by the overall improvements in the quality and speed of decisions regarding financial conditions, resource alignment, product demand and customer preferences within organisations (Işik, Jones & Siderova, 2013; Acito & Khatri, 2014). On the contrary, few

South African distributors had adopted any BI systems, infrastructure or applications. This necessitated an examination of the distribution industry and the role played by BI.

1.2.2 Technology Distribution Industry

In the examination of the distribution industry, it was shown that the technology vendors have historically set the trends that defined the technology distribution industry (Dent, 2011). These vendors also governed the number of routes through which their products were distributed to their customer segments (Dent, 2011; Rushton, Croucher & Baker, 2017). Many of these routes to market involved intermediaries such as wholesalers, distributors, resellers, and retailers. Dent (2011) explained that a technology vendor's route to market could be a direct, one-tier or two-tier distribution model. One tier structure means the product moved from vendor to reseller to consumer, whereas a two-tier structure is where it moved from vendor to distributor to reseller to the consumer, as illustrated in Figure 1 (Dent, 2011; Rushton et al., 2017). Dent (2011) maintained that getting these routes right were critical to reaching the target market. This structure was reflective of a typical demand-push model where products are pushed through the supply chain to customers in anticipation of their demand (Christopher, 2011).

Figure 1 – Product flow in the traditional distribution value chain



The distancing of the end-consumer by interposing a layer of intermediaries serves as a major disadvantage to both the vendor and the distributor because visibility of demand is obscured (Christopher, 2011; Dent, 2011). This impacts the ability of vendors and distributors to generate demand, fulfil that demand and thereafter respond to any changes in the demand (El Sawy, Malhotra, Gosain & Young, 1999; Dent, 2011; Bellamy et al., 2014).

The objective of the distribution supply chain is to balance the demand with the supply (Christopher, 2011). Historically, demand was forecasted by the distributor and inventory was

bought against that forecast (Christopher, 2011). Therefore, a result of excess inventory, combined with increased costs, implied unmatched demand and supply. Christopher (2011) argued that such a balance could be realised with an improvement in the demand-visibility and distinguished real demand from derived-demand. According to Christopher (2011), the derived-demand represented the demand that arose from intermediaries, while real demand represented that of the end-consumer within the market.

A distributor's access to real demand is however not currently attainable due to the vendor-imposed distance of the distributor from the end-consumer. It is rather the pursuit of derived-demand that is within the means of the distributor. The distributor is required to have access to the information generated by the reseller, otherwise known as supply network accessibility (Chae & Olson, 2013; Bellamy et al., 2014). Though, not all of this information has been captured or shared (Dent, 2011). This lack of information means that demand-visibility has continued to be obscured, thereby creating an information gap (Christopher, 2011; Chae & Olson, 2013). This gap has distanced the distributor further away from the reseller and the vendor. Thus with less access to transactional information, the value chain is fed less information about regions, volumes, sales and customer data (Chae & Olson, 2013; Bellamy et al., 2014; Rushton et al., 2017). The assumption is that with more information collected by the distributors regarding the derived demand, the better they are positioned to fulfil the demand and add value in the supply chain (Christopher, 2011; Dent, 2011; Bellamy et al., 2014; Rushton et al., 2017; GTDC, 2017b). The more data the distributors are able to collect about their resellers and end-consumers, the more proactive they can become in setting strategies and campaigns (Kowalczyk & Buxmann, 2014).

Therefore, this information gap and lack of demand-visibility are of notable consequence to South African distributors for at least three reasons:

I. There is a significant financial impact if demand and supply are not balanced. This was exacerbated with the weakening of the rand against the US dollar. This eroded South African purchasing power for imported technology products which resulted in deferred purchases or selection of cheaper alternatives (BMI Research, 2017). This weakening contributed to the foreign exchange losses that were recorded for publicly listed distribution organisations, according to BMI Research (2017).

II. Secondly, as more South African resellers graduate to one-tier status distributors, this allows the vendor to remove the distributor from the supply chain and go directly to the reseller. This diminishes the value distributors are able to add in that segment of the market, and eliminates their share of the market. This increases the competition in already margin-compressed space.

III. Finally, the traditional distribution business model is changing as evidenced by the transition to a subscription or consumption model, completely altering the revenue model (GTDC, 2016; Hinchcliffe, 2017). This transformation is reflective of a demand-pull model where the customer is pulling the product through the supply chain. As is the case with Microsoft's Office 365 which is no longer a physical stock item with a perpetual license fee, but instead a virtual license key with a subscription fee, available through direct online platforms (Burbidge, 2016; GTDC, 2016).

The common thread through these challenges is determining how the distributors and resellers are able to demonstrate their continued value along the distribution chain. This value will be demonstrated by distributors who not only collect and access the best data but draw valuable demand insights that work to narrow the growing information gap (Chae & Olson, 2013; Bellamy et al., 2014). Thus, the role for the distributor becomes one of demand-generation (GTDC, 2017b). Therefore, the analysis of such data is only as valuable as the quality of the data and its subsequent interpretation. The quality of the data is thereby reliant on how it is collected, sanitised and stored (Watson & Wixom, 2007; Işik et al., 2013; Larson & Chang, 2016).

Ross, Beath and Quaadgras (2013) argue that organisations have not done a good job with the information they already have because oftentimes they did not know how to analyse it in ways that enhanced their understanding. This may have been further exacerbated by the pace at which volumes of data grew because the starting point of analysis became more difficult (Işik et al., 2013). But it might have been that the right questions were never asked of the information. Thus the focus was not whether there was information, but rather how well the information was used (Acito & Khatri, 2014; Larson & Chang, 2016).

1.2.3 The Use of Business Intelligence in the Distribution Industry

For the distribution organisations that use BI to access the data, they are able to get timely, relevant and easy to use information (Elbashir, Collier & Sutton, 2011; Olszak, 2016). The BI systems provide distributors with the tools to analyse profitability across different product lines and regions, as well as to observe resellers behaviours (Chae & Olson, 2013; Olszak, 2016). In this research study, BI was mostly found to be developed in-house and involved connecting Excel to a database management system in order to extract organisational data from source data systems. Thereafter, within Excel, there was the ability to view this historical and current data over a period of time or drill down into the detail to gain a depth of understanding. This diagnostic ability of BI enabled an organisation's management to make better decisions (Elbashir et al., 2011; Acito & Khatri, 2014). Trkman, McCormack, de Oliveira and Ladeira (2010) have substantiated these claims with their findings of a positive relationship between analytics and supply chain performance. Analytics automated task-related decisions and improved human decisions (Trkman et al., 2010). McAfee and Brynjolfsson (2012) pointed out that although the exploitation of new information would improve performance, it would be subject to the organisation's ability to change their decision-making culture. This would need to be a culture that appreciated data-driven decision-making.

Likewise, Ghosh (2017) reaffirmed that if the distribution industry was to continue to compete, then data-driven strategies would need to form part of its culture. It was these strategies that would harness an approach of customer intimacy (Ghosh, 2017). Evidently, these data-driven decisions have previously translated into higher customer retention, increased profitability from the same product line or increased opportunity from new product introductions (Olszak, 2016; Ghosh, 2017). Data-driven strategies have also provided a competitive advantage over its competition (Ross et al., 2013; Ghosh, 2017; Oestreich & Chandler, 2015). In a highly competitive market such as distribution, these advantages are necessary for the sustainability of the organisation and industry.

1.3 Research Purpose

The distribution industry in South Africa, in its current form, is in its infancy of analytics prowess (Davenport, 2013), whilst the technology trends have veered ahead into big data, AI and machine learning (Hinchcliffe, 2017). With South African IT distributors trailing behind these advancements, the aforementioned information gap between the distributors and the end-consumers will widen and potentially devalue the contribution added by distributors. It has become paramount that distributors in South Africa learn to ride the digital wave and compete in the era of business intelligence, in order to ensure that decisions are made to improve their performance and ensure their long-term viability (Burbidge, 2016). With the right skills and resources, distributors may choose to leapfrog into the era of AI and big data. Whether the distributor chooses BI, AI or both, the kernel is using data to drive decision-making that will improve performance. In a time where business as usual is no longer usual (Heinrich & Betts, 2003), driving long-term performance is a necessity.

The researcher focused on understanding how senior management used BI to make evidence-based decisions within the IT distribution industry. The objective of this research was to develop a conceptual model for evidence-based decision-making by using business intelligence as the provider of the evidence upon which decisions were made by senior management. Encompassed in the conceptual model were the prerequisites that contributed to successful BI adoption, the information processing perspective of BI, as well as the absorptive capacity of the senior management team (Yeoh & Koronios, 2010; Tushman & Nadler, 1978; Todorova & Durisin, 2007).

1.3.1 Research Questions

More specifically the purpose of the research was to answer the following questions:

1. **What role does business intelligence play in the distributor's decision-making?**
2. **How can distributors improve the adoption of business intelligence in decision-making?**
3. **What role does senior management play to influence the use of business intelligence to make decisions and formulate strategy?**

1.4 Research Motivation

The motivation behind this research was rooted in the interests of the researcher, and the desire to explore, both from an academic perspective as well as a business perspective, how IT distributors were able to wield successful adoption of BI in evidence-based decision-making. The researcher was also interested in how this application could extend to those distributors that have not yet been successful in adopting BI for decision-making.

The distribution organisations in South Africa differ from their American and European counterparts in terms of their analytical capabilities, especially since they are plagued by legacy systems (GTDC, 2017a). This means that much of the American or European literature on supply chains and consumer electronics is not fully transferable, therefore leaving an underdeveloped context of South African IT distribution. A reason for this may be that research companies simply do not receive sufficient data from South African organisations for it to be considered representative. Case in point is that within the Global Technology Distribution Council (GTDC) there are only two members from South Africa, of which only one contributes data to the research companies. The researcher attempted to direct more effort toward bridging the literature gap.

The following contributions to the literature were pursued:

I. The information processing capability of BI was argued as better equipping the organisation to make evidence-based decisions than Tushman and Nadler's (1978) information processing capability performed by an individual. These contributions were viewed through the lens of evidence-based decision-making, therefore adding further support for the literature.

II. Yeoh and Koronios's (2010) critical success factors, expanded upon by Işik et al. (2013), Larson and Chang (2016) as well as Olszak (2016), were identified from the impact they showed in the BI implementations in organisations. These studies did not investigate the context of post-implementation, nor evaluated the extent to which these initial critical success factors contributed thereafter to the adoption of BI. Likewise, no explicit description was provided for the level of management that was examined. This research sought to confirm prior studies' factors, to add new factors that were appropriate to the context of successful adoption and to directly examine the senior management's contribution to the adoption.

III. Roberts, Galluch, Dinger and Grove (2012) found that a vast majority of Information Systems research investigated absorptive capacity because it was an attractive construct for its potential relevance to research problems such as IT assimilation, IT business value, and knowledge transfer. This focus on absorptive capacity was further recognised by Elbashir et al. (2011) as a critical component for successful assimilation of BI systems. However, the absorptive capacity of senior level management was found to have an indirect effect on BI assimilation (Elbashir et al., 2011). Thus the use of the construct for senior management absorptive capacity was explored in this research for its contributions toward evidence-based decision-making and the direct relationship it held with BI adoption.

1.5 Research Methodology

The philosophy adopted for this research was interpretivism, which advocated the necessity to understand differences between humans in their role as social actors (Saunders & Lewis, 2012). This philosophy was based on the need to understand and interpret the experiences of the participating individuals (Spiggle, 1994). In the case of this research, senior managements' absorptive capacity and critical success factors were the phenomena to be analysed in their role as enablers of business intelligence adoption in the distribution industry. As such, an inductive approach was followed through which the conceptual model for BI adoption in evidence-based decision-making was developed from the literature reviewed. The conceptual model was updated once the themes emerged from the interviews.

The research was cross-sectional, as it allowed for the collection of current attitudes, opinions or practices (Creswell, 2012; Saunders & Lewis, 2012). The research was also a time-bound study. Creswell (2012) explained that attitudes and opinions represented the ways in which respondents thought about issues, whereas practices were their actual behaviours. Therefore the use of a cross-sectional time period allowed for both of these elements to be captured at a point in time.

A non-probability sampling method was used to identify potential organisations to interview and a combination of snowball and convenience sampling was applied (Saunders & Lewis, 2012). The sample included IT distribution organisations that had already implemented a BI system. The sample unit was the respondent present at the senior management level. The reason that senior management level respondents were chosen was that they were reasoned to be very

knowledgeable about the issues being researched and regarded as being able to communicate them (Jiménez-Barrionuevo, García-Morales & Molina, 2011; Liu, Ke, Wei & Hua, 2013; Mungree, Rudra & Morien, 2013).

Data was collected by the researcher through semi-structured in-depth interviews with these senior managers and followed the guidance from the long interview method, as developed by McCracken (1988). Content analysis and thematic analysis were the data analysis approaches that were used, but the researcher also ascribed to layering the analysis and interconnecting the themes. As themes emerged and the insights were developed, the conceptual model was verified, updated and areas for future research were discovered.

1.6 Limitations

In the broader transferability of the research, there were some limitations present.

The qualitative study was exploratory and inductive in nature, and the assessments made resulted from the personal views of the researcher. As such, the personal bias of the researcher may have been introduced into the data, thus caution must be taken in the interpretation of data. It was also noted that a qualitative study presented the challenge of measuring validity.

Simultaneously, interviews may have elicited subject bias because respondents may have felt that telling the truth may show them in an unfavourable light (Saunders & Lewis, 2012). The researcher felt that subject bias was limited as there was a general climate of comfort in each interview. The use of a non-probability and snowball sampling technique might have also introduced bias into the findings.

The researcher is employed within the industry, and the interpretation of the results could have been shaped by the familiar organisational context, therefore researcher bias could have occurred during the literature review, interview process and analysis of results.

There was an advantage that the researcher possessed industry knowledge and was able to prevent subject bias to a degree. The researcher had taken care not to emphasise particular themes and introduce personal bias. Manufacturing distance was the advice given by McCracken (1988) for when the researcher possessed deep familiarity with certain topics. Thus it was incumbent that the researcher remained critically aware of allowing an invisible hand to direct the interviews (McCracken, 1988).

The researcher made the assumption that timely access to the interviewees would be granted, that interviews were conducted in an appropriate venue, and that honest and open discussions would be obtained. With time constraints present, the researcher recognised that the number of participants interviewed was on the lower end of the intended sample size. This was in spite of the concerted effort made to include more respondents.

The sample was limited to only the South Africa distribution industry, its distributors, and may not be generalisable for other countries or industries. The research did not include lesser-known distributors. The geographical position of the distributors was skewed to Gauteng but this followed the location of their head offices.

With the senior management level targeted as the respondents, the result was that the assessments of lower-level employees were omitted. The implication of this was that there may a bias present in the results for the organisation and may not have provided a complete representation of the current behaviours and practices of the entire organisation.

The research did not take into account post-adoptive behaviour over a period of time as this sample was cross-sectional due to the time constraints.

The plethora of definitions for business intelligence demonstrated a lack of widespread consensus and thus the usefulness of the definition utilised may be better understood in a longitudinal study.

Furthermore, insight into the organisational culture or management styles were not examined, thus the researcher acknowledged that it may influence the level of adoption of evidence-based decision-making.

Finally, since no empirical testing was performed, the research does not measure the improvement in performance beyond evidence-based management adoption. Thus no correlation nor causal relationships were proven.

1.7 Delimitations

There are a number of choices made by the researcher that impact the scope of the research.

I. The sample is limited to only Gauteng distributors but they are deemed to be the biggest players in the industry. However, these distribution companies predominantly have head offices in Gauteng and service the rest of the country. Further, the distribution model in America and Europe differs, as does its use of business intelligence and big data (GTDC, 2017a).

II. The respondents interviewed were only at a senior management level because organisation-wide adoption of BI or access to BI was not prevalent in the organisations. Thus to understand whether there was any type of evidence-based decision-making based on BI, it would have stemmed from the senior management level.

III. Although the distribution value chain includes other intermediaries like resellers, only the role of the distributors was examined because of their position to the technology vendors. Similarly, access to resellers was not practical.

1.8 Conclusion to Chapter 1

In conclusion, the objective of this research was to develop a conceptual model for evidence-based decision-making by using business intelligence as the provider of the evidence upon which decisions were made. Encompassed in the conceptual model were the prerequisites that contributed to successful BI adoption, the information processing perspective of BI, as well as the absorptive capacity of the senior management team.

It was intended that evidence-based decision-making would enable IT distributors to capitalise on the opportunities buried within their data and serve as a platform for future research.

1.9 Layout of the Research Study

The rest of this research is organised into chapters. Chapter 1 provided background information to the research problem and identified the research questions being asked. The remainder of the study is detailed as follows:

Chapter 2 explores the research problem by conducting a literature review to understand the prerequisites and theory applicable to answering the research questions. A conceptual model was developed for evidence-based decision-making. Encompassed in the conceptual model were the prerequisites that contributed to successful BI adoption, the information processing perspective of BI, as well as the absorptive capacity of the senior management team. The rationale for inclusion into the conceptual model is rationalised for each factor. Recent and seminal journal articles are compared and contrasted in order to build on the theory that needed to understand the research problem. The research questions are highlighted in Chapter 3.

The research methodology that was used by the researcher is explained in Chapter 4.

Chapter 5 presents the results of the primary research conducted via interviews. The interview questions were structured around the themes from the research questions in Chapter 3. Detailed discussion and analysis of the research findings are then explored in Chapter 6. This discussion aligns the research objectives in Chapter 1 and examines whether linkages were found with the literature reviewed.

Finally, Chapter 7 will summarise and conclude the research. Management implications, limitations of the research and opportunities for future research will be presented.

Chapter 2. Theory and Literature Review

2.1 Introduction

The discussion in this research focused on understanding BI adoption within IT distribution by employing a lens of evidence-based decision-making. The adoption of such intelligence and analytical capabilities has been very different in South Africa than with its counterparts in America and Europe (GTDC, 2017a). The presence of legacy systems has contributed to this lag. But in reaction to the slow adoption, few South African distributors have recognised the value of analytics and introduced BI systems that facilitate access to and analysis of their data (Doyle, 2017; GTDC, 2017a).

However, visibility of data does not guarantee usage thereof (Acito & Khatri, 2014). The reasons for the lack of usage were discussed in the literature and revealed that data quality, access, decision-making culture and the ability of the individual users played important roles. A combination of these prerequisites led the researcher to develop a conceptual model for evidence-based decision-making by using business intelligence as the provider of the evidence upon which decisions were made by senior management. The goal of the conceptual model was to link both the literature and inherent gaps in the literature to the research questions and results.

2.1.1 Conceptual Model for BI Adoption

The conceptual model of evidence-based decision-making as illustrated in Figure 2 below, was developed by the researcher and hinged on four main constructs.

Business Intelligence – The use of BI in an organisation has enabled evidence-based decision-making for the purpose of improving organisational performance (Işik et al., 2013; Larson & Chang, 2016). This has been accomplished by transforming raw data into valuable insight and creating value for the organisation (Jourdan, Rainer & Marshall, 2008). It is the execution on the insights that delivered the potential for performance improvement.

In effect, business analytics has personified evidence-based problem recognition and solving (Holsapple, Lee-Post & Pakath, 2014). The objective of BI has been to improve the processing of data and validation of the data quality (Kowalczyk & Buxmann, 2014). This information processing capability of BI was argued to better equip the organisation in making evidence-based decisions,

than the view put forward by Tushman and Nadler's (1978) individuals' information processing perspective. The justification of this argument was that BI has fundamentally been able to gather data from many sources, store it, access it and interpret the data far quicker and more effectively than an individual. Notwithstanding that the value of the individual would be in their synthesis of the information. Thus BI would be successful with a combination of the two components.

Evidence-based decision-making – The ability of individuals to receive, store, retrieve and transmit information without error was bounded by rationality, thereby diminishing an individual's absorptive capacity and limiting the overall organisational absorptive capacity (Roberts et al., 2012). However, such a limitation could be overcome with the implementation of BI as it was able to fulfil these capabilities not bounded by these errors. BI served to complement the decision-making capabilities with the absorptive capacity capabilities of senior management users.

It was based on the premise that evidence reduced decision uncertainties that the study reconciled the nuances observed in the literature. It was further proposed that the lens of evidence-based decision-making, enhanced via an organisation's BI capabilities, offered a positive relationship between the practice of evidence-based decision-making and improved performance. Figure 2 illustrates how, through the lens of evidence-based decision-making, the conceptual model of BI adoption was envisaged.

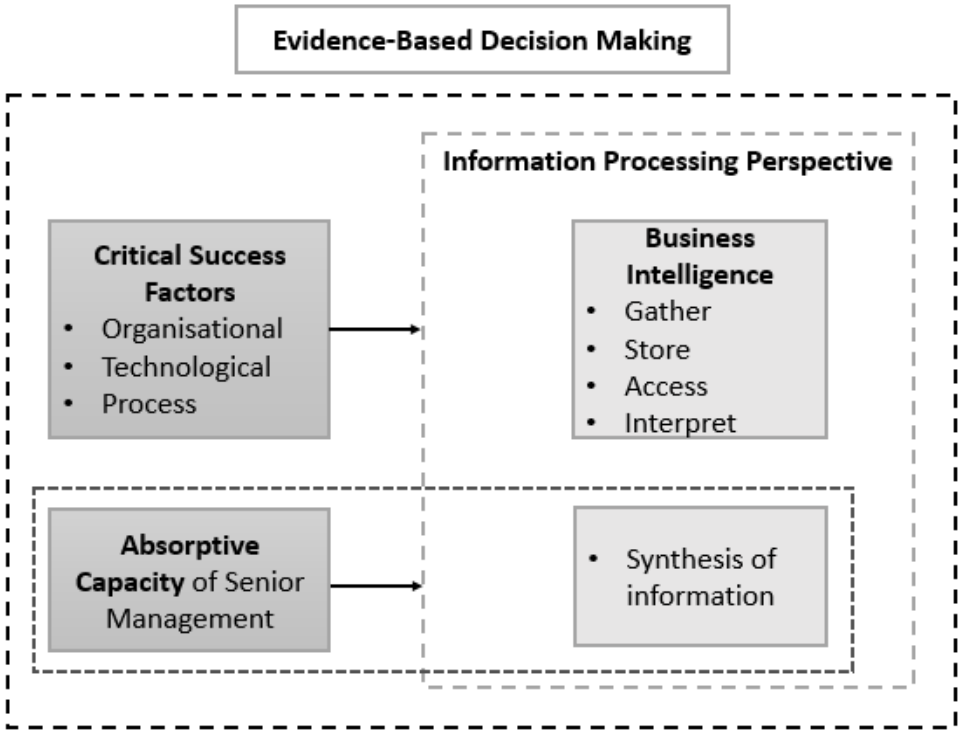
Critical Success Factors – Mungree et al. (2013), as well as Watson and Wixom (2007), criticised the ability of generic success factors to successfully explain behavioural and performance outcomes. In spite of this argument, success factors were contended to be a very useful construct for understanding the outcomes of a BI undertaking (Mungree et al., 2013). With the primary function of BI to support decision-making in organisations (Işik et al., 2013), the contributions of the success factors were explored through the lenses of organisation-orientation, technological-orientation and process-orientation (Yeoh & Koronios, 2010). This research focused on identifying whether these factors played an important role in the adoption of BI systems for decision-making by senior management, as they did for implementation. Furthermore, the goal was to determine what prerequisites of success, in the context of the South African distribution industry, were regarded as the most critical. Therefore, the use of this construct contributed to the in-depth understanding of the role these prerequisites played in successful BI adoption. In addition, it contributed to how they impacted evidence-based decision-making within the organisation.

Absorptive Capacity of Senior management – Senior management's absorptive capacity incorporated the broader wisdom and capability inherent in its leadership team, as well as the interactions with competitors, customers, and peers (Elbashir et al., 2011). Although Armstrong and Sambamurthy (1999) evaluated senior management's absorptive capacity, they failed to link senior management knowledge with IT assimilation. Elbashir et al. (2011) also explored the role of absorptive capacity in BI adoption, but they did not test a direct relationship between senior management's absorptive capacity and BI adoption.

With literary support provided by Mungree et al. (2013), the view was held that executives and managers readily understood the success factors inherent in BI adoption, and were effective for transforming theory into practice. It was reasoned that senior managers had the ability and autonomy to make executive decisions that affected their firms' operations (Jiménez-Barrionuevo et al., 2011; Liu et al., 2013; Mungree et al., 2013). Contributing to this argument, Deng and Chi (2012) described the challenges encountered when different individuals adopted BI systems, necessitating an examination of a specific user type instead.

Thus the use of the construct for senior management absorptive capacity was explored for its contributions toward decision-making, as well as the relationship it held with BI adoption in decision-making. Figure 2 aligned the absorptive capacity with the ability to synthesise the information.

Figure 2 – Conceptual model of factors that affect BI adoption for decision-making



The next section considers the literature available for each of these constructs, namely BI, critical success factors for BI adoption, the absorptive capacity of senior management and evidence-based decision-making.

2.2 Business Intelligence

2.2.1 Business Intelligence Background

BI systems require specialised IT infrastructure in order to function effectively (Elbashir, Collier & Davern, 2008). BI systems included multiple components such as source systems, Extract-Transformation-Load (ETL), databases, and front-end tools (Larson & Chang, 2016). The data marts and ETL tools were essential for converting and integrating data (Elbashir et al., 2008; Olszak, 2016), but the Kimball school of thought argued that Extract-Load-Transformation (ELT) was best practice especially when different database technologies were involved (Breslin, 2004; Ariyachandra & Watson, 2010). It was these components of the BI system that acted as the enablers for extracting value from organisational data (Elbashir et al., 2008; Larson & Chang,

2016). Management was assisted with decision-making since the BI applications were subsequently able to transform and analyse such organisational data (Deng & Chi, 2012).

Such capabilities allowed context and business rules to be applied to the data (Larson & Chang, 2016). Organisational data was mostly structured and housed in databases, data marts and data warehouses (Chen, Chiang & Storey, 2012; Holsapple et al., 2014; Olszak, 2016). The small volume of such data and its predominantly static nature allowed for it to be segregated in warehouses for deeper analysis (Davenport, 2013).

The capabilities considered critical for BI platforms were reporting, dashboards, ad hoc querying, search-based BI, online analytical processing (OLAP), interactive visualisation dashboards, scorecards, predictive modelling, and data mining (Elbashir et al., 2008; Chen et al., 2012; Olszak, 2016). Chang, Hsu and Wu (2015) proclaimed that it was based on these capabilities, that BI allowed its users to read information from standard reports, ad hoc reports, and alerts. Users were able to drag and drop objects to create Excel-like numerical reports (Watson, 2009; Chang et al., 2015).

In this research, BI was primarily the connection of Excel to a database management system in order to extract organisational data from source data systems. Thereafter, within Excel, there was the diagnostic ability to view the data over a period of time or drill down into the detail to gain a depth of understanding.

2.2.2 Business Intelligence Defined

Business analytics personified evidence-based problem recognition and solving (Holsapple et al., 2014). The objective of BI has been to improve the processing of data and to validate the quality of the data (Kowalczyk & Buxmann, 2014). Seddon, Constantinidis, Tamm and Dod (2017) defined business analytics as “the use of data to make sounder, more evidence-based business decisions” (p. 238), and business intelligence as the tools that enable business analytics. Business analytics has been characterised by the leveraging of value from the data (Acito & Khatri, 2014).

This explanation did not, however, clarify the difference between BI and business analytics. It was also unhelpful that in the literature the two have been used interchangeably (Chen et al., 2012; Kowalczyk & Buxmann, 2014).

Luhn laid claim to the term business intelligence in 1958, although much literature credited this to Dressner (Watson, 2009; Holsapple et al., 2014). Since then the literature, in Table 1, has offered a myriad of definitions for BI. Nonetheless, the kernel that emerged was the improvement of decision-making.

Table 1: Definitions of Business Intelligence

Research	Definition
Deng and Chi (2012)	A set of concepts and methods based on fact-based decision support systems (DSS) for improving business decision-making
Işik, Jones and Siderova (2013)	A system comprised of both technical and organisational elements that present its users with historical information for analysis to enable effective decision-making and management support, with the overall purpose of increasing organisational performance
Larson and Chang (2016)	A data-driven process that combines data storage and gathering with knowledge management to provide input into the business decision-making process (Negash & Gray, 2008).
	Gartner has extended BI to be an umbrella term which includes applications, tools, infrastructure, and practices to enable access and analysis of information to optimise performance and decision-making
Olszak (2016)	From a technical point of view, BI is an integrated set of tools, technologies, and software products that are used to collect heterogenic data from dispersed sources, and then to integrate and analyse data to make them commonly available. From an organisational perspective, BI means a holistic and sophisticated approach to cross-organisational decision support (Işik et al., 2013).
Chang, Hsu and Wu (2015)	An umbrella term that combines architectures, tools, databases, analytical tools, applications, and methodologies.
Watson (2009)	A broad category of applications, technologies, and processes for gathering, storing, accessing, and analysing data to help business users make better decisions.
Chen and Siau (2012)	At the *conceptual* level, BI is an umbrella term for systems and procedures that transform raw data into useful information for managers to make better decisions (Watson 2009). At the *operational* level, BI is an information system that has a technological element, a human competencies element and a third element that supports specific business processes that make use of the information or the new knowledge for increasing business values.
Elbashir, Collier and Davern (2008)	BI systems are defined as specialised tools for data analysis, query, and reporting, that support organisational decision-making that potentially enhances the performance of a range of business processes.

To build on rather than duplicate, only key observations in the definitions were explored. Deng and Chi (2012) described BI as a set of concepts and methods based on fact-based decision support systems for improving business decision-making. The aforementioned facts related to available data, however, this held the assumption that the input into the system was of a quality that would result in valuable and useful output.

Most notably, the conceptualisation of BI was devoid of the link which explained the process by which raw data transformed into valuable insight, thereafter acted upon by management in strategy execution. When there was no distinction made between the product and the process of BI, it was difficult to understand the transformation link (Jourdan et al., 2008). In addition, the definitions predominantly concentrated on the product viewpoint, but BI was also interpreted as a process. The process understanding of BI noted the particular emphasis on the methods that companies used to extract useful information (Jourdan et al., 2008). It was this information that Jourdan et al. (2008) found not only helped the company to create value, but also to thrive in the rapidly changing environment. It was noted that as BI moved from being descriptive to predictive, more value would be created (Chandler, Hostmann, Rayner & Herschel, 2011).

In an expansion of the definition, Chen and Siau (2012) differentiated BI at the conceptual level and at the operational level. The conceptual level was where raw data was transformed into insight for better decision-making, whereas the operational level discussed three elements: technological, human capabilities and the processes element (Chen & Siau, 2012).

The link between conceptual and operational BI was explored, and the conclusion was that an important element of BI was human interpretability. This was because it explained the abilities of users to retrieve data and transform it into information, and thereafter make decisions based on the new knowledge (Chen & Siau, 2012). It was this role of individuals that Turner and Makhija (2012) identified as lacking in the literature. They found that the manner in which an individual processed information influenced their ability and orientation towards fact-based problem-solving and decision-making (Turner & Makhija, 2012).

Prior BI definitions failed to capture the performance element explicitly, with the exceptions of Işik et al. (2013) and Gartner who provided the first suggestions that the use of BI was linked to performance. The BI definition developed by Gartner was selected to frame the understanding of BI in the conceptual model for BI adoption through the lens of evidence-based decision-making. Gartner, combining both the conceptual and operational level, described BI as "*an umbrella term*

that included applications, infrastructure, tools, and best practices that enabled access to and analysis of information to improve and optimise decisions and performance" (Larson & Chang, 2016, p. 701).

2.2.3 Information Processing Perspective

Fundamentally the BI system has been shown to enhance the ability of an organisation to process information (Elbashir et al., 2008; Kowalczyk & Buxmann, 2014; Olszak, 2016). This notion of information processing was explored by Tushman and Nadler (1978) as the "ability to gather, interpret and synthesise information" (p. 664) related to the organisation. Information processing stemmed from the acquisition of relevant information that assisted with problem-solving within an organisation, thereby reducing uncertainties related to those problems (Turner & Makhija, 2012).

Although elaborated upon by Turner and Makhija (2012), the shortcomings of these information processing capabilities were that:

I. Gathering was limited by the amount of information an individual could collect
II. Interpretation relied heavily on the value that individuals assigned to pieces of information, which undoubtedly incorporated their personal biases.
III. The synthesis was bounded by individuals' knowledge of the interrelationships of different pieces of information.

However, it was postulated that these shortcomings could be overcome with an alternative view to the information processing perspective, and it was one that incorporated BI adoption. Revisiting Watson's (2009) BI definition – the process for "gathering, storing, accessing and analysing data to help business users make better decisions" (p. 491) – revealed an overlap of aforementioned processing capabilities.

The implication of this overlap was that BI in an organisation possessed the ability to assume the role of information processing and not be biased by the shortcomings of individuals' capabilities to process information. Effectively, the argument put forward was that the BI system could replace the individual for the majority of the information processing capacity. The BI system was able to collect vast quantities of data, store it for future use and apply business logic to the data that assisted the interpretation. The BI system provided links to other data and relationships present in the data warehouses or databases, facilitating in-depth analysis. However, full synthesis was

argued to be lacking through mere BI adoption. The comprehension and analysis provided by an individual would be needed, and this would be dependent on the individual's absorptive capacity. Full synthesis would depend on an individual's adoption of BI and application of its information.

Thus the research proposed a merging of Watson's (2009) BI definition with Tushman and Nadler's (1978) information processing perspective, redefined as the ability to gather, store, access, analyse and synthesise information.

2.2.4 Rationale for Inclusion into Conceptual Model

The use of BI in an organisation has enabled evidence-based decision-making for the purpose of improving organisational performance (Işik et al., 2013; Larson & Chang, 2016). This has been accomplished by transforming raw data into valuable insight and using that insight to create value for the organisation (Jourdan et al., 2008). It is the execution on the insights that delivered the potential for performance improvement (Işik et al., 2013).

The objective of BI has been to improve the processing of data and validation of the data quality (Kowalczyk & Buxmann, 2014). This information processing capability of BI was argued to better equip the organisation in making evidence-based decisions, than the view put forward by Tushman and Nadler's (1978) information processing perspective. The justification of this argument, illustrated in Figure 2 above, was that BI has fundamentally been able to gather data from many sources, store it, access it and interpret the data far quicker and more effectively than an individual. Notwithstanding that the value of the individual would be in their synthesis of the information. Thus BI would be successful with a combination of the two components. This proposed the following question:

Research Question 1: ***What role does BI play in the distributor's decision-making?***

2.3 Factors of Business Intelligence Adoption

2.3.1 BI Success

BI success has been associated with the value an organisation has acquired from its BI investment, and Işik et al. (2013) explained that BI success represented the attainment of benefits such as improved profitability, performance tracking, reduced costs, and improved operational efficiency.

The tangible and intangible benefits were explored by Işik et al. (2013): The former included return on investment, improvements in operational efficiency or the increased profitability of the organisation. The latter, proving harder to measure, comprised of stakeholder support and the number of active users (Işik et al., 2013). With particular emphasis on tangible benefits, Watson and Wixom (2007) showed that BI reduced IT infrastructure costs by eliminating duplicated or redundant data extraction processes retained across the enterprise. It was proposed that if BI added tangible value and the members of the organisation believed they indeed were making better decisions, then this morale would be an intangible benefit.

Consensus regarding the type of benefit, tangible or intangible, was lacking in the literature, but there was agreement that BI success was dependent on alignment of the organisational goals to be achieved and of the specific context in which they would be achieved (Yeoh & Koronios, 2010; Clavier, Lotriet & van Loggerenberg, 2014; Işik et al., 2013; Larson & Chang, 2016; Olszak, 2016).

Research conducted by Yeoh and Koronios (2010) explicated that the critical success factors were very important for the implementation of BI systems. These factors were categorised by Yeoh and Koronios (2010) and could be analysed using three lenses, namely organisation-orientation, process-orientation, and technological-orientation.

2.3.1.1 Organisation-orientation

Critical success factors in the organisational dimension consisted of establishing a vision and gaining committed leadership support for BI (Yeoh & Koronios, 2010; Talib & Hamid, 2014; Larson & Chang, 2016; Olszak, 2016). Following the rationale for alignment between the organisation and the BI system, evidence was provided in support for organisation orientation as it was found to be the cornerstone for successful BI system implementation (Yeoh & Koronios, 2010; Olszak,

2016). In other words, organisations that realised success with their BI implementations had worked to make certain that their BI was consistent with their organisation's objectives (Işik et al., 2013). Yeoh and Koronios (2010) concluded that the implementation of a BI system had a much greater likelihood of success when business needs were identified at the outset and were used as the driver behind the implementation effort. In Yeoh and Koronios's (2010) identification of leadership support as a success factor, the level at which this was intended was not isolated or examined further. Watson and Wixom (2007) previously argued that senior management should establish the vision for BI and insist on its usage for decisions. As such, this research purposely isolated the senior management level.

2.3.1.2 Process-orientation

The process dimension supported the maintenance component of BI which implied having a skilled and balanced BI team (Yeoh & Koronios, 2010; Olszak, 2016). Işik et al. (2013) found that organisations instituted different levels of user access and that the success of BI was positively related to the quality of that user access. Therefore included in the BI capability was an interactive development approach, which could enable the organisation to improve its agility and responsiveness to the changing business environment and changing customer behaviours (Işik et al., 2013; Larson & Chang, 2016; Olszak, 2016).

Larson and Chang (2016) advocated for the constant evaluation of information and user feedback because if the information being analysed was inaccurate, according to Işik et al. (2013), the organisation would be limited in the value added throughout the supply chain. Therefore, the inclusion of a change management process was necessitated as well (Yeoh & Koronios, 2010; Larson & Chang, 2016; Olszak, 2016). The alignment between BI and the organisation, evolves with changing requirements, thus BI systems must incorporate necessary changes and feedback mechanisms in order to ensure continuous contributions to business performance (Larson & Chang, 2016). Therefore adding to the preceding discussion, Yeoh and Koronios (2010) supported the notion that the dedicated BI teams had to offer continual support and maintenance. Thus the team required very competent members (Yeoh & Koronios, 2010).

2.3.1.3 Technological-orientation

Technological critical success factors were comprised of data and infrastructure: sustainable data quality and integrity, stability and scalability of the technical architecture and environment (Yeoh & Koronios, 2010; Larson & Chang, 2016; Olszak, 2016). In an observation by Işik et al. (2013), problems with data quality had been highlighted as a regular organisational challenge in managing BI systems. Data challenges would moderate the ability of BI to deliver timely, accurate and consistent information across its users (Işik et al., 2013).

From an additional perspective, evidence was found in support of the role that IT infrastructure sophistication played to enhance BI assimilation (Armstrong & Sambamurthy, 1999; Elbashir et al., 2011). IT infrastructure sophistication referred to the extent to which an organisation had inculcated the key information technologies into its foundation for supporting business application (Armstrong & Sambamurthy, 1999).

2.3.2 BI Failure

Despite the sizable investments in BI solutions and capabilities in recent years, a lack of fit between an organisation's BI and its goals has been cited as one reason for failure (Marr, 2009; Işik et al., 2013). Olszak (2016), Clavier et al. (2014) reported that about 60% to 70% of BI applications fail, due to the organisational, technological, infrastructural and cultural issues.

Watson and Wixom (2007) identified BI as a process of getting data in and getting data out. Getting data in only realised its full value when users utilised the data available in the BI system to make decisions (Watson & Wixom, 2007). Thus it was challenged that the BI system by itself could not facilitate the conversion of data into insight, because not only was it dependent on infrastructure and data (Yeoh & Koronios, 2010), but it also needed to be supported by the executive leadership (Olszak, 2016). Another failure hinged on Chen and Siau's (2012) human capabilities with management asking the wrong questions of the data. The key implementation issues arose in the absence of leadership support, funding commitment, and information about its capabilities (Olszak, 2016). Where poor data quality was found at the originating source, or where there was incompatible legacy technology or data warehouse knowledge, technological challenges arose (Watson & Wixom, 2007; Işik et al., 2013; Mungree et al., 2013). It was assumed that these issues would also be prevalent in BI adoption.

Ross et al. (2013) rightly articulated that organisations did not automatically develop analytical competencies because they had invested in analytical tools, such as a BI system: They conducted studies and found very few companies consistently using data to guide their decision-making. Ross et al. (2013) discovered that the exceptions found rather displayed a culture of evidence-based decision-making. Culture is proposed to play a key role because if a leadership team does not possess a culture of curiosity nor ask the right questions, then insights from information will be lacking. “Data is not an end in itself” (Harrison & O’Neill, 2016, p.1). This provided evidence of the value realised when human capabilities fused with the BI technological capabilities (Chen & Siau, 2012).

2.3.3 Rationale for Inclusion into Conceptual Model

Mungree et al. (2013), as well as Watson and Wixom (2007), criticised the ability of generic success factors to successfully explain behavioural and performance outcomes. In spite of this argument, success factors were contended to be a very useful construct for understanding the outcomes of a BI undertaking (Mungree et al., 2013). With the primary function of BI to support decision-making in organisations (Işik et al., 2013), the contributions of the success factors were explored through the lenses of organisation-orientation, technological-orientation and process-orientation (Yeoh & Koronios, 2010).

This research focused on identifying whether these factors played an important role in the adoption of BI systems for decision-making by senior management as they did for the implementation thereof. Furthermore, the goal was to determine what prerequisites of BI success, in the context of the South African distribution industry, were regarded as the most critical. Therefore, the use of this construct contributed to the in-depth understanding of the role that these prerequisites played in successful BI adoption. In addition, it contributed to how they impacted evidence-based decision-making within the organisation. Thus the following question was posed:

Research Question 2: ***How can distributors improve the adoption of BI in decision-making?***

2.4 Absorptive Capacity

A subtle, yet recurring theme throughout the literature, has been the human interpretability element (Chen & Siau, 2012) and its link with successful BI adoption. Although BI has the ability to better equip the organisation with its information processing capability, the business value will be of no consequence if synthesis of the information is not performed by the user. In other words, failure to incorporate the vast quantities of data to support decisions, may be attributable to the inability of individuals to value and internalise the information (Marr, 2009; Kim et al., 2014). This information synthesising ability was said to be embodied by the absorptive capacity of the organisation and its leadership (Turner & Makhija, 2012).

It was Cohen and Levinthal (1990) who introduced the concept of absorptive capacity as "the ability of a firm to recognise the value of new, external information, assimilate it, and apply it to commercial ends" (p. 128):

I. The *value* capability required organisations to possess prior knowledge that enabled the assessment of new information (Cohen & Levinthal, 1990). If there was no prior knowledge, organisations were not able to evaluate the new information and thus were not able to absorb it (Todorova & Durisin, 2007).

II. The *assimilation* capability necessitated the ability to analyse, process, and understand new information (Cohen & Levinthal, 1990; Elbashir et al., 2011).

III. The *application* capability involved the use of the new information to drive organisational strategies and decisions (Cohen & Levinthal, 1990). These decisions were supported by the experience of the organisation in assimilating similar information, thereby finding it less difficult to apply it to commercial ends (Jiménez-Barrionuevo et al., 2011).

The original concept, however, was predicated on and influenced by the ability of an organisation to innovate. Since Cohen and Levinthal's seminal work, ambiguity has pervaded the constructs and operationalisation has varied from R&D intensity (Cohen & Levinthal, 1990; Tsai, 2001; Bellamy et al., 2014), to patent stock (Zhang, Baden-Fuller & Mangematin, 2007) and scales (Lin, Tan & Chang, 2002; Jansen, Van Den Bosch & Volberda, 2005; Lichtenthaler, 2009). Such ambiguity has made it difficult to study the concept (Zahra & George, 2002).

In an attempt to clarify the concept, Zahra and George (2002) suggested that there were two subsections of absorptive capacity: potential and realised absorptive capacity. The differentiation was that a company's capability to recognise the new information did not translate into exploitation thereof (Marr, 2009; Kim et al., 2014). Potential capacity comprised knowledge acquisition and assimilation capabilities and realised capacity encompassed knowledge transformation and exploitation (Zahra & George, 2002). Support was evidenced by Jiménez-Barrionuevo et al.'s (2011) development of an empirical measurement scale for absorptive capacity, absorptive capacity's indirect effect on performance by Liu et al. (2013) as well as the weakening of absorptive capacity with cultural barriers by Leal-Rodríguez, Ariza-Montes, Roldán and Leal-Millán (2014).

In light of the support Lane, Koka and Pathak (2006) argued that Zahra and George's (2002) reconceptualisation biased thinking toward the short term. Inherent in realised absorptive capacity was the notion that new information needed a longer time horizon upon which to be enacted. This preparation for the future was presumably ignored by their distinction in the definition (Lane, Koka & Pathak, 2006). Furthermore, it contradicted Cohen and Levinthal's (1990) emphasis on learning along with assimilation. Instead, Lane et al. (2006) related the three absorptive capacity capabilities to exploratory, transformative and exploitative learning. However, Roberts et al. (2012) challenged the exploration/exploitation framework of Lane et al. (2006) because they believed it had too suffered from a short-term focus and tended to place more emphasis on exploration over that of exploitation.

When Todorova and Durisin (2007) reviewed the work of Zahra and George (2002), they called for the rejection of such reconceptualisation, and cited their distinctive constructs as being ambiguous and unsubstantiated. Instead, Todorova and Durisin (2007) too returned to Cohen and Levinthal, in a similar manner to Lane et al. (2006), yet applied a more measured approach between exploration and exploitation. Accordingly, absorptive capacity was defined as the ability firms had to "recognise the value, acquire, transform or assimilate, and exploit knowledge" (Todorova & Durisin, 2007, p. 777). It was based on this construct's definition that the research focused its understanding of the absorptive capacity capability:

I. The recognition of the *value* capability meant that if no prior knowledge existed, organisations would neither be able to evaluate the new information nor absorb it (Cohen & Levinthal, 1990; Jiménez-Barrionuevo et al., 2011).

II. Further, the capabilities of *transform or assimilate* recognised the difference in the types of new information (Todorova & Durisin, 2007). This meant that new information that was compatible with the current knowledge required minimal assimilation. But for information that was not easily compatible with the knowledge base, then transformation was required to be able to adapt the new knowledge that could not be readily assimilated (Todorova & Durisin, 2007). In this respect, Todorova and Durisin (2007) theorised that transformation was an alternative process to assimilation.

III. It was this development of the knowledge base that enhanced an organisation's ability to recognise valuable information and capitalise on the opportunities presented within the information. The increased learning of a specific domain was postulated to enhance that knowledge base, thereby absorptive capacity was increased and learning, or rather exploration, was reinforced (Roberts et al., 2012). The consequences of this afforded accumulation of absorptive capacity in one period, and permitted more efficient accumulation in the next period (Cohen & Levinthal, 1990).

Roberts et al. (2012) found that a vast majority of Information Systems research investigated absorptive capacity because it was an attractive construct for its potential relevance to research problems such as IT assimilation, IT business value, and knowledge transfer. When absorptive capacity was conceptualised as a capability at the organisational level, it served as a complement to IT capabilities in generating business value and also positively affected the assimilation of IT (Roberts et al., 2012; Liu et al., 2013; Leal-Rodríguez et al., 2014).

This focus on an organisation's absorptive capacity was further recognised by Elbashir et al. (2011) as a critical component for successful assimilation of BI systems because it reflected the capabilities and competencies present in the organisation. Bellamy et al. (2014) found that within a supply chain network, an improvement in information flows was enhanced by an organisation's absorptive capacity and positively influenced the output. An organisation's absorptive capacity was dependent on the absorptive capacities of its individuals (Cohen & Levinthal, 1990). Zahra and George (2002) explicated that maintaining absorptive capacity, and therefore strengthening the knowledge base, was vital to a firm's long-term survival. Reiterating the support for absorptive capacity, Jiménez-Barrionuevo et al. (2011) defended that an organisation's knowledge base was strategic for obtaining a competitive advantage. In line with this support, Liu et al. (2013) confirmed a positive relationship between an organisation's absorptive capacity and organisational

performance. Evidence was also found in support of a positive relationship between organisational absorptive capacity and supply chain agility (Liu et al., 2013).

In the same regard that the mere presence of a BI system did not create an organisation with the necessary analytical competencies (Ross et al., 2013), so too, acquisition and assimilation of information did not assume effective exploitation thereof (Zahra & George, 2002; Marr, 2009; Kim et al., 2014). This pathway to knowledge application is not linear (Kim et al., 2014). Instead, by building absorptive capacity in supply chains Roberts et al. (2012) and Liu et al. (2013) advocated that organisations were better positioned to improve operational efficiency, capitalise on market opportunities and therefore increase profitability and market share.

2.4.1 Rationale for Inclusion into Conceptual Model

Senior management's absorptive capacity incorporated the broader wisdom and capability inherent in its leadership team, as well as interactions with competitors, customers, and peers (Elbashir et al., 2011). However, the findings of Elbashir et al. (2011), explained that an organisation's absorptive capacity was best captured by operational-level managers. The findings also concluded that it was at that level, not at the senior management level, that there was a strong relationship with increased levels of BI assimilation (Elbashir et al., 2011). It was inferred that senior management played an indirect role in establishing the culture which permeated the business via the actions of operational-level managers.

Although Armstrong and Sambamurthy (1999) evaluated senior management's absorptive capacity, they failed to link senior management knowledge with IT assimilation. Research has not thoroughly explored the direct relationship between senior management team's absorptive capacity and BI adoption (Armstrong & Sambamurthy, 1999; Elbashir et al., 2011; Liu et al., 2013). It was expected that the IT system referred to in Armstrong and Sambamurthy's (1999) research, had been supplanted by the advancement of BI systems and that it was plausible new insights would be gathered from exploring this direct relationship, not tested by Elbashir et al. (2011). With literary support provided by Mungree et al. (2013), the view was held that executives and senior managers readily understood the success factors inherent in BI adoption, and were effective for transforming theory into practice. The analytically engaged manager produced, consumed or created insights (Acito & Khatri, 2014).

Contributing to this argument, Deng and Chi (2012) described the challenges encountered when different individuals adopted BI systems, necessitating an examination of specific user type instead. Further evidence was provided by the use of a single respondent being common among empirical studies investigating IT and supply chain management (Liu et al., 2013). The rationale substantiated that senior managers were deemed knowledgeable about the related issues being explored but more importantly had the ability and autonomy to make executive decisions that affected their firm's operations (Jiménez-Barrionuevo et al., 2011; Liu et al., 2013; Mungree et al., 2013). Figure 2 illustrates this ability to synthesise the information to aid decision-making. Thus the use of the construct for senior management absorptive capacity was explored for its contributions toward decision-making and for its relationship to BI adoption in decision-making. Through this exploration the following question arose:

Research Question 3: ***What role does senior management play to influence the use of business intelligence to make decisions and formulate strategy?***

2.5 Evidence-based Decision-making

An emerging theme in the management literature on decision-making has been evidence-based management (Ross et al., 2013; Wright et al., 2016). Evidence-based management denoted principles based on best evidence being translated into organisational practices (Rousseau, 2006). Rousseau (2006) stipulated that through evidence-based management, practising managers developed into experts who made organisational decisions informed by organisational research or the best available evidence. In line with these notions, Briner, Denyer and Rousseau (2009) stated that such decision-making by management ought to consider other stakeholders that would be affected.

The rationale for this modification stemmed from the weakness borne in the concept as highlighted by Reay, Berta and Kohn (2009), which stated that the management voice may be privileged above other organisational voices, and may lead to senior management bias (Learmonth, 2008). Such bias in the form of power and inequality were not considered by Rousseau (Learmonth & Harding, 2006). Thus the inclusion of other stakeholders was aimed at

diminishing the management bias. Nevertheless, Rousseau (2006) countered that the strength of the concept's principle was that which afforded higher-quality managerial decisions, and provided a comparative advantage over a company's less competent counterparts.

Briner et al. (2009) supplemented that evidence-based management represented a way of approaching organisational decisions. In an oversight not considered, McCormick (2010) cautioned other authors that ethics must be considered at the beginning of the decision-making process, in order to understand whether the intended decision is, in fact, ethical and legal. Thereafter, sources of information need not be only academic research evidence, but broader inclusions of financial data, internal data, surveys as well as practical experience (Briner et al., 2009; McCormick, 2010; Wright et al., 2016). This afforded the decision-making process by management to be enacted with context-sensitive judgement and information (Wright et al., 2016).

Echoing the general sentiments in favour of Rousseau's concept, Marr (2009) reaffirmed that evidence-based management was based on finding the best available evidence, accepting those facts and acting upon them. Technological developments meant that companies possessed the ability to capture and store vast quantities of data to support decision-making (Marr, 2009). Pfeffer and Sutton (2006) focused attention on the value of collecting and analysing internal organisational data or evidence.

In this respect, the criticism of what constituted evidence was managed (Learmonth & Harding, 2006; Tourish, 2013) as technological advancements, such as BI, provided data that was not easily contestable, provided that the quality of the data was maintained. Therefore, unlike the argument put forward by Learmonth (2008), such data was not constructed or biased in a way that served the self-interests of management.

BI challenged the criticism that no empirical evidence had been found in support of evidence-based management having an impact on performance (Learmonth & Harding, 2006; Briner et al., 2009; Reay et al., 2009; Tourish, 2013), when the use of data had empirically been found to improve performance (Tsai, 2001; Roberts et al., 2013; Liu et al., 2013). However, Briner et al. (2009) made an important point regarding the lack of empirical evidence because literature has not fully explored the performance outcomes in different organisational contexts.

The preceding discussion suggested that by challenging the initial concept of evidence-based management, permission was not granted to disregard evidence or data in its entirety. An

absence of evidence does not denote ineffectiveness (Briner et al., 2009). It was rather to remain cognisant of the biases and challenges the initial concept raised. One of the challenges put forward by Learmonth (2006) was that in the presence of uncertainty, more information may have resulted in increased uncertainty. Adoption of evidence-based decision-making required a cultural shift which redefined work processes and established business rules that guided people in their work (Ross et al., 2013; Leal-Rodríguez, 2014).

Marr (2009) suggested that challenges to the practice of evidence-based management could be overcome in instances where there was an underpinning by the senior management team. Perhaps an even more powerful argument was the acceptance of one source of data (Ross et al., 2013). The implications of this were that users would not trust data on which they could not rely (Watson & Wixom, 2007). Other ways of overcoming these challenges were an inculcation of a passion for learning, curiosity, widespread analytical capabilities and infrastructure development throughout the organisation (Marr, 2009; Acito & Khatri, 2014).

As the strength of evidence in the form of data, both internal and external, becomes more apparent to management, it is likely to generate stronger demand and thus add to the business case for evidence-based management adoption (Reay et al., 2009).

2.5.1 Rationale for Inclusion in the Conceptual Model

The ability of individuals to receive, store, retrieve and transmit information without error was bounded by rationality, thereby diminishing an individual's absorptive capacity and limiting the overall organisational absorptive capacity (Roberts et al., 2012). However, such a limitation could be overcome with the implementation of BI as it was able to fulfil the capabilities not bounded by these errors. With successful implementation, BI served to complement the decision-making capabilities with the absorptive capacity capabilities of senior management users.

It was based on the premise that evidence reduced decision uncertainties, that the study reconciled the nuances observed in the literature. It was further proposed that the lens of evidence-based decision-making, enhanced via an organisation's BI capabilities, offered a positive relationship between the practice of evidence-based decision-making and improved performance. Figure 2 illustrates how through the lens of evidence-based decision-making the conceptual model of BI adoption was envisaged.

2.6 Conclusion to Chapter 2

In order to conceptualise how management would be better able to make decisions based on evidence, the researcher analysed the literature on (i) evidence-based decision-making, (ii) BI as an information processing perspective, (iii) absorptive capacity and (iv) critical success factors for BI implementation.

The literature on BI focused on the improvement in decisions, however, failed to capture the manner in which an individual processes information and influences their orientation towards evidence-based problem-solving and decision-making. The argument was put forward that BI was better positioned to continuously and effectively contribute to the overall evidence-based decision-making within the organisation.

The critical success factors were explored through three lenses, and of particular interest was the organisation-orientation approach where committed management support for BI was key to the successful implementation of BI. However, the level at which this was intended was not explicitly isolated. Furthermore, the literature did not investigate these factors in the context of post-implementation nor evaluated the extent to which these initial critical success factors contributed thereafter to the adoption of BI. The literature provided an opportunity to examine the role of these factors in successful BI adoption and explore their impact on evidence-based decision-making.

An organisation's absorptive capacity was recognised by Elbashir et al. (2011) as a critical component for successful assimilation of BI systems. However, the absorptive capacity of senior management was found to have an indirect effect on BI assimilation (Elbashir et al., 2011). Thus the use of the construct for senior management absorptive capacity was explored in this research for its contributions toward evidence-based decision-making and the direct relationship it held with BI adoption.

Based on the literature reviewed, research questions were formulated and tested qualitatively.

Chapter 3. Proposed Research Questions

The research developed a conceptual model for evidence-based decision-making by using business intelligence as the provider of the evidence upon which decisions were made. Encompassed in the conceptual model were the prerequisites that contributed to successful BI adoption, the information processing perspective of BI, as well as the absorptive capacity of the senior management team.

This research sought to expand on the literature by adopting a lens of evidence-based decision-making that answered the following questions relating to the proposed conceptual model as shown in Table 2 below.

3.1 Research Question One

What role does business intelligence play in the distributor's decision-making?

3.2 Research Question Two

How can distributors improve the adoption of business intelligence in decision-making?

3.3 Research Question Three

What role does senior management play to influence the use of business intelligence to make decisions and formulate strategy?

Table 2: The Link between Theory, Interview Questions and Research Questions

Research Question	Interview Questions	Literature Review
1. What role does business intelligence plays in the distributor's decision-making?	What is your understanding of the term business intelligence?	Chen and Siau (2012) Turner and Makhija (2012) Işik, Jones and Siderova, (2013) Olszak (2016) Tushman and Nadler (1978) Watson (2009)
	Tell me about the kind of business intelligence in the organisation?	
	What are the business activities (functions) that are supported by your BI system? And how often are they consulted?	
	In what way has BI been used to enhance customer relationships? Do you know who your customer is and your end-consumer?	
	In what way has BI been used to enhance supplier relationships?	
	In what way has BI been used to enhance entrance into new markets?	
	Are there other examples that you can think of where BI has been used?	
2. How can distributors improve the adoption of business intelligence in decision-making?	What do you think are the critical success factors for BI adoption?	Işik, Jones and Siderova (2013) Yeoh and Koronios (2010) Watson and Wixom (2007)
	Has there been an education/training effort for BI?	
	Are there specialised teams that are responsible for BI? What are their roles?	
	What are or have been the challenges for BI adoption? What did you do to overcome these challenges?	
3. What role does senior management play to influence the use of business intelligence to make decisions and formulate strategy?	How often is management exposed to external data or internal data, and to what extent?	Elbashir, Collier and Sutton (2011) Todorova and Durisin (2007) Bellamy, Ghosh and Hora (2014). Reay, Berta and Kohn (2009) Rousseau (2006) Tourish (2013)
	Is there a difference between the senior management and the rest of the layers of management?	
	In terms of academic journals, articles, white papers that are published online, is there an affinity to read those?	
	Can you please describe scenarios when data is consulted for decision-making?	
	What is the general process adhered to for decision-making?	
	What do you think management ought to do to improve the use of data in decision-making among members in the organisation?	

Chapter 4. Proposed Research Methodology and Design

4.1 Philosophy

The philosophy adopted for this research was interpretivism, which advocated the need to understand differences between humans in their role as social actors (Saunders & Lewis, 2012). This philosophy was based on the need to understand and interpret the experiences of the participating individuals (Spiggle, 1994). In the case of this research, it was about understanding the role that management's absorptive capacity and critical success factors of BI, the phenomena, played as enablers of evidence-based decision-making in the distribution industry.

Interpretivism was additionally well-suited to this qualitative research, as the emergent themes from the engagements with the senior managers, the social actors, constructed the knowledge surrounding the phenomena and revealed multiple realities (Saunders & Lewis, 2012; Guest, Namey & Mitchell, 2013). The implications for this were that the interpretations were personal assessments of the themes that captured the phenomena (Creswell, 2012).

Similarly, the interpretation was based on the literature reviewed, whereby it formed the foundational knowledge on which to build the conceptual model. The research questions subsequently were created based on this foundational knowledge (McCracken, 1988). McCracken (1988) stated that the qualitative goal was often to isolate and define concepts during the process of research. Thereafter the insight that was obtained, stemmed from the personal interpretations of the phenomena by the researcher and the respondents. This was achieved because the qualitative interview allowed the researcher to step into the mind of the participant to understand the experiences from their perspective (McCracken, 1988). This lens of exploration allowed for patterns among concepts to surface, quite unlike the precision for definitions and relationships as evidenced in quantitative research (McCracken, 1988).

However, there were disadvantages to this approach that were considered. With an interpretivist approach, the concern was that the researcher's personal assessment would impact the generalisation of the study. It was therefore important that there was validation of the data to ensure its reliability, discussed below in "Validity and Reliability".

4.2 Approach

An inductive approach involved analysing the data collected and thereafter developing the theory (Saunders & Lewis, 2012). This was appropriate for the study because the literature review provided the data to aid the development of the conceptual model for BI adoption in evidence-based decision-making. Inductive reasoning allowed the researcher to move from specific observations to broader generalisations and theories (Saunders & Lewis, 2012). The researcher thus determined research questions from the literature reviewed, and in the subsequent interviews was able to obtain broader theories for the phenomena.

As per the view of Saunders and Lewis (2012), the researcher began to observe patterns of phenomena, investigated speculative areas across the transcripts and developed some general conclusions. The qualitative research sought to mine the terrain of themes, not survey it (McCracken, 1988). Creswell (2012) and Schreier (2014) enriched this idea because qualitative researchers analyse their data by reading it several times and conducting an analysis each time. Such iterative behaviour was demonstrated by the researcher with the transcripts being reviewed multiple times. The outcome of these iterations was a structure that was flexible, and allowed the emphasis of the research to change as the research progressed (McCracken, 1988; Spiggle, 1994; Creswell, 2012; Schreier, 2014). Iteration promoted verification because the researcher was looking for information that negated the initial assumptions (Spiggle, 1994).

4.3 Strategy and Choice

Saunders and Lewis (2012) claimed that the focus of an exploratory research was to analyse phenomena that were not fully understood. With this strategy, the focus became progressively narrower as the research developed (Saunders & Lewis, 2012). Thus the collection of primary data in the form of semi-structured interviews lent itself to the exploratory nature of this qualitative research. This was appropriate because as themes emerged from the interviews, the focus of the research became more defined. Likewise, the ease of comparison of responses and themes was also aided by the standardisation of interview questions (Saunders & Lewis, 2012). McCracken (1988) suggested that the questions ensured that the researcher covered all the content in the same order. It also allowed for prepared prompts to be included in order to maintain the scope of the interview (McCracken, 1988). By adopting this strategy, the researcher was able to create a narrative that was had profundity and richness (Guest et al., 2013).

Therefore, the chief advantage of the interview was the ability to probe the respondent further and collect a richness of understanding and more detailed examples, while simultaneously maintaining the respondent's confidentiality (McCracken, 1988; Creswell, 2012; Guest et al., 2013). McCracken (1988) proclaimed that this research strategy provided access to the respondents without the fear that their privacy would be violated. Consequently, with such assurances, the level of insight to be gained from the executives was certainly more forthcoming, and this became very valuable in exploration of the research questions. Interviews provided clarity for the questions that were not fully understood by the respondent. In terms of the answers, these open-ended questions did not constrain the type of answer that a survey would impose (Guest et al., 2013). But, an important advantage was that the questions had been sent ahead of the scheduled interview, which provided the respondents ample opportunity to formulate their responses. This strategy assisted in collating data that was well thought-out, and thus was able to contribute to the richness of the research and contextualised the conceptual model further.

The disadvantage, apart from the time-consuming nature of the interviews, was the requirement of interviewing sufficient executives to have facilitated comparisons across respondents. There was also the risk of the questions being too leading and not offering the opportunity of being more open-ended. Of the two, the bigger challenge was getting agreement for the interview to take place. Some respondents did not want the researcher coming to their offices or were not comfortable partaking in research conducted by a competitor's employee. This impacted the number of respondents interviewed. The researcher offered a neutral location or opted for a telephone call. These options were mostly well received by the hesitant respondents but there were two senior managers that still refused to participate. There were a further two managers who failed to commit to an interview date, despite many follow-up calls and emails.

4.4 Time

This research chose to examine the research questions at a point in time and thus constituted a cross-sectional study. The study was time-bound therefore this was the most appropriate choice. The cross-sectional study allowed for the collection of current attitudes, opinions or practices (Creswell, 2012; Saunders & Lewis, 2012). Creswell (2012) explained that attitudes and opinions were the ways in which respondents thought about issues, whereas practices were their actual behaviours. In this research it was the interest in both what they thought and how they acted, that

was believed to be the most appropriate. It was considered necessary to capture the context in which BI adoption for decision-making was facilitated.

A future area of research to be considered may be investigating these attitudes, opinions and practices over a period of time (Deng & Chi, 2012).

4.5 Population and Sampling Method

The population of this research was limited to South African IT distributors who had implemented a form of BI but were not limited by annual turnover or gross assets. The reason for this strategy was that many of these companies were not publicly listed, and thus access to financial information would likely be limited.

A non-probability sampling method was used to identify potential candidates to interview and no sampling frame was used because a complete list of all members of the total population was not available. This method was supported by the view of Saunders and Lewis (2012) that non-probability samples were often analysed using qualitative analysis techniques. In finding those organisations that had implemented BI, a combination of snowball, purposive and convenience sampling was applied (Saunders & Lewis, 2012). With the networks available, the researcher's relationships with colleagues and executives were leveraged in order to secure interviews with the applicable organisations. This included asking an executive to personally email or call a potential participant to help set up an interview or telephone call. This was not always successful.

4.6 Sample Size

The researcher produced a list of the relevant organisations in the IT distribution industry, which totalled approximately 25 organisations with head offices in Johannesburg. Many of these organisations did, however, operate in other cities within South Africa. It was further understood that there may have been smaller entities that were overlooked due to their unfamiliarity with the researcher.

The next step in obtaining a sample was by inquiring whether those organisations had a business intelligence system, tool or in-house solution. The criteria needed to constitute inclusion in the research were (i) the organisation was a technology distributor that transacted primarily with

intermediaries and not the end-consumers, and (ii) had implemented a BI system or software. However, the organisation selection was also established with the help of contacts at the organisations. Where contacts were not present, direct telephone contact was made with the organisation. It was anticipated that the number of appropriate organisations would reduce to at least half, totalling 12 to 14 relevant organisations. This was because many had not implemented any form of analytics system. The researcher was surprised that two publicly listed distributors did not meet the entry criteria either. The final sample was eleven organisations. According to Saunders and Lewis (2012), it was recommended that the researcher established the number of interviews needed inductively, and then conducted interviews until data saturation was reached. Leedy and Ormrod (2001) advised that a sample of between 5 and 25 was sufficient when conducting in-depth interviews for qualitative research. McCracken (1988) suggested that eight respondents were sufficient because the objective of the qualitative research was not generalisability of the behaviour and experience.

The researcher's aim, in anticipation of interview challenges, was to try and conduct at least eight interviews with the selected organisations and to interview the respondents operating at a senior management level but acknowledged there may be challenges. The research included a relatively homogeneous population, distribution management, and had reasonably narrow objectives of BI adoption (Guest, Bunce & Johnson, 2006). Based on this, five to eight interviews was determined to be sufficient as per Leedy and Ormrod (2001).

4.7 Unit of Analysis

The sampling unit was the object being measured or observed with respect to the phenomena being studied (Wegner, 2016). In this research, the sampling unit was the respondent present at the senior management-level and their perception of decision-making guided by BI within the IT distribution industry.

The reason senior management-level participants were chosen, was because they were reasoned to possess decision-making capabilities (Liu et al., 2013). They were also reasoned to be knowledgeable about the issues being researched and were regarded as being able and willing to communicate about them (Jiménez-Barrionuevo et al., 2011). Contributing to this rationale, Deng and Chi (2012) described the challenges encountered when different individuals adopted BI systems, advocating for an examination by specific user type instead.

Furthermore, Watson and Wixom (2007) believed that for BI to be useful in an organisation, it should be driven by senior management. This should be in terms of strategic alignment, resources, and example-setting (Watson & Wixom, 2007). It was proposed that senior management readily understood the success factors inherent in BI adoption, and were effective for transforming theory into practice (Mungree et al., 2013). Thus, the researcher followed the approach of Jiménez-Barrionuevo et al. (2011) which ensured the same type of respondent was chosen in order to keep the level of influence among companies constant, and thus increased the validity of the researched areas. The qualitative approach was further substantiated by the view that empirical studies did not always capture the richness of theoretical arguments and facets of the absorptive capacity construct (Zahra & George, 2002).

4.8 Measurement Instrument and Data Gathering Process

Research data was collected once ethical clearance for the research was approved by the Research Ethics Committee. This process involved submitting the proposed interview questions, methodology, and letter of consent to the committee. The letter of consent explained the purpose of the research and that participation was voluntary. It also assured participants that the data collected would be kept confidential with no identifiers mentioned in the research. After approval was provided by the researcher's supervisor, these documents were submitted to the Research Ethics Committee and ethical clearance was approved. A copy of the ethics approval is found in Appendix 1 and the consent letter is in Appendix 2.

Thereafter, data was collected by the researcher through semi-structured in-depth interviews with senior managers in distribution organisations. Where face-to-face interviews were not possible, then telephonic interviews were utilised. Only three interviews were telephonic. No difference was found in terms of openness or length of interview.

With the guidance from the interview method, as developed by McCracken's (1988), the researcher proceeded to develop a guiding schedule of interview questions which helped establish a clear sense of direction and content to be covered. It also showed participants that no sensitive information would be asked. A piloting phase of the semi-structured interview questionnaire was conducted by the researcher to ensure reliability of the process (Saunders & Lewis, 2012). This pilot made the use of three colleagues in the distribution industry to check that the question guide was clear and would likely result in appropriate answers (Saunders & Lewis, 2012). These exercises allowed the researcher to remove any ambiguity in the questions. The

pilot interview conducted with one colleague revealed an additional question to be added to the interview schedule. Thereafter, the questions remained the same for the duration of the interviews.

The consent letter and questions were sent ahead of the scheduled interview in order to give the participants ample opportunity to formulate their responses. This assisted in collating data that was well thought-out, and thus was able to contribute to the richness of the research (Saunders & Lewis, 2012). Respondents were also informed of the use of recording devices and such consent was included in the consent letter. The emphasis on confidentiality of the responses was reiterated to ensure the respondents felt comfortable in answering the interview questions. Respondents were also informed of their right not to answer a question and proceed to the next question should they feel uncomfortable in answering it. None of the participants chose not to answer a question.

It was important that the researcher was not obstructive to the flow of conversation, as McCracken (1988) cautioned that the respondents must be able to tell their own story in their own words. Accordingly, interview questions were phrased in a general manner and can be seen below. Likewise, the researcher took care not to impose her own perspective on the respondent (Carson, Gilmore, Perry & Gronhaug, 2001). The use of prompts was included in the construction of the questions to serve as conversation cues, called upon when the conversations deviated from the material to be covered. Overall, the interviews flowed with the researcher asking the main questions and in some cases, either a prompt or a follow-up question was asked.

The interviews were recorded and then transcribed for analysis. The service of a transcriber was enlisted and a non-disclosure agreement was signed. Where questions arose, post the transcribing process, contact was made with the respondent in order to obtain clarification. This follow-up session with the respondent was a useful way to discuss the key concepts that emerged from the initial interview (Carson et al., 2001).

4.8.1 Interview Questions

Research Question One: What role does business intelligence play in the distributor's decision-making?

1. What is your understanding of the term business intelligence?
2. Tell me about the kind of business intelligence in the organisation?
3. What are the business activities that are supported by your BI system? And how often are they consulted?
4. In what way has BI been used to enhance:
    a. Customer relationships?
    b. Supplier relationships?
    c. Entrance into new markets or products?
    d. Are there other examples that you can think of where BI has been used?

Research Question Two: How can distributors improve the adoption of BI in decision-making?

5. What do you think are the critical success factors for BI adoption?
    a. Has there been an education/training effort for BI?
6. Are there specialised teams that are responsible for BI? What are their roles?
7. What are or have been the challenges for BI adoption? What did you do to overcome these challenges?

Research Question Three: What role does senior management play to influence the use of BI to make decisions and formulate strategy?

8. How often is management exposed to external data or internal data, and to what extent?
    a. Is there a difference between the senior management and the rest of the layers of management?
9. Can you please describe scenarios when data is consulted for decision-making?
    a. At what level in the organisation is it permitted?
10. What is the general process adhered to for decision-making?
11. What do you think management ought to do to improve the use of data in decision-making among members of the organisation?
12. Do you find that distribution industry is changing or does it still operate as it always has?

4.8.2 Hurdles encountered in data collection

The sample of the research belonged to a small industry and it turned out that even fewer IT distributors, eleven to be exact, had adopted any form of business intelligence than previously anticipated. This made it very important to interview all of those that had indeed implemented such analytics capabilities.

With clashing schedules, the interviews were delayed. The researcher also failed to anticipate the timing of many technology conferences taking place over August and September. This delayed two interviews as the selected participants were overseas and out of reach. Upon their return, the researcher struggled to get time in their schedules but eventually was able to interview one.

The respondents that were not interviewed were contacted on numerous occasions to secure interviews. This included phone calls at different times of the day, follow-up emails and even the help of the researcher's CEO to contact them directly. In many cases this was successful, but for the last two interviews, this proved ineffective.

Another two selected participants refused to participate or even provide a lower level manager to participate on their behalf. One participant did not have time to meet in person and did not welcome the idea of a competitor being on their premises. However, they were open to conducting a telephonic interview.

4.9 Data Analysis Approach

Creswell (2012) reported that many qualitative studies added additional rigor and insight into the research by layering themes or interconnecting them. The data analysis approach chosen, included content analysis and thematic analysis, but moved further and ascribed to layering the analysis and interconnecting the themes as per Creswell (2012). Schreier (2014) highlighted that the objective of content analysis was to provide a detailed description of the topic under analysis and to apply more context-dependent meaning. The description and development of themes from the data consisted of answering the major research questions and forming an in-depth understanding of the central phenomenon through description and thematic development (Creswell, 2012; Guest et al., 2013).

In addition to the above approach, the data collected was analysed primarily through ATLAS.ti 8. All data was securely stored on a Google cloud platform, which was easily accessible and reduced the risk of loss. The researcher developed meaningful categories or codes to describe the data and answer the research questions (Saunders & Lewis, 2012). Categorisation essentially identified those passages of text that related to some more general phenomenon (Spiggle, 1994). There were passages that attracted multiple categories and those with no meaningful information thus attracting none (Spiggle, 1994).

A coding frame was developed with various categories defined and it contained all the aspects of the transcribed interview that related to the research questions (Schreier, 2014). Following the inductive approach in this research, the categories were mostly based on emerging themes but also included terms from existing applicable theory used in the literature (Saunders & Lewis, 2012; Guest et al., 2013). There were main categories and subcategories in the coding frame (Schreier, 2014). Hereon, the layering and interconnecting of themes were applied as per Creswell (2012). Many categories went beyond the specific words used and were conceptualised at a higher level of abstraction allowing the category to apply to many other descriptive paragraphs (Spiggle, 1994; Schreier, 2014). Parallels and differences across the passages were examined by the researcher as per Spiggle (1994). As the coding progressed, so the parallels and differences became more systematically identified (Spiggle, 1994).

4.9.1 Validity and Reliability

According to Saunders and Lewis (2012), validity represented the “extent to which the data collection methods accurately measured what they were intended to measure” (p. 127), and the research findings correctly reflected what was measured (Saunders & Lewis, 2012). The researcher sought to reduce the risk of subject selection by ensuring the selection of participants was predominantly representative of the population. The criteria screening of organisations also contributed to the validity of the research. The distribution industry in South Africa is relatively small, with a few key organisations owning the majority of the market. Most of the key organisations were interviewed, thus representability was believed to be achieved.

Reliability, according to Saunders and Lewis (2012), was “the extent to which data collection methods and analysis procedures produced consistent findings” (p. 128). Saunders and Lewis (2012) advised that reliability could be pursued through structured interviews with questions

derived from the literature, in order to examine the respondents in the same way. McCracken (1988) argued though, qualitative research was not about generalisability, but rather it was about access to the construction of the world from the respondent's viewpoint.

However, in light of McCracken's view, efforts to ensure reliability were implemented by the researcher. These efforts, suggested by Creswell (2012), had followed the technique of member checking and triangulation of data sources. Member checking was where the researcher asked one or more participants in the study to check the accuracy of the account (Creswell, 2012). In this instance, the transcription was checked. The researcher planned to limit observer bias through consultation with subject matter experts and ensured that the questioning in the interview was not deliberately leading. The two experts were in the field of BI and the use of colleagues helped ascertain whether the interview was leading.

Triangulation was a process adopted by the researcher as it corroborated evidence from different respondents or types of data (Creswell, 2012). The researcher heard similar answers for questions by different respondents, thereby validating the triangulation. Therefore, the process was deemed to be appropriate for qualitative research. Finally, consideration was also made to ensure that those interpreting the research could clearly see how conclusions were formulated from the base data (Saunders & Lewis, 2012).

4.10 Limitations

There are several caveats and limitations to be considered in the broader transferability of the research.

I. This qualitative study was exploratory and inductive in nature, and the assessments resulted from the personal views of the researcher. As such, the personal bias of the researcher was introduced into the data, thus caution must be taken in the interpretation of data. However, the subjective nature of interpretation of a respondent's experience was recognised by Spiggle (1994) as unavoidable. It was also noted that a qualitative study presented the challenge of measuring validity.

II. Simultaneously, interviews may have elicited subject bias because respondents may have felt that telling the truth showed them in an unfavourable light (Saunders & Lewis, 2012). The

researcher felt that subject bias was limited as there was a general climate of comfort in each interview. The use of a non-probability and snowball sampling technique may also introduce bias into the findings.

III. The researcher is employed within the industry, and the interpretation of the results could have been shaped by the familiar organisational context, therefore researcher bias could have occurred during the literature review, interview process, and analysis of results.

IV. There was an advantage that the researcher possessed industry knowledge and to an extent could prevent subject bias. The researcher had taken care not to emphasise particular themes and introduce personal bias. Manufacturing distance was the advice given by McCracken (1988) for when the researcher possessed deep familiarity with certain topics. Thus it was incumbent that the researcher remained critically aware of allowing an invisible hand to direct the interviews (McCracken, 1988).

V. The researcher made the assumption that timely access to the interviewees would be granted, that interviews were conducted in an appropriate venue, and that honest and open discussions would be obtained. With time constraints present, the researcher recognised that the number of participants interviewed was on the lower end of the intended sample size. Thus the omission of other distributors may have an impact on the results.

VI. The sample was limited to only the South Africa distribution industry, its distributors, and may not be generalisable for other countries or industries. The research did not include lesser-known distributors. The geographical position of the distributors was skewed to Gauteng but this followed the location of their head offices.

VII. With the management level targeted as the respondents, the result was that the assessments of lower-level employees were omitted. The implication of this was that there may be a bias present in the results for the organisation. Similarly, the results may not have provided a complete representation of the current behaviours and practices of the entire organisation.

VIII. The research did not take into account post-adoptive behaviour over a period of time as this sample was cross-sectional due to time constraints.

IX. The plethora of definitions for business intelligence demonstrated a lack of widespread consensus and thus the usefulness of the definition utilised may be better understood in a longitudinal study.

X. Furthermore, insight into the organisational culture or management styles were not examined, thus the researcher acknowledges that it may influence the level of adoption of evidence-based decision-making.

XI. Finally, since no empirical testing was performed, the research does not measure the improvement in performance past evidence-based management adoption. Thus no correlation nor causal relationships were proven. Qualitative researchers do not typically think in causal terms (Spiggle, 1994, p. 495).

4.11 Ethical Considerations of the Research

In lieu of the fact that the researcher is employed in the industry, the full disclosure of this fact was provided to the other respondents from competing organisations. Reassurances were made that the nature of the interview was to be conducted in good faith and that no confidential information was expected to be revealed. Their consent to participate in the study was voluntary.

Each respondent signed the consent statement (Appendix 2). The participants were given time to read through the letters and the questions. In the event a respondent mentioned a name or company, such identifiers were removed from the transcripts and all transcripts were kept confidential.

Chapter 5. Results

5.1 Introduction

The previous chapter outlined the methodology that was adhered to for collection and analysis of the data that was obtained from the in-depth interviews. The interviews provided an insightful perspective into the use of BI for decision-making by IT distributions' senior management.

In this chapter the results of the interviews are discussed. The sample of the interviews and the contexts of those interviews are described. For every research question, a series of interview questions were asked to the respondents (Table 2). The findings of each interview will be elaborated upon in terms of the research questions posed as per Chapter 3 above. This approach allows the themes that emerged from the interviews to be discussed and not the specific codes that were created. This follows the inductive nature of the research.

5.2 Sample of Interview Respondents

Leedy and Ormrod (2001) advised that a sample of between 5 and 25 individuals was sufficient when conducting in-depth interviews for qualitative research. The researcher's aim, however, was to conduct between five and eight interviews with selected organisations' senior management level, as per the recommendation by Leedy and Ormrod (2001) and McCracken (1988). McCracken (1988) suggested that eight respondents were sufficient, because the objective of qualitative research was not generalisability of the experience. However, over a period of seven weeks, a total of seven interviews were held with seven distribution executives, all of a CEO level. Their years of experience is found below in Table 3. Although two more respondents had agreed to be interviewed, they were available after the cut-off date decided upon by the respondent. The respondents had also not followed up on securing time. The researcher was bound by time constraints to complete the research project. Thus the researcher recognised this was on the lower end of the intended sample size. In light of this, the researcher was happy with the interviews held and felt they were able to give ample insight into the research questions. Thus the researcher chose to follow the recommendation of Leedy and Ormrod (2001) and was satisfied with the sample of seven organisations.

Table 3: Summary of Respondents' Distribution Experience

Respondent	Distribution Experience (years)
1	25
2	11
3	5
4	1.5
5	10
6	15
7	28

The interviews were held in office meeting rooms, either at the respondent's workplace or at the researcher's workplace. During the sessions there were no interruptions and the conversation flowed freely. The interviews lasted on average thirty-three minutes and the longest interview lasted thirty-eight minutes. All interviews were recorded using a voice recorder and were backed up to the researcher's file on Google Drive. The recording allowed the interview to flow freely without having to interrupt the respondent. The researcher was able to clarify points raised by the respondents and make note of the prompts or questions to be asked in the next interview.

Table 4 shows that the audio recordings were 3 hours 46 minutes and created 33 569 words of transcription. The average length of a transcription was 8.4 pages.

Table 4: Summary of Interview Durations

Interview	Duration
Total Interview Duration	3 hours 46 minutes
Longest length	38.35 minutes
Shortest length	29 minutes

The first interview was transcribed by the appointed transcriber. The researcher used this first interview to check the audio quality, flow of conversation, how often the researcher spoke and whether distance was applied as per McCracken (1988). The researcher was pleased with the audio quality as this would make future transcriptions easy to do. Likewise, the flow of questioning was deemed acceptable and the researcher spoke primarily to ask clarifying questions. This revealed that the researcher was able to manufacture distance by not leading the respondents to a particular answer (McCracken 1988).

The second and third interviews occurred in the same week with the same interview schedule being utilised. The flow of these interviews confirmed that the order of questioning was appropriate and the allocated interview time allowed the respondents to comprehensively explore their answers. With the help of the researcher's colleagues, interviews were scheduled over a three-month period. A further two senior managers refused to participate. The fourth interview occurred in person at their offices, while the fifth was a telephonic interview because the senior manager was not available in Johannesburg for the next few weeks.

Similarly, the last two interviews were conducted over the phone. The remaining interviews were more difficult to set up as two individuals were away on a conference and one other was hesitant to conduct the interview seeing as the researcher was an employee from a competitor. The researcher managed to get one of the individuals that was away and the latter hesitant individual to interview over the phone. Another individual could not accommodate the researcher into his schedule. Assurances of confidentiality were made to help avail any resistance they displayed, but with no success. For a period of three weeks, the last two senior managers were called numerous times to secure interviews but the researcher struggled to get a hold of them. Colleagues were used to help secure interviews but they too could not get a definitive booking with either of those two individuals. A total of seven interviews were thus conducted, of which the researcher was familiar with only three of the respondents.

5.3 Transcribed Data Analysis

5.3.1 Transcription of Data

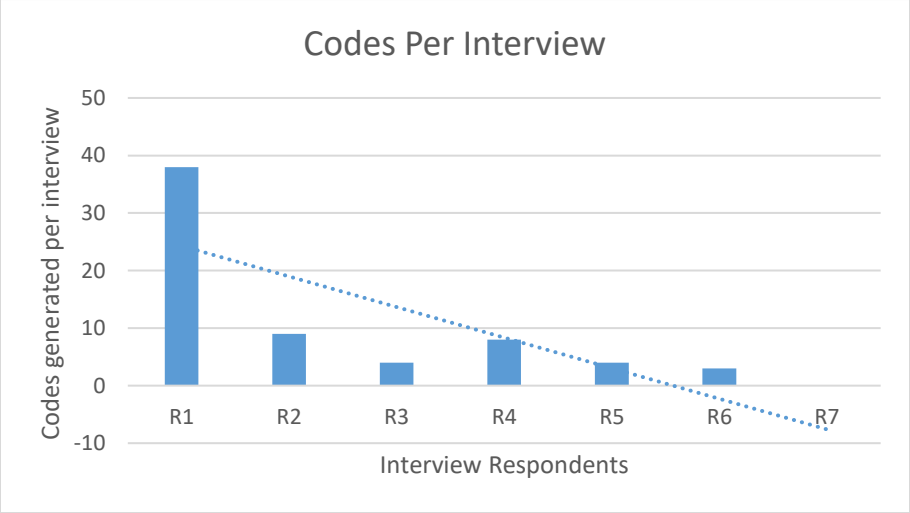
Once each interview was completed and the audio recordings were saved, the transcriber accessed the audio recording via a shared folder in Google Drive. The interviews were then transcribed on Google Doc. This ensured strict security measures, no loss of information and ease of access to the transcriptions. The researcher listened to each recording and reviewed the transcription. Where there was an "inaudible" clip, the researcher was always able to fill in the missing words. Few corrections were made per transcript, and these usually tended to be industry terminology. Overall the researcher was pleased with the quality and accuracy of the appointed transcriber.

5.3.2 Analysis of Transcripts

All transcripts were imported into a project in Atlas.ti.8. The naming convention of each interview remained unchanged as the respondents interviewed were homogenous.

With the research being primarily inductive in nature, this meant that although various themes were extracted from the literature, the researcher sought to elicit the general themes from the interviews. A code book was created as each interview was coded. In the Atlas.ti project code book, the researcher provided descriptions for each code. These were duplicated on a separate Excel spreadsheet. The coding became iterative in nature as new codes were uncovered in subsequent interviews, and then applied to previous transcripts (Creswell, 2012; Schreier, 2014). There was also a merging of similar codes. The use of content analysis was examined through the amount of time a respondent spent talking about a specific concept and thematic analysis helped uncover these new concepts. With this is mind, the researcher began to group codes into second-order groups, first-order groups and finally into themes. This was first attempted on the Excel spreadsheet and then applied in Atlas.ti. The complete codebook is provided in Appendix 3. There were 65 codes created, categorised into 22 second-order groups, and a further 10 first-order groups. These groups represented themes that were representative of the three questions set out in Chapter 3. Figure 3 illustrates the number of codes that were generated per interview.

Figure 3: Codes generated per interview



Although the researcher could not interview with all eleven organisations, the sample size remained sufficient as it became evident that the rate of the new codes was diminishing after the fourth interview. The researcher further believed that code saturation would have been met, had

the eighth interview taken place. It was expected that data saturation too would have been achieved because of the homogenous nature of the sample and their comparable approach to business. Thus the researcher accepted that code saturation was met with the seventh interview.

5.4 General Findings

5.4.1 Business Intelligence

Throughout all the interviews a recurring perception of "business intelligence" was that it was used to help guide decision-making. Both Respondent 5 and Respondent 6 acknowledged that the ability to make these decisions was enabled by the power of BI to retrieve data from various sources within the organisation and present it in an accessible format. The outcome of these decisions, in the case of Respondent 2, was linked to improved performance: "…*using data within business to help make better decisions to impact the profitability of that business".* The other respondents did not explicitly link their use of BI to improved performance.

> *Respondent 5: "Data from various sources to help you make better decisions."*
>
> *Respondent 6: "it's a consolidated information that helps us to make informed decisions and get a real perspective on different elements of our business".*

In line with Respondent 6's thoughts, it was because of these different elements of BI that other respondents also understood BI as a broad term.

> *Respondent 1: "business intelligence is quite a broad term because it doesn't just refer to technology, I think it refers to architecture, data, systems, processes, systems processes, culture, organisational readiness. All of those things for me sits inside the BI realm."*
>
> *Respondent 7: "I think it's a very broad category. To me it's all information that can assist a company in planning, in operating. I mean it's the use of information to run the business day-to-day".*

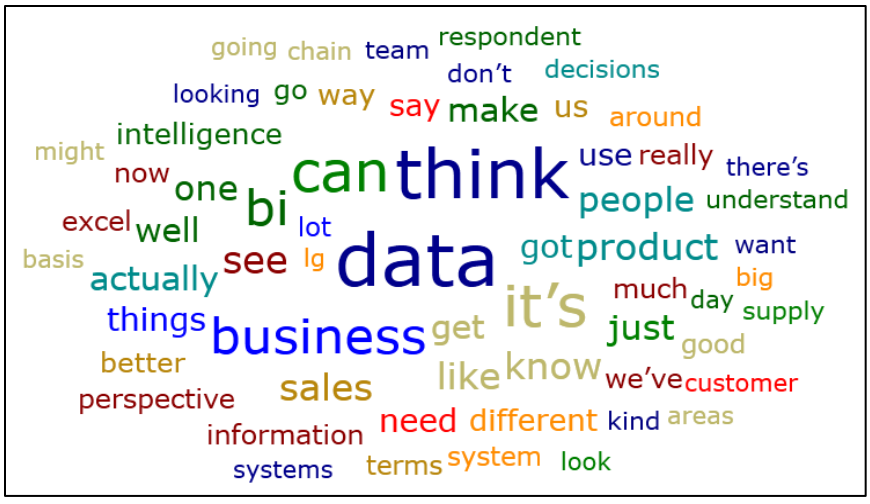
It was evident that the respondents interviewed had understood the essence of business intelligence. Yet, it was interesting to note that when asked about their form of BI, many downplayed their BI as being simple or unsophisticated. This gave the impression that, in their mind, they were trailing in comparison to other BI solutions available in the market, to other distributors or even industries. This demonstrated their awareness of the potential that was yet to be explored with BI in their organisations. Support, however, was provided when comparing their analytics capability with those of their international counterparts. When Respondent 5 decided to

upgrade their entire distribution facility, he visited six distributors in the United Kingdom and brought back those learnings and best practices. Nonetheless, when a comparison was made against other local distributors within the South African distribution industry, those perceptions of *simple* BI were unfounded. Recall that of a possible sample of 25 organisations, only 11 met the criteria of having any form of BI. This meant 14 organisation did not possess any analytics capability. Included in those organisations were two publicly listed distributors. This provided evidence that although they had perceived their in-house BI as simple, they were in fact in a better position than their local industry counterparts to advance such analytical capabilities in the forthcoming stages of BI adoption.

> *Respondent 3: "There is no fancy Business Intelligence systems…"*
>
> *Respondent 2: "but I think because we haven't rolled out, like the full-blown BI system and it's also kind of Excel based… Everything is basically compiled, consolidated and published in Excel. Which I think is probably not unique"*
>
> *Respondent 6: "We have Excel sheets that are integrated into external data, so we basically plug into live feeds from our systems which allows us to drill down in our pivots and specific customer, product brands, quantity, revenue, profit, you name it*"

There is a product side of understanding BI in the respondents' perceptions of BI as it relates to data, information, systems and Excel. As shown in Figure 4, the broader application of BI covers different perspectives around business, people, products and customers. This process perspective links to the business decisions to be made with the data. These ideas are explored below. It was evident that there was not one accepted definition of BI or set of benefits that resulted from implementing and adopting BI within the organisation.

Figure 4: Word cloud for the understanding BI theme



5.4.2 Research Question 1: The role of BI in decision-making

The purpose of Research Question 1 was to gauge management's understanding of the concept of BI and examine how well it was used for decision-making. Thereafter the researcher sought to understand the extent to which BI was inculcated into the organisation and to what extent it replaced the individual's information processing perspective (Tushman & Nadler, 1978). This would be revealed by the various business activities that used and supported BI. Lastly, the intention was to determine whether the notion of demand-visibility and the challenge it presented the industry were acknowledged by the respondents.

5.4.2.1 Tracking Performance

BI has allowed an organisation to access internal information, present it in a format that can be analysed and used for decision-making. While the consistent use of BI in decision-making has been questioned, its role for tracking performance has not. Respondents explained that most of the time the information retrieved from their systems was used to track targets, sales, company and individual performance. Tracking has enabled the organisations to focus on areas in need of development, either from a people, product or an operational perspective.

Primarily the focus had been on sales tracking, which was expected with these being sales-oriented organisations with targets to achieve: *"…most of our managers use it purely as a reporting tool and it goes to the extent of are they on target or not, and that's it"* (Respondent 1). A key area of monitoring was the sell-in and sell-out view of the data: it allowed the distributor to see whether the stock brought in was getting sold and in what quantities.

With stock forming a large component of the working capital in these organisations, effort has been directed to *"understanding the supply chain efficiencies better…How productive are [they] in the use of [their] assets in the warehouse?"* (Respondent 1). Respondent 5 explained how their BI revealed the amount of time wasted by not consolidating orders or maximising the locations in the warehouse for fast-moving products: *"So by consolidating, you are immediately bringing down your operational costs to a very high degree"* (Respondent 5).

> *Respondent 2: "I think in retail, analysing your margin whether it would be at the distribution level or whether further down the food chain… is very important. And I think just understanding which are the categories or product that are contributing the most. So it's always looking at that. For me, consumer electronics runs very thin on margin. So if*

you're not are using proper tools to analyse it, I think you can very quickly get into trouble and it's so fast-paced that you will lose money quickly".

Respondent 3: "I think it's to enhance profit as much as possible; I think that it gives you a good overview…sometimes often one product is carrying the other, and you cannot actually make the decisions. So that whole range, the product category might be great, but one is really pulling it down, or it might be bad, but it should be good because one is really pulling it down".

Respondent 4: "Right now, we are making big decisions around our operational cost structures based on sales, profitability and historical trends. And they're very data-driven".

The key learning is that BI has been used retrospectively. It is a reactive response to what happened. There was no mention of a predictive capability forecasting what will happen. Nonetheless, the ability to view the sales or stock trend played a key role in helping the distributors plan stock purchases with the vendors. It also ensured that there was sufficient stock available in the different distribution channels. From the vendor perspective, this information is very important for the purpose of manufacturing and forecasting demand.

Respondent 6: "So this is really interesting, we share with selected vendors, we share stock-on-hand, sales information, which is down to monthly sales, unit numbers, key customers, and so we are then able to generate really effective forecast orders, we completely aligned in it, it means that we're also able to proactively address problem areas with the collective support of our vendors. It's very integral in our vendor relationships".

Respondent 5: "information is sent to them [vendors] on a daily basis. We also engage with them on our stock holding as well. So they have clear visibility of exactly what we have available in our warehouse at any given time: on what we have on order with them, what we've got on back-orders from them."

Respondent 2: "So we literally take the BI info, from a sell-out perspective, on a weekly basis and we kind of reverse engineer it back into our forecast to make sure that when we see demand signals shift, whether it be up or down in the market, we are adjusting our forecast and our ordering onto our supplier in line with that."

Respondent 1: "there is a big need for us to report back to our vendors, in terms of inventory and sell-through. Mostly so they can align their manufacturing systems accordingly, because they have got a much quicker view of the perceived demand in the market. Because they perceive one sell out from us as demand."

The interviews also revealed that senior management was aware that they had only begun to appreciate the value of their BI capability. Some of the organisations were investing further in order to advance their BI capability, and recognised their capability would mature with experience.

In an observation made by the researcher, much of the analysis focused on historical trends and interpreting the data from a prescriptive BI standpoint. The examples were predominantly reactive in nature, demonstrating that the prospective nature of BI was not being utilised. This was confirmed by Respondent 4 who agreed that he had not *"seen things like predictive analytics, trend analysis, correlations and sensitivity analysis…"* as well as Respondent 1 who said *"it's not so much interpretive or predictive in any way. I think it's almost more reporting than it is true business intelligence"*. Nevertheless the value of the data they did have, at that point in time, was acknowledged by the senior management interviewed.

> *Respondent 1: "what we have built is a very strong capability in making sure the data is accurate, timeous… it's far more timeous than it's ever been. So we've got all the building blocks. I think we are just not utilising it from an interpretive perspective in the way we should."*
>
> *Respondent 6: "I think any management meeting without data is hearsay".* This statement shows profound support for a culture of evidence-based decisions. Respondent 7 confirmed this, *"I think you cannot ignore data in making decisions, I think that we are no longer required to make decisions on the fly"*.
>
> *Respondent 5: "Well, if you don't adopt BI into any business, you obviously, you know, you're just fishing in the dark... You have no idea what's happening, you don't know what the market is doing. I think it's critical, you have to do it. We find that it's almost, we couldn't run the business if we didn't have that".*

5.4.2.2 Tracking People

The use of BI for performance management and commission calculation was recognised by all of the respondents, citing that being able to use the data as the basis of the discussion was very effective. Respondent 6 explained that it was used to *"reference key areas of attention, there's no subjective data. It's there and allows us to address points without any emotion, and very often we get very good results from that"*. This information was also used for promotion discussions: *"We make decisions around data for things like performance management: so promotions based on people hitting targets over a consistent period of time..."* (Respondent 4). Respondent 7 explained that the data was used *"in setting the salespeople's targets for the next month".*

Target achievement had a financial impact on the organisation as a whole and the teams were duly motivated to ensure that their numbers reflected correctly *"And when they want to have commissions paid to them, they certainly go back into the systems and re-check everything"*

(Respondent 3). Therefore, the value of data is shown to be of great importance when discussions occur about employee performance. Seeing as commissions are paid monthly, it highlighted that at least on a monthly basis, data from the BI system is accessed and utilised to make decisions.

5.4.2.3 Tracking Customers

The use of BI for tracking customers, where used effectively, created a better understanding of the organisation's customers. Such knowledge of the customer allows for the information gap, inherent in the distribution value chain, to be narrowed. This is because the better senior management understand where their product sells, the better they are able to meet customer demand and align their channel strategies. Consequently, much of the analysis drawn from the BI system has focused on the purchasing patterns detailing the customers' sales, profitability and quantity growth and as Respondent 7 put it: *"it enables you to have more intelligent conversation"*. *"Unfortunately price and stock availability, once upon a time, were the differentiating factors between who would win the business in the distribution game, these days I think a distributor needs to offer a lot more than that"* (Respondent 6).

The researcher got a sense that differentiating between run-rate customers and larger enterprise or deal-specific customers was central to understanding the role that BI played in these areas. For the run-rate customers, the distributor might play the role of order fulfilment, but may not have insight into why the order was created in the first place. But the use of BI with these customers could show their preferences for particular products. Thus tailored promotions could be sent to them or tailored customer strategies could be developed. In the larger deal specific customers, there was usually more intimate knowledge of and early involvement in the deal. Generally the distributor was aware of who the end user was, whereas in run-rate business the end-consumer was mostly unknown.

> Respondent 6 understood this challenge and took a different approach by providing their customers with a BI dashboard: *"So we've got dashboards that are rolling out to customers on a monthly basis which helps them to meet growth expectations that are between management levels… So if we've got a customer who will share that information with us, down to an account manager who is responsible for the info, we can then customise our dashboards to incentivise individuals, as opposed to a blanket number on the company as a whole"*.
>
> Respondent 7 admitted that they *"try and engage the reseller nowadays, more than what was done years back, to try and establish that type of pipeline and information. Because*

you can then assist him again, by engaging the vendor, and trying to maybe get the vendor's assistance in closing the deal".

Respondent 2: "so on a weekly basis we get the sell-out reports from each of resellers… we get sell out reports from them on weekly basis. Therefore we then get sight into…we actually get sales reports and stock on hand reports, so you actually get sight into how many units they are selling to the actual consumer, end user, in the market".

Respondent 1: "So we have got a lot of quantitative data about our customers, but very little qualitative data. Why they buy from us, and when do they buy from us. What's the primary factors that are driving those qualitative things, we don't know… We don't have a clue what's going on at the end user levels, and in some cases we don't know where our product is going"

Respondent 3 explained that for larger deals the end user, reseller and distributor will meet to discuss what solution will be best: *"It's more again, I think, a feel. I think we our sales guys and management understand to a degree, what that customer wants, and what those end users eventually want, and can help build a solution around that. Are they using BI to do that? I don't think so. I think that's sitting around the table and discussing and saying what will work best at that".*

This knowledge of the customer base and perhaps in some cases the end user, speaks to the desire to close the information gap created by the very nature of the distribution industry. However, besides for Respondent 6 and Respondent 7, there was not overwhelming evidence that the data from the BI was used very often for this purpose. The weight of the historical relationships seemed to hold the other distributors back from fully accepting which customers were more valuable than others. The interviews provided little evidence that they were able to narrow the information gap. This questioned the value that these distributors would continue to provide in the supply chain. *"The survival of distribution is on services"* (Respondent 7) and this is concerning with customer profiles still being largely driven by relationships and historical agreements.

Where Respondent 3 may understand the customer for the large deals, they do not know when their top customers buy the most "*Should we? Yes. Do we? No…. we don't keep records of any who the end users are. Our focus is on the resellers."*

Respondent 4: "I think we've got quite a lot of data about customers, and we don't necessarily use it enough. It's not to say that the BI is the problem, it's probably the pull isn't coming from the business

Respondent 1: "I think, we have no clear understanding of the demand, because we are not sure what the demand is at end user. And with the way technology is now changed… the power is shifting from the vendor to the end user, and that user knows what it is all about, and we are one step away from the true demand. So we are at best aggregating".

It is clear that the intention is there to use BI in order to assist with decisions about customers. However, there is neither widespread nor consistent use thereof, regardless of the customer or sales transaction. Thus the evidence shows that the information gap has not been narrowed and will likely challenge their future value in the supply chain.

5.4.3 Research Question 2: Improving the adoption of BI in decision-making

The purpose of Research Question 2 was to examine the prerequisites for a successful BI adoption in the South African distribution industry and whether there was an overlap with the literature on BI implementation. The intention was also to explore the failures or challenges encountered by the organisations when adopting BI in decision-making. The researcher was interested in what was done to overcome these challenges and thus examined whether these actions constituted additional prerequisites for success.

5.4.3.1 Technical Critical Success Factors

5.4.3.1.1 Trust the Data

There was a notable tension between trusting the data and trusting one's own instincts. This builds on the use of BI for customers. The reason for this tension was that many of these organisations have been around for more than 20 years. Many decisions have been inadvertently biased by the many long-standing relationships that had been built over time. Nevertheless, in these organisations there was a recognition that "*you need to mix BI with the human relationships*" (Respondent 3).

It was not that there was a complete reluctance to use the data, but it was very important that as a point of departure, the data was accurate. This proved more important from a product view than the customer view. Respondent 5 alluded to the fact that they automated their transactional data by having a program that ensured data integrity: *"every transaction that's gone through is recorded in the correct journal entry or sales entry"*. Thus it highlighted the point that the foundation of good decision-making was good data. Good data was that which could be trusted at all levels in the organisation.

Respondent 1: "Do we have clean data? I think that is a critical thing that if people use the system and it proves that the system is inaccurate… I think that all stops the systems quite quickly"

Respondent 2: "Get a single source of the truth… Typically you've got multiple systems that feed different forms of information… if the hierarchies aren't accurate and aren't defined clearly enough, the data that you can extract out of it, you actually will make wrong decisions on it."

Respondent 6: *"Well, the first is I think the data needs to be trusted, so you need to make sure that whatever you've got, whatever data you're presenting is accurate. So that's got to be updated regularly and it's got to be sound…"*

5.4.3.1.2 Integration and Infrastructure

Appropriate integration and infrastructure were considered to be two of the most important capabilities for BI adoption, especially because it enabled getting the data all in one place. Many of the respondents highlighted the legacy systems present in their organisations. In two cases, they had subsidiaries with different systems that were not integrated within the group system, thus were operating separately. Respondent 1 confirmed that in his organisation they *"run off multiple ERP systems, so bringing all that data onto one platform across the group, across the businesses, getting one view of the customer across the businesses, that's sort of the next layer and we don't have all the systems in place.*" The complexity of integrating the separate systems was accepted as a common challenge. Respondent 4 experienced the same challenge and stated that "*the systems issue is a very practical limitation*" but it did open a platform for a much broader "*discussion around the value of data*" (Respondent 4).

For other organisations, this integration issue was overcome, and such is the case for Respondent 6, who personally oversaw their BI implementation: "*So apart from our standard accounting and inventory management system that we use, we've integrated into a lot of APIs, into a lot of external reporting tools that help us to make informed decisions."* These technological factors were the starting point for both implementation and thereafter adoption. It was incumbent upon the organisation to have the right resources.

5.4.3.1.3 BI Resources

Although it was argued that having good data housed in appropriately integrated systems was the foundation on which the success of BI adoption was built, it was not as effective without the presence of dedicated BI resources or a BI team. In all but two of the interviews, the organisations had specialised BI resources. Of the two respondents, one was personally responsible for the BI capability.

> *Respondent 2: "You've got the head who looks after the whole BI team [three people], who's responsible for managing that team, and then what you've got is a business analyst that looks after different parts of our group… they all use a similar report to publish their data with."*

> *Respondent 5: "Most of the time we are very reliant on our IT team. We've got a highly dynamic IT team that are highly analytical - anything that you want to do, they can come up with a solution for you."*

While most teams consisted of four individuals, the largest team had six people and were split between the finance and IT departments. This was an advantageous approach because it accounted for the possibility that the technically-oriented individuals may be limited in their knowledge of the business side.

> *Respondent 4: "a specialised BI team in finance, which is responsible for producing a lot of the data and the reporting. There's a team, or a couple people at least within IT who have the technical skills to…know where the data sources are… my understanding is that those teams work together to produce it for different areas of the business."*

The downside with having a team of analysts in the finance department was that the focus tended to be more on financial ratios and less on operational metrics: "*it's a small team of isolated people which forms part of the finance team, which I think is challenging in its own right, because then it becomes financial in nature, instead of, it being a tool that can be used across the organisations*" (Respondent 1). Further evidence was provided by Respondent 1 arguing that BI as a tool was predominantly used "*to corroborate what they've [finance] already got in the ERP system but in a more, in a way that the ERP systems cannot give it to them today"*. This reinforces the current reactive nature of BI adoption. The ERP systems in their case were unable to provide the detail inbuilt with the drill down capability of BI systems.

There was an interesting debate pertaining to the capacity of the team which centred on the reports produced. *"So the people who were running the reports were getting an unbelievable*

number of requests for this report and that report" (Respondent 7). Respondent 2 expected the BI team to manage their capacity by producing standardised reports, whereas Respondent 4 and Respondent 6 believed that reports should be tailor-made, especially at the executive level. The underlying theme present in this debate was understanding what information provided the most valuable insight for the organisations and then continued to debate who was privy to this insight.

> Respondent 2 cautioned that with different levels of adoption within the organisation, inevitability there would be an individual who would want to see more and more data.
>
> "*The big challenge always is then you end up creating not generic reports, but you end up creating a lot of smaller, specialised reports. What that then does is it decreases capacity of the team, which means that you can't move on to other projects that actually probably need the attention….It becomes a team that pushes out Excel spreadsheets but doesn't apply any intelligence to the data" (Respondent 2).*
>
> In response to the call for differentiation, Respondent 6 welcomed the idea of tailored reports "*And what's exciting is now we've got the buy-in, if you will, of so many members of our team that are now asking for BI in different elements and have seen new opportunities for it to be implemented so it's really gathered a lot of momentum over the couple of months*" (Respondent 6).
>
> On the other hand, Respondent 4 complained that he did not request the daily reports he receives and questioned their usefulness: "*We've got access to data, but it's not always the right data, in the right format, presented at the right time*." He explained that senior management and middle management tend to get the same reports but it "*would certainly help me more if we could differentiate the type of data a little bit better in that case".*

Figure 5 below, summarises the quotations of the respondents that related to each second-order group identified within the technological-oriented success factors. The major second-order groups identified include data quality, infrastructure and BI resources. The quotation from Respondent 1 (document 2) attracted all three code groups. Infrastructure and data quality overlapped in five quotations below, strengthening the argument that these are prerequisites which reinforced the other.

Figure 5: Network for technological oriented critical success factors

5.4.3.2 Business-Oriented Critical Success Factors

5.4.3.2.1 Change Management

It was apparent that most of these organisations operated in a certain way for many years and the adoption of BI was in its infancy for many of the organisations. This was especially evident among senior management highlighted by Respondent 3, whose founders were still active within the organisation. Thus it became clear that the organisation was required to emphasise the personal benefits along with the organisational benefits that arise from adoption of BI. But Respondent 5 was quick to recognise that people do not like change and are very comfortable with how they do business.

> *Respondent 2: "Unfortunately, when going through any of these processes, something like change management comes into play as well….If you don't create a proper process of doing change management and getting people to adopt the new reports, then people don't. People fall back onto old reports and old habits".* Consequently Respondent 2 felt that more could be done from a change management perspective and that it would be considered going forward.
>
> *Respondent 1: "I think there's a big challenge in terms of organisational readiness".*
>
> *Respondent 6: "we've tried to put champions in place to drive that [change management]. So, where we're able to really demonstrate the value with a few key players in our business and they've been able to really use it to their benefit, other members of the team are a lot more willing and eager to incorporate it into their way of working."*

Whether it be the placement of champions or the example set by management, it was clear that visible effort to promote adoption was a prerequisite for gaining the buy-in from the wider organisation and aspiring to the intended levels of adoption.

5.4.3.2.2 Analytical Mindset of Teams

Although there was much focus on the readiness of the organisation, the success of BI adoption was heavily reliant on the analytical potential of the organisational members, and this was not excluding senior managements'. It was Respondent 4 who challenged the expectation that all management would be adept in their analytical capabilities. The industry was built from a sales mentality and those that rose through the management layers may not necessarily have been *"numbers focused"* (Respondent 2). This was confirmed by Respondent 1 and Respondent 4.

Respondent 1: "Managers are employed because they are the best at what they do. And a lot of our product managers comes out of a sales environment, which is one dimensional. So it's in terms of only looking at sales, so not a negative, I'm just saying, that is just the way it is".

Respondent 4: "I think you've got a challenge that not everybody in this organisation comes from a background that really understands… doesn't have an analytical approach to business, to the work that we do. There's a lot of people who are traders, they buy and sell, and they're very good at it. They maybe want sales data, but they don't necessarily see the value of operational data."

In contrast to this perspective, Respondent 6 was asked by his staff to communicate and share the analytical insight of the overall company: *"We've now incorporated a degree of that information for the entire company at our annual year-end event... That was based on information from our employees to say we think the rest of the team would really value this kind of insight into the business".* This demonstrated that at the core of BI adoption was the culture of curiosity that was exhibited by members of the organisation. Much of the success could be attributed to these types of members, mostly senior management, and their insistence on backing decisions with data.

Respondent 1: "clever people" …" if your organisation is largely functionally structured, and people are largely coming to work to do a task, then I think the BI will only be the remit of a few exceptional people in the organisation that understand that they need this information to make better decisions. But that means it would be a very shallow implementation of the BI across the business." The first remark does not go unnoticed because he points out that talent is a key challenge.

Respondent 5: "We have a few people at branch level or senior level that are very analytical. They like this kind of information all the time so they engage with business to extract data to answer specific questions or to address certain concerns or certain challenges that we're facing".

With adoption of BI being supported by management, wider adoption can be facilitated through training mechanisms that are set in place, because if the BI capability is used by only a select few, wider traction will most likely fail. Thus education and communication of BI must be inculcated throughout the organisation, otherwise *"people fall back onto old reports and old habits"* (Respondent 2). It also provides a mechanism to grow talent from within.

Respondent 3: "Training on the software and having competent people looking at the data… as I was saying before, if you get a dashboard, that's all good and well looking at the data. If you don't have someone that can interpret it".

Respondent 4: "So the training that I've had has been somebody from IT coming in and saying here's a cube… you have access to it… This is how you slice and dice your data… It's not, not exactly a scalable solution, but it's worked enough to get me onto the cubes that I've seen". This demonstrated that even smaller training efforts were effective so long as the BI dashboard was easy enough to use.

Respondent 5: "…first it was the fear factor we had to get over, then it was time to get people's skills to the right level, to be comfortable to login to a computer... take the instructions that the actual device gave you and you just had to follow it". Great pride was taken in being able to upskill this level of employees.

This pride was exhibited by Respondent 7 but it was primarily in response to the capacity of their IT team, thus he felt that the managers *"must be trained on how to run that report at [their] level and get access to the information [they] need for [their] reports… But I can't have you going to ask somebody else to do it every day"*.

5.4.3.2.3 Management Support

Management communication about the purpose of BI reinforces training because the manner in which an organisation positions this transition to a data-driven culture, will undoubtedly have a wider impact on the mindset of the organisation.

Respondent 1: "We've got to think about what's in it for me, from a personal perspective and stuff like that, because if I get real benefit, it makes my job easier, I get better information, I get better decision-making".

Respondent 6: "And getting that mindset to a point where people started to embrace it for identifying opportunity and areas of improvement that they could willingly do. So as much as the data can be used to micromanage, we've tried to ensure that it's created a platform for people to self-regulate their performance and actually identify their own areas of improvement. In many respects it's helped individuals in our business take on senior roles and incorporate more leadership in the way that they conduct themselves."

The key principle substantiated by Respondent 6 was that access to data can lead to improvement in areas of both financial consideration as well as personal development. The respondents offered different views on the level of access. This followed with the type of dashboards or reports that were shared, with some having filtered information while others with no such restrictions.

Respondent 5: "I think it's an opportunity to try and filter the data down to grassroots level… And it's almost a scenario where you have people that manage and people that just work. And I'm saying I want the workers now to be open and exposed to more data, not that it isn't, it's getting them to start absorbing it, starting to think about that".

Respondent 1: "Anybody I think can have access to it, if they were curious enough (laughs). I don't think we ever denied anybody access to it".

Respondent 4: "I haven't seen any restrictions based on level here. There's a very open view on data, that if you need to get access to it. So I think that's one of the nice things people don't necessarily understand the full value of data, but they also not highly protective about it."

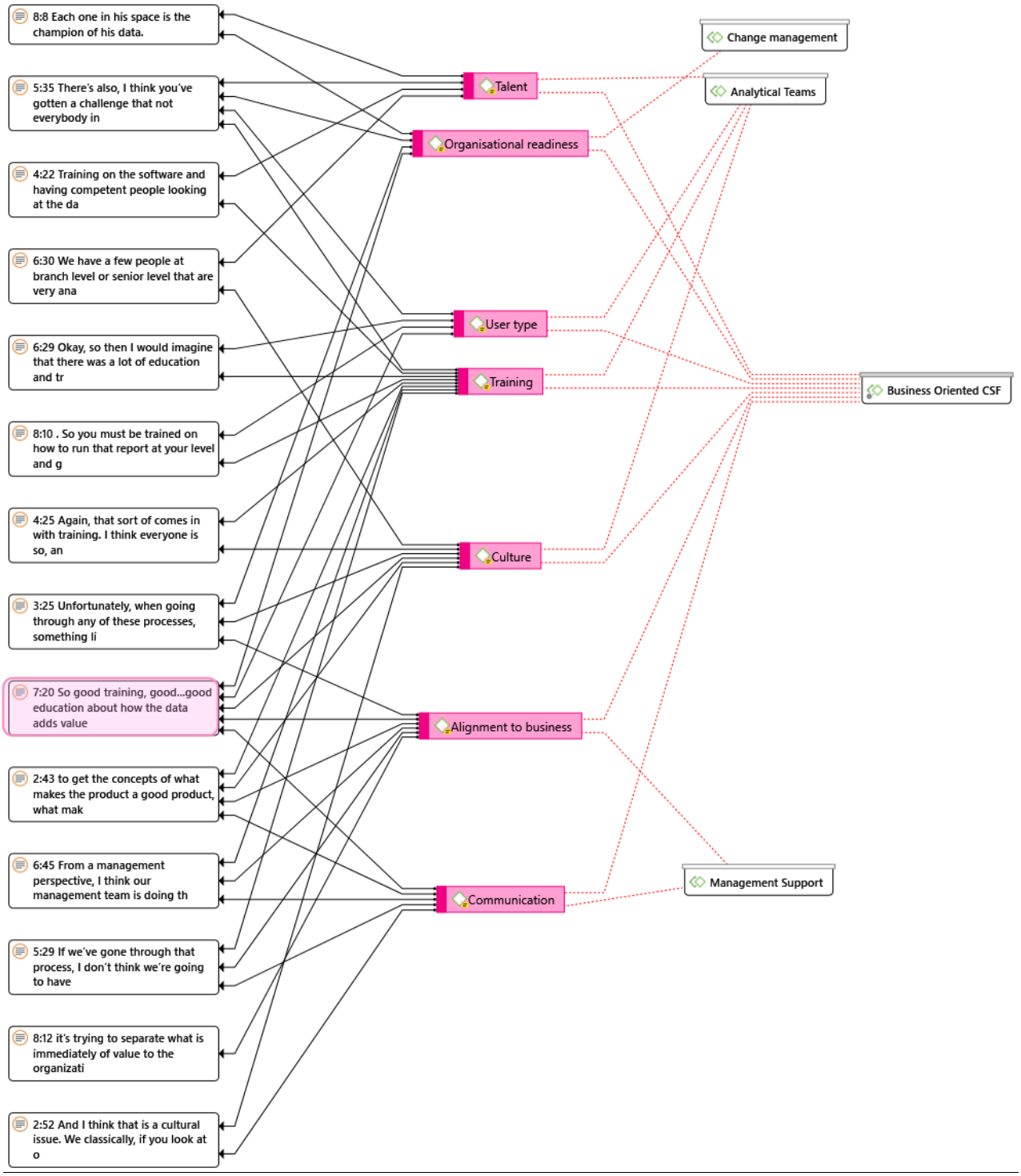
However, others shared the view that data should be restricted. *Respondent 2: "As long as you are not full blown operational, you will get access to it, but it will always be a version".*

Respondent 7: "there are levels of restrictions that obviously product managers and then it is restricted to their products"

Respondent 6: "It's filtered for now. We solidly believe in sharing the information with everybody who needs to use utilise it, so right down to an account manager"

Figure 6 below, summarises the quotations of the respondents that related to each second-order group identified within the business-oriented success factors. Respondent 6's quotation linked to the most second-order themes as he spoke about the value of good data and training. Links included communication, alignment to business, culture, user type and organisational readiness. These critical success factors are shown to have a clear orientation towards people, whereas the technological factors were more heavily weighted towards to technical aspects of BI adoption.

Figure 6: Network for business oriented critical success factors



5.4.4 Research Question 3: Role of senior management to influence the use of BI

The purpose of Research Question 3 was to assess the likelihood of senior management using evidence to make decisions. The evidence included the data provided by their BI system. But this exposure to evidence included the use of outside information for making decisions, such as market data, research, or articles to name a few. From these insights, the general decision-making process was examined to assess whether senior management incorporated these data sources. The link between BI adoption and senior management's absorptive capacity was explored as well. Lastly, the researcher intended to explore what the behaviours or actions of management should be in order to promote the use of BI.

5.4.4.1 Different Data Sources

Although all interviews confirmed that they did have access to many external data sources, the practice of utilising them to make decisions was not consistent across their organisations or in their own behaviour. Though there was confirmed use of market research, the online news articles and white papers were mostly skimmed over for the decision-making purposes. These information sources were rather consulted in order to keep the teams informed of any developments taking place within the industry. The use of internally-generated data was highly dependent on the type and context of the decision being made.

> *Respondent 1: "I think people are exposed maybe to it, but to do something with it, is a very different situation. So we do get access to market data, we do get access from external parties like GFK, IDC, and all those that we can get access to it. But once again, the culture is not one where we would go and say, this is what's happening in the marketplace, this is what we are doing in our business".*
>
> *Respondent 4: "at an EXCO level, I think there's a reasonably good level of exposure from research papers, points of view. We share amongst ourselves, we've got mailing groups that we use and whenever somebody's reading something…"*
>
> *Respondent 2: "We don't make any decision-making without looking at the data. So typically, we don't make gut-feeling decisions, we actually look at the data. If we don't agree with what the data is saying we'll check the data, at all we'll try get all the information".*

The market research was found to be extremely useful for Respondent 5, who used it for the purpose of adopting best practice within his organisation. This was contrary to the view held by Respondent 6 who found the reports of no use, because *"A lot of our products are so new to*

market that there is not a lot of formal data to really use. I think one of the things we found is that not all data is reported by all parties, so it is difficult to trust. So what we've done is we've tried our best to do a lot of the data capturing, where necessary, ourselves".

5.4.4.2 BI Adoption and Senior Management

A challenge to BI adoption that was encountered, was driven by the vast amount of data that was at the disposal of senior management. This was exacerbated by the numerous reports that not only were available within their BI systems, but in some cases were already being sent out on a daily, weekly or monthly basis. Respondents realised the need for reports to be tailored to senior management's needs. This facilitated the ease with which they could start adopting those reports more regularly. They also maximised the value extracted from the larger BI reporting. The outcome of this was an aggregated and top-level view either in the form of dashboards or reports.

> *Respondent 5: "And from a management perspective, you have the reports that give you a general overview of everything. We call them coffee-table reports where I want to see 10 critical areas and I get a report every morning and I open it. That's all I need to see".*
>
> *Respondent 6: "we've become better at understanding the critical data that actually is useful as opposed to all the frilly nice-to-have stuff that nobody ever looks at"*
>
> *Respondent 7: "It's trying to separate what is immediately of value to the organization, or what is of interest to the organization, and what is just nice to know?"*

In alignment with this, many respondents have opted for key metrics to be produced in order to prevent the situation described by Respondent 3, *"you also cannot get too lost in the data, day in and day out, it will drive you mad*". His organisation opted for a *"fortnightly monthly meeting"* with senior management to review the information. Therefore senior management are required to set the example for the rest of the organisation. This becomes a point of departure that time allocation is needed to allow the management team to engage with one another on important matters, and review the available data.

> *Respondent 2: "What's very important is to have a regular weekly session that you actually go through the key data points, the key takeaways from the data. So ensuring that there is a session to kind of discuss the interpretation of what's being published, and what are the key actions out of it?"*
>
> *Respondent 7: "The first meeting after month end will review the performance which is obviously data-related. So then as you go into the month, the weekly performances you will be looking at last week versus targets versus information".*

Respondent 4: "So every month we'll have a look at our sales data, we'll look at targets, and we have to adjust the business every month".

Respondent 6: "So I set aside time with every individual in our sales team and our marketing team once a month, to sit personally and make sure that the data can be applied to improving them on a personal level not just telling them how things are going".

Building on this rationale, the presentation of information played a key role in the willingness to use the information in the reports. The creation of dashboards was a method undertaken by Respondent 6 to gain further adoption of BI. Respondent 5 opted for specialised reports.

Respondent 6: "a dashboard that gives specific information to all elements of, all areas of business; right down from individual account manager dashboards that helps track their performance, up until executive management and every department including marketing and all the other departments. So that will give us a bit of an overview, with key indicators of where there are areas that are needing to perform as well as areas that have demonstrated good growth success".

Respondent 5: "We've segmented the reports into functional areas…from a management perspective, you have the reports that give you a general overview of everything. We call them coffee-table reports where I want to see 10 critical areas…"

5.4.4.3 Human Interpretability

Conforming to the idea that evidence-based decision-making is the balance between experience and data, management will do well to know when it is appropriate to use one over the other and when the two should be used in conjunction to achieve the most favourable outcome. This viewpoint accepts that emotions and gut feel still play a role in the distribution industry's decision-making. However, it embraces the fact that great effort has been made to incorporate more data into the decision-making process.

Respondent 3: "Gut feel. Has it improved? I do not think that is only bad by the way, I definitely think there is a good element to it. I think has that improved? Yes. Improved in the fact that data is helping to make decisions, but it is more gut feel".

Respondent 6: "I think there's always a gut-feel. and I think that's what any great business needs to have, is a great combination of insight, gut feel and then obviously the data that can help you make an informed decision…" It is interesting that this statement comes from the proficient user of BI.

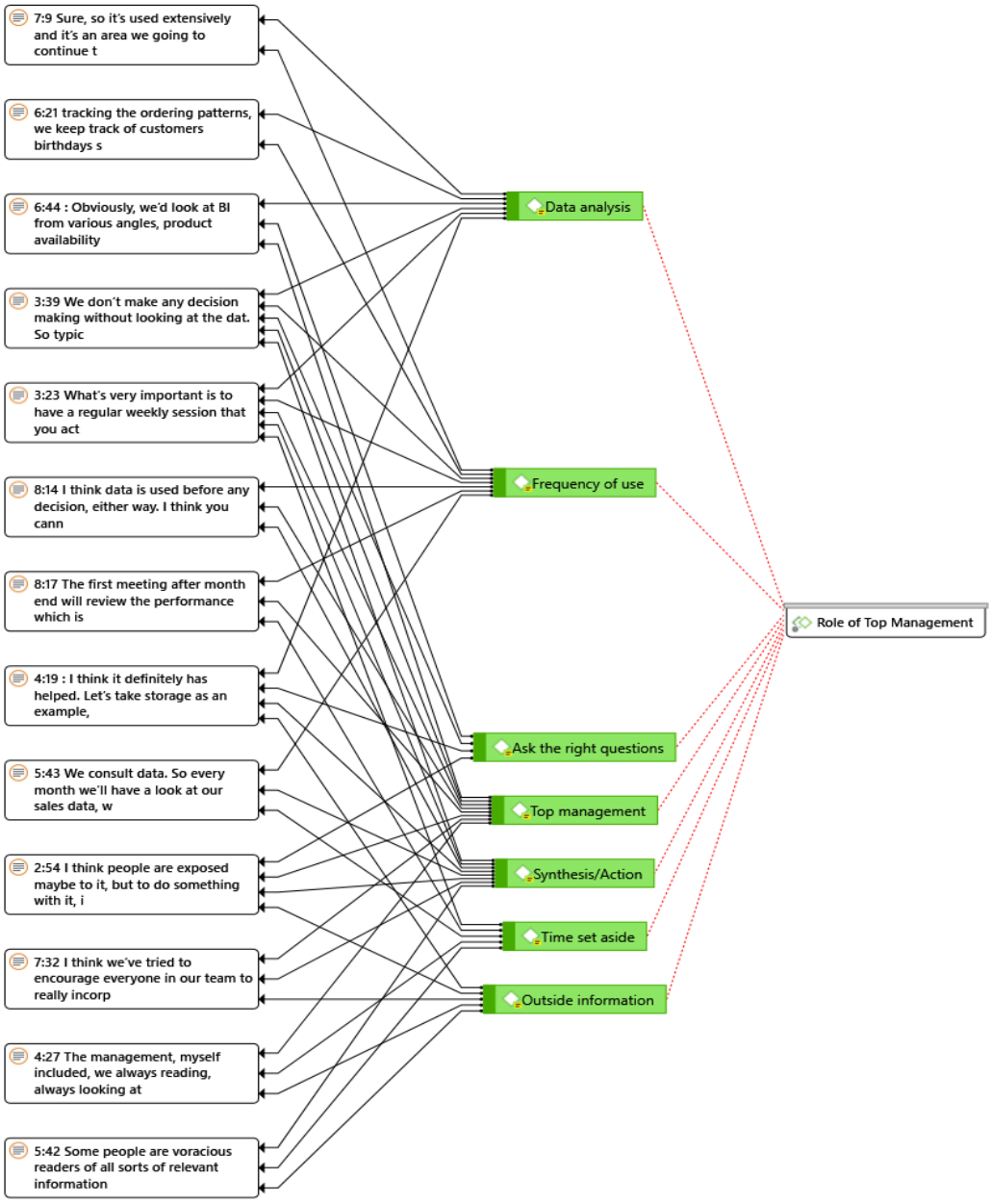
Respondent 4: "all important decisions must be based on data. That we will not have decisions which cannot be justified by data and it takes, theoretically it takes away a lot of the emotion of decision-making, and theoretically, it means you make a lot better

decisions because that is substantiated by the underlying data". This was far aspirational than it was currently true.

Respondent 7: "I think data is used before any decision, either way. I think you cannot ignore data in making decisions"

Figure 7 below, summarises the quotations of the respondents that related to each second-order group identified within the role of management. Quotations attracted many overlapping code groups, illustrating that the role of management was widespread across the ability to synthesise the information, set time aside for analysis and ensure good questions were asked of the data.

Figure 7: Network of the role of management



5.5 Conclusion

This chapter explored the different themes that emerged from the results of the interviews. These themes were aligned to the three research questions set out in Chapter 3. An in-depth review was conducted to extract the key insights from the interview question results. The most notable insights are summarised below:

Role of BI

The concept of BI was loosely understood by the respondents. It was found that in its application, the tracking capability was the most valued. However, the adoption thereof was predominantly reactive in nature. Yet, the use of analytics helped vendors and management recognise that there was much to be gained from their BI.

This potential use would be valuable for customer tracking as the current tracking was deemed poor because the preference was gut-feel. The data was sometimes overshadowed by the long-standing relationships with their customers irrespective of their actual performance trends. This was viewed as a concern for the future viability and their value added into the supply chain.

Critical Success Factors

Technological-Oriented

For the technological success factors, the appropriate infrastructure and systems integration was critical. Equally, the quality of the data had to be accurate.

A further finding was that although the organisations has varying sizes of BI teams or dedicated resources, much value was offered when the team was split between finance and IT departments. This served to complement the other team's strengths.

Business-Oriented

Visible management support or the nomination of champions for BI was viewed as important initiatives to be undertaken by the organisation. This would be enhanced with an overall analytical mindset of the organisational members. However, where this was not possible, training of the

members was then necessary to improve their analytical orientation. The key point raised was a shortage of talent.

Role of Management

Management often made use of external research reports and where the decisions needed data, they were more inclined to use it for product or process decisions over customer decisions. But not in all cases. It was found that the value of gut-feel was not completely relied upon because there was acknowledgment that a balance between BI and gut-feel was needed.

Further, management were likely to use BI if the format of the information was easily accessible. Many opted for special personalised reports. Therefore, the example that management set in using data to guide their decisions permeated the general culture of the next layer of management.

The next chapter discusses the results with reference to the literature reviewed in Chapter 2. This allowed the researcher to understand these results through the lenses discussed in the literature and incorporated in the conceptual model of evidence-based decision-making. A thorough investigation was conducted to determine whether the results answer the research questions posed in Chapter 3.

Chapter 6. Discussion of the Results

6.1 Introduction

In the previous chapter, the results of the interviews were presented by exploring the answers in response to the three research questions posed. These questions were analysed through the perspectives of seven senior managers from different distribution organisations within Gauteng.

This chapter delves deeper into the findings of Chapter 5 and attempts to understand these results through the lens of evidence-based decision-making, as discussed in the literature. These themes identified through this lens created the conceptual model, Figure 2, and comprised of senior management absorptive capacity, critical success factors of BI, and the information processing perspective. A thorough investigation was conducted to determine whether the results answered the research questions posed in Chapter 3. It also evaluated the themes' continued inclusion in the conceptual model. Each research question was discussed in greater detail, highlighting the areas that either supported, contradicted or departed from the literature reviewed in Chapter 2.

6.2 Results: Research Question One:

What role does business intelligence play in the distributor's decision-making?

The use of business intelligence in an organisation enabled evidence-based decision-making for the purpose of improving organisational performance (Işik et al., 2013; Larson & Chang, 2016). More specifically Respondent 2 believed that BI involved "*using data within business to help make better decisions to impact the profitability of that business".* Fundamentally the BI system has been shown to enhance the ability of an organisation to process information (Elbashir et al., 2008; Kowalczyk & Buxmann, 2014; Olszak, 2016). This has been accomplished by transforming raw data into valuable insight and using that insight to create value for the organisation (Jourdan et al., 2008). The purpose of Research Question 1 was to understand the frequency and extent to which such data was being used to help drive decision-making across the organisation. This served to demonstrate how well BI was understood within the organisation. The results of which would provide insight into whether BI was able to complement the information processing perspective of Tushman and Nadler (1978).

6.2.1 General Comprehension of Business Intelligence

Gartner defined BI as "a broad term that included applications, infrastructure and tools that enabled access to and analysis of information to improve and optimise decisions and performance" (Larson & Chang, 2016, p. 701). Such an understanding of the various concepts within BI was understood by Respondent 1 who stated that *"business intelligence is quite a broad term because it doesn't just refer to technology, I think it refers to architecture, data, systems, processes, systems processes, culture, organisational readiness…"* and by Respondent 3 who recognised that "*there's different facets within Business Intelligence".*

In line with this rationale, BI was also appreciated in terms of the benefits achieved within the organisation. It was postulated that BI would provide overall improvements in the quality and speed of decisions regarding financial conditions, resource alignment, product demand and customer preferences within organisations (Işik et al., 2013; Acito & Khatri, 2014).

> Respondent 5 shared how their BI program would analyse historical trends of a product and "*the amount of times you replenishing from that particular location and it gave you a suggestion of where the item should be positioned in the warehouse".* Respondent 1 agreed that BI had also allowed them to start *"to understand the supply chain efficiencies better".* These examples provided partial evidence of the positive relationship between analytics and supply chain performance that was found by Trkman et al. (2010).
>
> Likewise, in the case of Respondent 4 upon evaluating their financial situation, *"we are making big decisions around our operational cost structures based on sales, profitability and historical trends. And they're very data-driven".*
>
> Respondent 2 *"literally take the BI info, from a sell-out perspective, on a weekly basis and we kind of reverse engineer it back into our forecast to make sure… we are adjusting our forecast and our ordering…"* This approach captures the supply network accessibility (Bellamy et al., 2014) and supporting the notion that having such access to this information allowed partial visibility of the demand, or more specifically Christopher's (2011) derived-demand, within the channel. However, the failure to consistently use BI for decisions regarding their customers meant that visibility of demand was not fully exploited.

Although the focus remained on the tangible benefits, there was insight into some of the more intangible benefits that were realised. Işik et al. (2013) described intangibility as stakeholder support, and this was shown with an example by Respondent 6: *"so many members of our team*

are now asking for BI in different elements and have seen new opportunities for it to be implemented". The stakeholders, in this case, were the organisational members who liked having access to their data because it helped them to perform better in their roles. As such, they were finding more ways for which it could be used.

6.2.2 Tracking Activities Supported by BI

In the explanation of the various benefits realised through the adoption of BI, Işik et al. (2013) highlighted performance tracking and the improvement of profitability as two of the most predominant roles played by BI throughout the organisations.

There was no consistent use of BI across all the organisations and the decisions to which it was being applied also varied quite substantially. Respondent 1 explained that their managers mostly used the BI tool to determine whether *"they on target or not, and that's it"*. In line with this, tracking sales and profitability did appear to be a popular practice of BI.

> *Respondent 4: "how our margins are decreasing over time; if our sales volumes have been dipping as well; and actually start using that to anticipate…"*
>
> *Respondent 3: "I think it's to enhance profit as much as possible; I think that it gives you a good overview…sometimes often one product is carrying the other, and you cannot actually make the decisions. So that whole range, the product category might be great, but one is really pulling it down, or it might be bad, but it should be good because one is really pulling it down".* The effect of Pareto was established and thus future decisions can be made by bearing in mind the impact that certain products or customers have on organisational sales and margin.
>
> Respondent 2 supported this view and explained*: "And I think just understanding which are the categories or product that are contributing the most. So it's always looking at that. For me, consumer electronics runs very thin on margin. So if you're not are using proper tools to analyse it, I think you can very quickly get into trouble and it's so fast-paced that you will lose money quickly".*

The ability to view the sales reflected the stock trend which helped the distributors plan stock purchases with the vendors. The BI systems provided distributors with the tools to analyse profitability across different product lines and regions (Chae & Olson, 2013; Olszak, 2016). From the vendor perspective, this information was very important for the purpose of manufacturing and forecasting demand. Except for two respondents, the others all send their vendors data on a regular basis.

> *Respondent 5: "information is sent to them [vendors] on a daily basis. We also engage with them on our stock holding as well. So they have clear visibility of exactly what we have available in our warehouse at any given time: on what we have on order with them, what we've got on back-orders from them."*
>
> *Respondent 1: "there is a big need for us to report back to our vendors, in terms of inventory and sell-through. Mostly so they can align their manufacturing systems accordingly because they have got a much quicker view of the perceived demand in the market. Because they perceive one sell out from us as demand."*

Respondent 1 brought into focus the issue of demand-visibility within the supply chain as explained by Christopher (2011). The implications of understanding this demand were that, where distributors were better able to see where their product sold, they were then better able to meet the customer's demands. Though, a result of the distributor not having clear visibility of their customers demand was that it impacted their ability to fulfil that demand and respond to any changes in demand (El Sawy et al., 1999; Dent, 2011; Bellamy et al., 2014). Thus Respondent 1 provided evidence in favour of the concept of the information gap which resulted from the nature of the distribution industry.

> *Respondent 1: "So most of what we do, is what happened in the last previous couple of months, and we predict that into the future. So by default, I think, we have no clear understanding of the demand, because we are not sure what the demand is at end user... We don't have a clue what's going on at the end user levels, and some cases we don't know where our product is going. Maybe it's different for people who sell software"*

Increasingly, the distributors recognised the value of collecting and analysing internal data (Pfeffer & Sutton, 2006). The more data the distributors were able to collect about their resellers, the more proactive they became in setting strategies and campaigns (Kowalczyk & Buxmann, 2014). Thus, three of the respondents sought to reduce their information gaps and focused their strategies around targeted customer centricity (Ghosh, 2017):

> Through the use of BI, Respondent 5 realised that many of their customers had been placing multiple orders per day. Accordingly, they decided to align their deliveries with the customers' ordering processes and to *"hold those orders back as much as possible, as late as possible, and then we basically consolidate them"* and made one order.

Respondent 6 *"can track customers' sell-out performance based on their information that we can get... So part of our campaign is to reward loyalty, reward customers. We've run numerous successful campaigns"*

Respondent 7: "We do try and engage the reseller nowadays more than what was done years back to try and establish that type of pipeline and information".

Consequently, these data-driven strategies provided those organisations with a competitive advantage over their competition (Ross et al., 2013; Ghosh, 2017; Oestreich & Chandler, 2015). As a consequence, the value in the distribution chain was to be claimed by those who collected and accessed the best data, and who drew valuable insights from it (Chae & Olson, 2013; Bellamy et al., 2014). This insight sought to narrow the information gap.

6.2.3 BI and the Information Processing Perspective

The information processing perspective was borne out of the need to acquire relevant information in order to solve problems arising within an organisation, and this information would reduce the uncertainties surrounding those problems (Tushman & Nadler, 1978; Turner & Makhija, 2012). The shortcomings of these processing capabilities were that not all the information could be gathered by a single individual, and interpretation thereof relied heavily upon that individual (Turner & Makhija, 2012). The expectation was that BI could fill the shortcomings of this information processing capability of an individual. The rationale was that it applied unbiased business rules and was not limited, in general, to storage capacity.

Although Respondent 1, Respondent 3 and Respondent 4 had admitted that the full potential of their BI capability was not being harnessed, they did recognise the strides it had achieved in providing better and more timeous data.

Respondent 1: "what we have built is a very strong capability in making sure the data is accurate, timeous… it's far more timeous than it's ever been. So we've got all the building blocks. I think we are just not utilising it from an interpretive perspective in the way we should."

Respondent 4: "we can do queries and we've got the ability, flexibility to slice and dice, view on month, on a period, on a product set, and filter. I'm not seeing the more advanced sides of BI yet, but maybe just that I haven't been exposed to it." The periodicity cited reveals that the BI system is able to store data for future use, and apply various filters to the data.

Respondent 5: "People used to keep excel spreadsheets and this was more people's personal knowledge of where stock was, instead of a computer trying to direct you what to do in the more efficient way of doing it". This provided evidence that BI was better able to provide valuable insight than that of an individual and numerous unintegrated spreadsheets.

The recognition of an individual's personal biases was raised as a shortcoming in the information processing perspective (Turner & Makhija, 2012). Respondent 2 agreed that it could become *"one person's opinion of interpreting data, instead of a little bit, you know, more in-depth views in what it says"*. However, he suggested that a way to overcome these biases were to *"have a regular weekly session that you actually go through the key data points, the key takeaways from the data"* (Respondent 2). This approach allowed the interpretations to be validated by other members.

Respondent 6 echoed these sentiments and felt that *"any management meeting without data is hearsay"*. *"Theoretically it takes away a lot of the emotion of decision-making, and theoretically, it means you make a lot better decisions because that is substantiated by the underlying data"* (Respondent 4). However, theoretical practice must be turned into actions. As such this approach has been valuable in providing information for promotion discussions. Respondent 4 advised that they *"make decisions around data for things like performance management: so promotions based on people hitting targets over a consistent period of time..."* According to Respondent 3, it gave a good background into the individual's performance. The data allowed the facts to overshadow the emotion inherent in these decisions.

6.2.4 Summary of Findings for Research Question 1

There was evidence that senior management was knowledgeable about the capabilities of their BI and more so of the capabilities that were yet to be actualised. There was an appreciation for the inherent value that BI brought to the organisation. One of these benefits was improved profitability, which provided support for Trkman et al.'s (2010) findings of a positive relationship between analytics and supply chain performance.

The literary concept of demand-visibility garnered support from the senior managers and evidence was provided to acknowledge the impact that the information gap had on the distribution industry (Christopher, 2011; Bellamy et al., 2014). Consequently, the information extracted from their systems was deemed highly valuable by senior management which supported the claims by

Pfeffer and Sutton (2006). In many cases, this information would be used to guide their decisions regarding organisational processes, customer engagements, and profitability of product lines (Işik et al., 2013; Acito & Khatri, 2014; Larson & Chang, 2016). However, the consistent adoption of BI in these decisions was lacking.

The respondents had explained how BI, much like the information processing perspective of Tushman and Nadler (1978), was able to gather data from many sources, store it, access it and interpret the data far quicker and more efficiently than an individual. Thus, it was concluded that BI possessed the ability to assume most of the roles within information processing and not be biased by the shortcomings of individuals' capabilities to process information. However in the definition of Tushman and Nadler (1978), the last capability was to synthesise information, and this is still believed to be a core function of the individual or BI user. Therefore, to derive the full value of BI, an individual was still required to provide the synthesis of the information. Therefore, this analysis provided an extension to the concept developed by Tushman and Nadler (1978). Support for the researcher's new definition was given and it defined the information processing capability as the ability to gather, store, access, analyse and synthesise information.

6.3 Results: Research Question Two:

How can distributors improve the adoption of business intelligence in decision-making?

Yeoh and Koronios (2010) and Olszak (2016) proposed that there were three lenses through which the implementation of a successful BI initiative could be examined. The purpose of Research Question 2 was to examine whether these lenses and their associated factors, were applicable in the context of BI adoption. The researcher found that while some factors validated their theory, other factors were absent from the interviews and could not be compared with the literature. However, with the information gathered by the researcher, it was clear that Yeoh and Koronios's (2010) original distinction between organisation-oriented factors and process-oriented factors was not well-defined.

Hence, the researcher classified a new dimension called business-oriented success factors. Business-oriented factors informed the practices that were necessary for establishing organisational readiness for such a transition. As such, this transition required support from senior management and the implementation of change management programs. The transition would also require employees to be more analytically-inclined and attend training to facilitate this

transition. Consequently, with this new dimension classified, the researcher introduced new critical success factors to the theory. The dimensions of technological-oriented and business-oriented critical success factors are discussed in detail below.

6.3.1 Technological Orientation

6.3.1.1 BI resources

Initially, the use of 'appropriate team skills' (Mungree et al., 2013) or 'balanced team composition' (Yeoh & Koronios, 2010) was categorised under the process-orientation dimension, but these were mostly in reference to technical expertise. The researcher evaluated the responses of the interviews and concluded that the 'BI team' formed part of the technological-oriented success factors since the teams predominantly represented more technical expertise. Yeoh and Koronios (2010) observed that the success of BI adoption was dependent on the cross-functional skills and knowledge of the BI team.

An interesting contrast was the role that IT played in Respondent 3's organisation versus Respondent 5's organisation. *"Our IT department, we always say just keep the lights on. Keep the lights on and you have done your job" (Respondent 3)*. This organisation does not have a dedicated BI team. However, Respondent 5 revealed that *"Most of the time we are very reliant on our IT team. We've got a highly dynamic IT team that are highly analytical - anything that you want to do, they can come up with a solution for you".* Although they were referred to as IT teams, there were organisations that specifically identified these team as BI teams:

> *Respondent 2: "the head who looks after the whole BI team, who's responsible for managing that team, and then what you've got is a business analyst that looks after different parts of our group".*
>
> *Respondent 4: "There are as far as I know a specialised BI team in finance, which is responsible for producing a lot of the data and the reporting. There's a team or a couple people at least within IT who have the technical skills to do and who know where the data sources are. What data to pull and to produce and my understanding is that those teams work together to produce it for different areas of the business".*
>
> *Respondent 1: "We've got 3 people, at last count, that collates most of the information in one aspect, and there is probably two or three people that ancillary to the process that might come out of the IT space, to make sure the data gets collated… And they are also being used to construct queries and stuff like that from other data sources. So, from me, it's a small team of isolated people which forms part of the finance team, which I think is*

challenging in its own right, because then it becomes financial in nature, instead of, it being a tool that can be used across the organisations"

Drawing on the similarity to team composition in Respondent 4 and Respondent 1's organisation, both had teams comprised of different functions. They were also ring-fenced from their initial departments. This composition was similar to what had been recommended by Yeoh and Koronios (2010). But, Respondent 1 highlighted that a balance was absent, seeing as their BI team tended to emphasise more of the financial side of the business, thereby limiting wider adoption or focus. This finding added to the recommendation given by Yeoh and Koronios (2010) that although "the BI team should be cross-functional and composed of both technical and business personnel, so-called best of both worlds" (p. 27), a balance between the functions must be maintained. Therefore, not only having a dedicated BI team, but one that maintains the balance between organisational functions, is a critical success factor for BI adoption in decision-making.

6.3.1.2 Trusting the data

Işik et al. (2013) noted that problems with data quality had been highlighted as a regular organisational challenge in managing BI systems. Where there was a presence of poor data quality or incompatible legacy technology, technological challenges arose (Watson & Wixom, 2007; Işik et al., 2013; Mungree et al., 2013). These challenges would moderate the ability of BI to deliver accurate, consistent and timely information (Işik et al., 2013). The quality of the data was thereby reliant on how it was collected, sanitised and stored (Watson & Wixom, 2007; Işik et al., 2013; Larson & Chang, 2016). Further, usage of the data was dependent on how much it was trusted as being accurate.

Respondent 2: "I think it's trying to get a single source of the truth. So I think it's getting a single data source, so I think that's very important… Typically you have got multiple systems that feed different forms of information that is trying to get that from a single source ensuring that the hierarchy in that database is clearly defined"

Respondent 5: "Obviously you don't want to be giving incorrect information so that data is checked up virtually on a daily basis. We have other programs that are running in the background that basically does comparisons and does items matching to make sure that every transaction that's gone through is recorded in the correct journal entry"

As a consequence, the analysis of such data can only be as valuable as the quality of the underlying data. *"It's the old story of the output is only as good as the input"* (Respondent 7).

Therefore, the responses were in line with the theory that stated an acceptance of one data source (Ross et al., 2013). The implications of this were that users would not rely on data that they could not trust (Watson & Wixom, 2007). In these situations users would rely on their instincts *"…we still do a lot of gut feel decisions"* (Respondent 4).

Therefore, accurate data was the starting point of building trust in an organisation's BI capability. Data quality and accuracy demonstrated that in the presence of correct information being retrieved from the BI tool, it could be used for decision-making.

6.3.1.3 Integration and Infrastructure

The BI system, by itself, does not convert data into insight, it is highly dependent on both the infrastructure and the quality of the data (Yeoh & Koronios, 2010). The stability and scalability of the technical architecture were cited as a technological success factor (Yeoh & Koronios, 2010; Larson & Chang, 2016; Olszak, 2016). Integration of all systems proved to be a complex challenge that was experienced by the organisations.

> *Respondent 1: "We run off multiple ERP systems so bringing all that data onto one platform across the group, across the businesses, getting one view of the customer across the businesses, that's sort of the next layer and we don't have all the systems in place"*

Two respondents had overcome the challenges that integration has first presented. Both had consequently implemented their BI capabilities at least 7-9 years ago, as opposed to Respondent 1 who had implemented BI only three years ago. Thus, this information offered an insight into the learning process that accompanied the implementation of these systems and the infrastructure that was needed to support it.

> *Respondent 5: "Prior to going with the WMS [warehouse management system] we had three computers in our distribution centre. Everybody else worked with paper. And now all of a sudden, you putting a fancy programme"* and "*We have other useful programs that are coupled up to our WMS that monitors and gives you feedback".*
>
> *Respondent 6: "So apart from our standard accounting and inventory management system that we use, we've integrated to a lot AP, to a lot of external reporting tools that help us to make informed decisions. So all of our sales data is exported and reported to dashboards, which gives us overviews of different departments of different divisions in our business"*

The responses demonstrated the role that both integration and therefore IT infrastructure played in creating an environment that was conducive to BI (Chen et al., 2012). The responses provided support that, although the respondents had varying levels of infrastructure sophistication, such infrastructure would enhance BI assimilation as formerly positioned by Armstrong and Sambamurthy (1999) and later by Elbashir et al. (2011).

6.3.2 Business-Orientation

6.3.2.1 Evidence of Management Support

Only two senior managers out of the organisations that were interviewed did not have direct involvement in the BI implementation. However, in one case, the respondent only joined the organisation after the implementation was rolled out, but appreciated the value of the BI capability. For those respondents who were involved, there was a consensus that without their direction, the adoption of BI would have been less successful. Respondent 6 found that through his support, there had been a wider adoption of BI: *"I am quite passionate about it but what we have found is that the different heads of departments are now starting to see the value that it brings to the business and are coming to me with specific project scopes*". Thus the identification that management support was a success factor, previously highlighted by Olszak (2016) and Yeoh and Koronios (2010), was found to be applicable in this context. With management support, it proved to be easier to allocate the right resources (Yeoh & Koronios, 2010) towards the organisation's BI capability and to overcome any resistance encountered (Mungree et al., 2013). In response to the resistance, Respondent 1 offered a different angle for achieving buy-in, "*We've got to think about what's in it for me, from a personal perspective and stuff like that, because if I get real benefit, it makes my job easier, I get better information, I get better decision-making*".

Another feature of management support involved having alignment between BI and organisational objectives (Işik et al., 2013; Larson & Chang, 2016; Olszak, 2016). The one way this was achieved was by having regular sessions with management to ensure that the various teams were on the same page. Present in those sessions *"would be the different business unit heads linked with the relevant business analysts that publishes the reports. And I think that's what you want to do, is bring the commercial aspect of the business together with the analytical and data aspect of the business"* (Respondent 2). The way alignment was also encouraged was through communication of the BI capability. Respondent 4 explained that if the need of the business was well understood,

"*and you've successfully succeeded in producing a report that meets that need, I shouldn't have any problem communicating and getting adoption*". This confirmed the conclusion put forward that the implementation of a BI system had a much greater likelihood of success when business needs were identified at the outset (Yeoh & Koronios, 2010).

Unfortunately, it was observed that the communication throughout these organisations was not sufficient to increase the levels of adoption. Communication was further hampered by the restrictions to the data imposed upon by management. It was Işik et al. (2013) who made mention of user access to the data as being a factor for success. This led to a debate about the level of access permitted amongst the organisations. *"The product managers have access by the product that they are responsible for"* (Respondent 7). This was in contrast to Respondent 5 when in reference to warehouse employees shared this sentiment: *"I think it's an opportunity to try and filter the data down to grassroots level… And I'm saying I want the workers now to be open and exposed to more data, not that it isn't, it's getting them to start absorbing it, starting to think about that"*. Or the openness to data demonstrated by Respondent 1 that *"anybody I think can have access to it if they were curious enough (laughs). I don't think we ever denied anybody access to it".* However, while Işik et al. (2013) drew conclusions that there was a positive relationship between user access and BI success, this could not be substantiated through the results of the interviews. The reason for this was that it was not clear that BI had indeed been as successful as envisioned. Although Respondent 1 and Respondent 4 had no restrictions on access, both declared that it was certainly not a practice that was being employed consistently across their organisations. In light of this argument, it can be concluded that granting access to all senior management and encouraging the consistent use of BI, would at least provide the foundation on which successful BI adoption could be built.

6.3.2.2 Change Management

Wide recognition of the importance of change management was accepted by the respondents but not all respondents went as far as having implemented such a program. Yeoh and Koronios (2010) advised that greater inclusion in the transition led not only to better understanding of the business needs, but also encouraged greater success of the BI capability. Respondent 2 acknowledged that people were resistant to change and *"if you don't create a proper process of doing change management and getting people to adopt the new reports, then people don't".* But some organisations were more experienced at implementing such a program and this was

illustrated by the example of Respondent 5: "*Every time we've made any significant changes to the business, so for example when we changed our ERP system to the latest product that we selected, then had we not adopted a change management programme, we would have never been as successful as we expected to be".* However, it was key to recognise the impact that the history of distribution had on the organisation, that *"there's a tendency to just accept things for what they are rather than try to deeply understand what is different and wrong"* (Respondent 1).

The main observation was that people are happy to remain in their comfort zones and they did not like change. Furthermore, by adopting BI there was an initial fear and the sense that the data would be used to point out their flaws. *"So if the culture of the business does not aspire to improvement and to growth and to personal development, then it's going to be largely ineffective because it really... I mean when you put it out there, you're standing naked...the real data is there"* (Respondent 6). This highlighted the importance of an organisation's interactive development approach when it came to introducing a BI capability (Larson & Chang, 2016).

Support was found for Larson and Chang (2016), who emphasised the need for the constant evaluation of information and user feedback because it ensured an ongoing contribution to business performance. In support of this, the selection of champions was believed to be critical for successful adoption according to Yeoh and Koronios (2010). Respondent 7 advised that each head of department was *"the champion of his data"*. Interestingly, Respondent 6 put official champions in place "*where we're able to really demonstrate the value with a few key players in our business and they've been able to really use it to their benefit, other members of the team are a lot more willing and eager to incorporate it into their way of working".* It was recommended that the implementation of a change management program, as well as the nomination of BI champions, be instituted so as to allow the adoption of BI to become more pervasive within the organisation.

6.3.2.3 Analytical Mindset

The senior management was comfortable admitting that not everyone in their organisation had *"an analytical approach to business"* (Respondent 4) or were *"numbers focused"* (Respondent 2). Much of the success of BI adoption was attributable to having these kind of individuals, especially in roles of senior management.

However, there were mechanisms to instil this type of thinking without replacing all members in the organisation. With BI being supported by management, wider adoption was facilitated by their insistence on backing decisions with data. This substantiated Watson and Wixom's (2007) consideration that senior management should insist on BI usage for decisions.

It was also noted that through training mechanisms, wider traction was achieved and BI usage was no longer *"remit of a few exceptional people in the organisation"* (Respondent 1). Thus education and communication of BI were considered critical, otherwise *"people fall back into old reports and old habits"* (Respondent 2). This acknowledged evidence from Işik et al. (2013) that stakeholder support and the number of active users were also critical success factors.

This was because at the core of BI adoption was a culture of curiosity. As such, support was shown for Ross et al. (2013) who had reasoned that organisations did not automatically develop analytical competencies in the presence of a BI system. Ross et al. (2013) discovered those that were more analytically-inclined, displayed a culture of evidence-based decision-making.

6.3.3 Summary of Findings for Research Question 2

The findings verified that for an improvement in BI adoption to be realised, the organisations needed to consider two lenses of success: Factors of a technological-orientation and business-orientation. Though Mungree et al. (2013) and Watson and Wixom (2007) had criticised the use of success factors, they were proven to be very useful for understanding the outcomes of a BI undertaking.

On the technological side, having a dedicated BI team and one that maintained the balance between organisational functions, was a critical success factor for BI adoption in decision-making. This supported Yeoh and Koronios's (2010) team composition claim but added the element of balance as a key consideration.

It was not surprising that there was support for having good quality data and one version of the truth (Watson & Wixom, 2007; Ross et al., 2013). Thus, the responses were in line with Ross et al.'s (2013) recommendation of accepting one data source. It was concluded that accurate data was the starting point of building trust in an organisation's BI capability.

There was a learning process that accompanied the implementation of a BI capability. The respondents validated the role that both integration and IT infrastructure played in creating an environment that was conducive to BI. Thus the literature that claimed infrastructure enhanced BI adoption was supported (Armstrong & Sambamurthy, 1999; Yeoh & Koronios, 2010; Elbashir et al., 2011).

From the perspective of business-oriented success, leadership support, alignment of business and BI function and communication were recognised as critical business success factors. The findings of management support validated the works of Olszak (2016) and Yeoh and Koronios (2010). Management support also took the form of regular review meetings. In this way, alignment was encouraged by senior management and thus supportive of the findings by Yeoh and Koronios (2010).

While Işik et al. (2013) drew conclusions that there was a positive relationship between user access and BI success, this could not be substantiated through the results of the interviews. Access levels to the data varied and no indication of a relationship could be made. In light of this observation, it was concluded that granting access to all senior management and encouraging the consistent use of BI, would at least provide the foundation on which successful BI adoption could be built.

Ross et al. (2013) reasoned that organisations did not automatically develop analytical competencies in the presence of a BI system. But, there were mechanisms to instil this type of thinking or culture of curiosity. Among the mechanisms suggested, were BI training and support for Watson and Wixom's (2007) management's insistence on data-backed decisions.

Finally, it was concluded that an organisation should implement a change management program, supported by management, to provide interactive feedback. This was in line with the recommendation made by Yeoh and Koronios (2010). This feedback could be used to better improve the adoption of BI (Larson & Chang, 2016). Additionally, champions within the organisation should be nominated to help drive and inculcate the adoption of BI throughout the organisation (Yeoh & Koronios, 2010).

6.4 Results: Research Question Three:

What role does senior management play to influence the use of business intelligence to make decisions and formulate strategy?

Although BI had the ability to better equip the organisation with its information processing capability, the value derived from the data would not be harnessed unless the organisations, in this case, senior management, used it to guide decision-making. As such, the failure to incorporate data to support decision-making may be attributable to the lack of absorptive capacity of senior management or the lack of adoption of evidence-based management (Marr, 2009; Elbashir et al., 2011; Kim et al., 2014).

The purpose of Research Question 3 was to examine whether senior management made use of data, be it internal or external, to assist with their decision-making. This provided insight into the extent to which decisions were evidence-based. Subsequently, upon analysis of the aforementioned data, the researcher sought to understand the level of absorptive capacity held by senior management. This meant understanding how well information was synthesised in order to be included in decisions made by senior management.

6.4.1 Different Data Sources

Evidence-based management was based on finding the best available evidence, accepting those facts and acting upon them (Rousseau, 2006; Marr, 2009). The sources of information need not be only academic research evidence, but broader inclusions of financial data, internal data as well as practical experience (Briner et al., 2009; McCormick, 2010; Wright et al., 2016). This ensured decision-making had context sensitive judgement and information (Wright et al., 2016). The responses revealed that many of the organisations were using various sources of information to make different decisions. Respondent 5 explained how Gartner provided his organisation with highly regarded insight into best practice that he then adopted. Other respondents made use of market research, online articles as well as white papers.

> *Respondent 1: "We do get access to market data, we do get access from external parties like GFK, IDC, and all those that we can get access to it. But once again, the culture is not one where we would go and say, this is what's happening in the marketplace, this is what we are doing in our business. There's a gap, so let's go and attack that gap".*

> *Respondent 2: "I think senior management typically will take some time to read it [external articles], to try and figure out how it impacts their business or is there is anything they can learn out of it"*.
>
> *Respondent 3*: *"Some guys do things better than others and helps us again sit around the table, you go to the Gartner quadrant - who's in the top, we don't have this guy, let's try get him"*

It came to light that sometimes the market does not possess the necessary information needed. Respondent 7 explained that those *"reports cover certain spectrums of the industry [they're] not even involved in."* In the case of Respondent 6 *"a lot of our products are so new to market that there is not a lot of formal data to really use".* Rather than accept this, they tasked themselves "*to do a lot of the data capturing, where necessary, ourselves".*

It was inferred that some external data was included for decision-making, and if not all, it was at least consulted with to ensure that senior management was kept up to date with the news across the industry. This demonstrated support for Rousseau's (2006) view that through evidence-based management, practising managers made organisational decisions informed by the best available evidence.

6.4.2 Key Indicators

Marr (2009) suggested that resistance to the practice of evidence-based decision-making could be overcome with strong support by senior management encouraging the adoption. Senior management was more knowledgeable about the issues that BI was meant to solve and because they were mostly involved in the BI implementation, it reinforced their support thereof (Jiménez-Barrionuevo et al., 2011; Liu et al., 2013). Therefore it was important that senior management set the example.

One way of setting an example was through the use of the BI-generated internal reports or through the use of market research reports. Many respondents realised that the vast amount of internal data at their disposal would need to be tailored in order to provide only a few key metrics. This facilitated the ease with which they could start adopting those reports. They also maximised the value extracted from the larger BI reporting. In this respect, senior management had an overview of performance, and if they wished to delve deeper they could retrieve further information. Respondent 5 termed these reports *"coffee-table reports"* where his view displayed *"10 critical*

areas". Respondent 6 opted for the use of a dashboard that essentially live-tracked their revenue and profitability. *"I think it's to get relevance correct and the volume and then the presentation"* (Respondent 7). This presentation of information was also highlighted by Respondent 2 as well as Respondent 1.

> *"They [BI team] put it in a format that is easily accessible on a daily, weekly and sometimes monthly basis, depending on what information it is" (Respondent 2).*
>
> *"I should easily be able to use our own underlying information to construct a new view of that data" (Respondent 1)*.

These respondents, therefore, provided evidence that an analytically engaged manager would at least produce or consume new insights (Acito & Khatri, 2014). Respondent 6 took this a step further and shared these insights with his team by creating personalised dashboards. The result of which had been *"a culture that truly embraces this type of information. Every individual in our company is encouraged and incentivised to grow personally"* (Respondent 6).

6.4.3 Human Interpretability

The focus on senior management's absorptive capacity was recognised by Elbashir et al. (2011) as a critical component for successful assimilation of BI systems. The reason for this was that data in isolation had little value. *"So having great systems means nothing if people don't use it effectively"* (Respondent 6). Todorova and Durisin (2007) understood this, and as such their definition of absorptive capacity included the capability of assimilating the information acquired. It was reasoned that without this step, the insight buried beneath the data could not be capitalised. Therefore data-driven decision-making required a combination of a user's ability to synthesise data and to capitalise on the opportunities presented by the data (Todorova & Durisin, 2007; Chen & Siau, 2012). Respondent 3 recognised this need for balance *"I think you need to mix BI with the human relationships".* This was echoed by Respondent 6 as he felt "*that's what any great business needs to have, is a great combination of insight, gut-feel and then obviously the data that can help you make an informed decision… It's not simply trusting the data and saying well that's what the Excel sheet says".* Respondent 7 felt that *"you can only strengthen your relationships by using the information"*

The respondents raised an important point of consideration: Access to volumes of data cannot by itself always generate value for the organisation. The industry is still very relationship focused and

thus the human capabilities element (Chen & Siau, 2012) will always be necessary, but not solely relied upon. Such was the example of Respondent 1 who admitted that their "*business is far more relational basis than data-driven".* This was contrasted with Respondent 4 who felt that the business was becoming *"more data-driven"* when the data was available, but in situations where it was not they "*still [did] a lot of gut feel decisions"*.

Acito and Khatri (2014) offered an alternative perspective on BI, and they argued that the focus should be on how well the information that was available was being used. In support of this perspective, it was Respondent 3 who queried the types of questions being asked of their data. *"People are scared to ask, maybe for lack of, not embarrassment, but you know, some of the simplest questions are the best questions to ask"* (Respondent 3). It was this reference to the manner in which an individual processes information that Turner and Makhija (2012) sought to understand how it influenced an individual's orientation towards fact-based problem-solving. Inculcating a passion for learning and curiosity was suggested by Marr (2009) and Acito and Khatri (2014) as a way of overcoming the hesitation mentioned by Respondent 3.

6.4.4 Summary of Findings for Research Question 3

The examination of the overall use of data for decision-making was supported. This was because many of the organisations used various sources of information to make both long-term and short-term decisions. This demonstrated support for Rousseau's (2006) view that through evidence-based management, practising managers made organisational decisions informed by the best available evidence.

Support was found for the absorptive capacity of senior management to be present for the adoption of BI to be successful. Elbashir et al. (2011) had found no support for this relationship in their research and this served to add to the literature about senior management absorptive capacity and its influence on BI adoption. It was through their ability to synthesise information that the data, both internal and external, was used to support decisions. These respondents, therefore, provided evidence that an analytically engaged manager would produce, consume or create new insights (Acito & Khatri, 2014).

Thus evidence was found in support of absorptive capacity serving as a complement to BI capabilities and helping to generate business value whilst positively influence the adoption of BI (Roberts et al., 2012; Liu et al., 2013; Leal-Rodríguez et al., 2014). This provided further evidence

that data-driven decision-making required a combination of a user's ability to synthesise data and capitalise on the opportunities presented within the data (Todorova & Durisin, 2007; Chen & Siau, 2012).

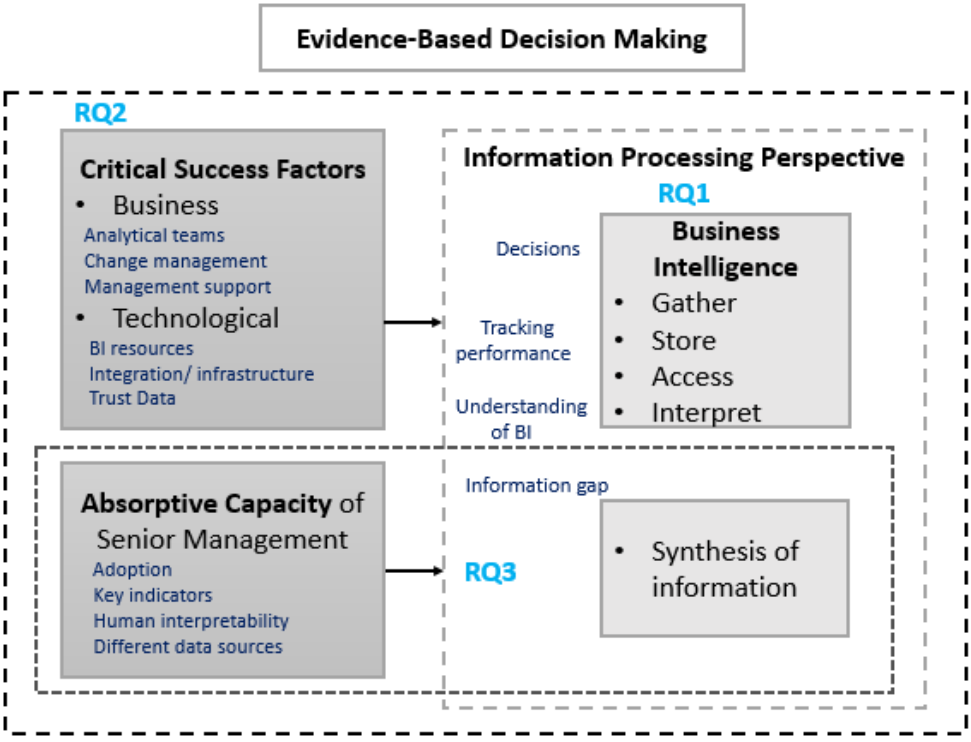
Chapter 7. Conclusion

7.1 Principal Findings

The researcher focused on understanding how senior management used BI to make evidence-based decisions within the IT distribution industry. The result of this was the development of a conceptual model for evidence-based decision-making by using business intelligence as the provider of the evidence upon which decisions were made. Encompassed in the conceptual model were the prerequisites that contributed to successful BI adoption namely, the information processing perspective of BI, as well as the absorptive capacity of senior management. The conceptual model examined the gaps found in the literature as a result of the responses provided to the research questions.

With the analysis of the interview responses, evidence was provided in support of the initial model developed in Figure 2. However, a modification was made to the critical success factors within the conceptual model because the lenses provided by Yeoh and Koronios (2010) were not supported. This allowed the model to show evidence supporting the link between the literature and the research questions. Therefore, Figure 8 illustrates the updated conceptual model of evidence-based decision-making.

Figure 8 – Conceptual model of factors that affect BI adoption for decision-making



RQ1: What role does business intelligence play in the distributor's decision-making?

There was an appreciation for the inherent value that BI brought to the organisation even though it was not being used consistently by senior management. It was concluded that BI possessed the ability to assume most of the roles within information processing and not be biased by the shortcomings of individuals' capabilities to process information. This is shown by the Business Intelligence component in the conceptual model, Figure 8 above. But, to derive the full value of BI and the information processing perspective, an individual was still required to provide the synthesis of the information. This conclusion provided an extension to the theory developed by Tushman and Nadler (1978).

Consequently, the information extracted from the systems was deemed highly valuable by senior management. This supported Pfeffer and Sutton's (2006) claims that management recognised the value of collecting and analysing internal data. In many instances, this information would be used to guide their decisions regarding organisational processes, customer engagements, and profitability of product lines (Işik et al., 2013; Acito & Khatri, 2014; Larson & Chang, 2016). The emphasis appeared to be concentrated on processes and products and to a lesser extent on customer engagements. The use of BI to assist with tracking was the most valued capability by the respondents for the former. In relation to customer engagements, the data was sometimes overshadowed by the long-standing relationships with their customers. This practice questioned the future viability and value-add of the distributor along the supply chain. Thus it was recommended that more data be included in customer-related decisions, thereby balancing the influence of data and relationships.

RQ2: How can distributors improve the adoption of business intelligence in decision-making?

The improvement of BI adoption, as shown in Figure 8, results from a combination of success factors as viewed through two main lenses: technologically-oriented and business-oriented.

It was concluded that having a dedicated BI team and one that maintained a balance between organisational functions, was a critical technological success factor for BI adoption in decision-making. The different skillsets served to complement the team's strength. This supported Yeoh and Koronios's (2010) team composition claim and emphasised balance as a key consideration. Likewise, data quality and accuracy were the starting points of building trust in an organisation's

BI capability. Without this starting point, the ability of BI to deliver accurate, consistent and timely information would be greatly impacted (Işik et al., 2013). This notion was in line with Ross et al.'s (2013) recommendation of one data source. The respondents validated the role that both integration and IT infrastructure played in creating an environment that was conducive to BI. These supported the findings by Armstrong and Sambamurthy (1999), Yeoh and Koronios (2010) and Elbashir et al. (2011): IT infrastructure sophistication enhanced BI adoption.

From the business-orientation perspective, the findings of management support as a critical success factor validated the works of Olszak (2016) and Yeoh and Koronios (2010). It was suggested that granting access to all senior management and encouraging their consistent use of BI, would at least provide the foundation on which successful BI adoption could be built. There was no conclusive support was found for Işik et al.'s (2013) positive relationship between user access and BI success.

Ross et al. (2013) reasoned that organisations did not automatically develop analytical competencies. Consequently, mechanisms would be needed in order to steer the organisation towards a more analytical way of thinking. Among the mechanisms suggested were BI training and support for Watson and Wixom's (2007) management's insistence on data-backed decisions.

Finally, it was recommended that an organisation implement a change management program, supported by management, to provide interactive feedback which could be used to improve the adoption of BI. An agreement was found with Yeoh and Koronios (2010) that greater inclusion in the transition led to the greater success of the BI capability. Additionally, champions within the organisation should be nominated to help drive and reinforce the adoption of BI.

RQ3: What role does senior management play to influence the use of business intelligence to make decisions and formulate strategy?

Many of the senior managers in the organisations used various sources of information to make both long-term and short-term decisions. These sources were utilised to varying degrees, with BI being the most common. This, however, demonstrated support for Rousseau's (2006) view that through evidence-based management, practising managers made organisational decisions informed by the best available evidence. However, management was more likely to use BI if the format of the information was easily accessible and presented. To this end, many opted for special personalised reports.

Support was found for the absorptive capacity of senior management to be present for the adoption of BI to be successful. Elbashir et al. (2011) had previously found no support for this relationship in their research. Therefore, this finding added to the literature on senior management's absorptive capacity and its influence on BI adoption. These respondents, therefore, provided evidence that an analytically engaged manager would produce, consume or create new insights (Acito & Khatri, 2014). Additionally, these new insights would serve to benefit the organisation by exploiting the knowledge (Todorova & Durisin, 2007) or by applying it to commercial ends (Cohen & Levinthal, 1990). Senior management understood that there needed to a balance between BI and emotion-driven decisions. Consequently, the example that management set by using data to guide their decisions permeated the general culture of the next layer of management.

This provided further evidence that data-driven decision-making required a combination of a user's ability to synthesise data and then capitalise on the opportunities presented within the data (Todorova & Durisin, 2007; Chen & Siau, 2012).

7.2 Implications for Management

The conceptual model for evidence-based decision-making through the adoption of BI, Figure 8 above, offers a perspective for managers to determine the extent to which they operate in a data-driven environment. It also offers a perspective on the role that senior management plays, in terms of inculcating a culture of data-driven decision-making. The key benefit is the learning from the various success factors that other distributors have adopted. This learning allows the management team reflection on their approach to realising the full potential of their BI capability and the value in their data. It also underscores the potential to narrow the information gap that is present within the industry. The use of data effectively allows the organisations to establish better demand visibility within the various distribution channels.

It contributes a first attempt at understanding the current "best practices" adopted by distributors in South Africa. It serves as a foundation on which other distributors, who do not currently have any BI capability, can build. It highlights key areas that must be considered for such an implementation. The one takeaway is that an organisation will reap many benefits through the creation of an in-house solution and must not be dissuaded by the BI tools on the market. Once the organisation matures and their BI performance improves, then it might be more appropriate to look at maturing the analytics approach.

7.3 Limitations of the Research

This qualitative study was exploratory and inductive in nature, and the assessments resulted from the personal views of the researcher. It must be reiterated that the researcher is employed within the industry, and the interpretation of the results could have been shaped by the familiar organisational context, therefore researcher bias could have occurred during the literature review, interview process and analysis of results. Thus, with a possibility of personal bias being introduced into the data, caution must be taken in the interpretation of data.

From an alternative viewpoint, there was an advantage that the researcher possessed industry knowledge and to an extent could prevent subject bias. Manufacturing distance was the advice given by McCracken (1988), for when the researcher possessed deep familiarity with certain topics. Thus it was incumbent that the researcher remained critically aware of allowing an invisible hand to direct the interviews (McCracken, 1988). In conjunction with this advice, the researcher took care not to emphasise particular themes and introduce personal bias.

With the management level targeted as the respondents, the result was that the assessments of lower-level employees were omitted. The implication of this was that there may be a bias present in the results for the organisation. Further, the sample size obtained was noted as being on the lower end of the desired number of interviews. Thus the omission of other distributors may have an impact on the results. The sample was limited to only the South African distribution industry, its distributors, and may not be generalisable for other countries or industries.

Similarly, the results may not have provided a complete representation of the current behaviours and practices of the entire organisation. Furthermore, insight into the organisational culture or management styles were not examined, thus the researcher acknowledges that it may influence the level of adoption of evidence-based decision-making.

Finally, since no empirical testing was performed, the research does not measure the improvement in performance past evidence-based management adoption. Thus no correlation nor causal relationships were proven. Qualitative researchers do not typically think in causal terms (Spiggle, 1994, p. 495).

7.4 Suggestions for Future Research

The resultant sample size was lower than expected hence with future research, a broader sample can be collected in the South African distribution industry. Future research may also want to empirically test those distributors with BI analytics against those that did not have any BI analytics.

The majority of the interviewed organisations limited their access of BI to mostly the management level. It would worthwhile to see if wider access of BI would result in the same critical success factors. The interviews excluded lower-level employees and differences between different layers of management in the organisation. It would also attest to the soundness of the conceptual model in Figure 8. This suggestion was in response to Respondent 5*: "And it's almost a scenario where, if you have people that manage and people that just work. And I'm saying I want the workers now to be open and exposed to more data, not that it isn't, it's getting them to start absorbing it, starting to think about that."*

It is further recommended that a deeper investigation into the organisational culture and its role in successful BI adoption be researched. The impact of culture fell out of the scope of the research.

Likewise, the adoption was researched at a point in time, and thus results prove more comprehensive if the research were to be conducted as a longitudinal study.

The conceptual model can be tested across other distribution industries and potentially such industries in other emerging markets. It also recommended that a difference between resellers and distributors be investigated. The inclusion of empirical testing could better verify the conceptual model created.

As per the recommendation of Trkman et al. (2010) the study has assumed that sharing of the information was a given but an exploration into the trust between the companies could provide interesting insight and a different perspective with which to examine the adoption of BI.

7.5 Research Conclusion

The researcher focused on understanding how senior management used BI to make evidence-based decisions within the IT distribution industry. This was the purpose of the research as set out in Chapter 1. The findings of the research revealed that senior management generally drove an evidence-based approach to decision-making. It was not always a consistent practice throughout the distribution industry. As a result of this, demand-visibility in the supply chain remained predominantly unclear, although there were pockets of improved visibility.

In pursuit of understanding this phenomenon, the respondents helped the researcher refine the conceptual model for evidence-based decision-making. The initial model was constructed out of the literature and through the analysis of the interview responses, the model was updated to reflect the insights gained by the researcher. Encompassed in the conceptual model were the prerequisites that contributed to successful BI adoption, the information processing perspective of BI, as well as the absorptive capacity of the senior management team. Finally, senior management was accepting of the fact that their analytical capabilities were predominantly in their infancy stages and the maturity of these capabilities would be a continual process.

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Appendix 1: Ethical Clearance

Gordon Institute of Business Science
University of Pretoria

20 July 2017

Lori Grevler

Dear Lori,

Please be advised that your application for Ethical Clearance has been approved.

You are therefore allowed to continue collecting your data.

We wish you everything of the best for the rest of the project.

Kind Regards

GIBS MBA Research Ethical Clearance Committee

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Appendix 2: Informed Consent Letter

Gordon Institute of Business Science
University of Pretoria

Informed Consent Letter

I am a Masters of Business Administration (MBA) student at the University of Pretoria's Gordon Institute of Business Science. I am conducting research on understanding the adoption of business intelligence in decision-making within the IT distribution industry, and am trying to find out more about the factors that contribute to the success of adoption and the role that evidence-based decision-making would play.
Our interview is expected to last about 45 minutes, and will help me understand how data is helping executives make decisions.

Your participation is voluntary and you can withdraw at any time without penalty. The audio recording of this interview is also voluntary, and you may choose not to be recorded. All data will be kept **confidential** and no company names or interviewee names will be mentioned in the research.

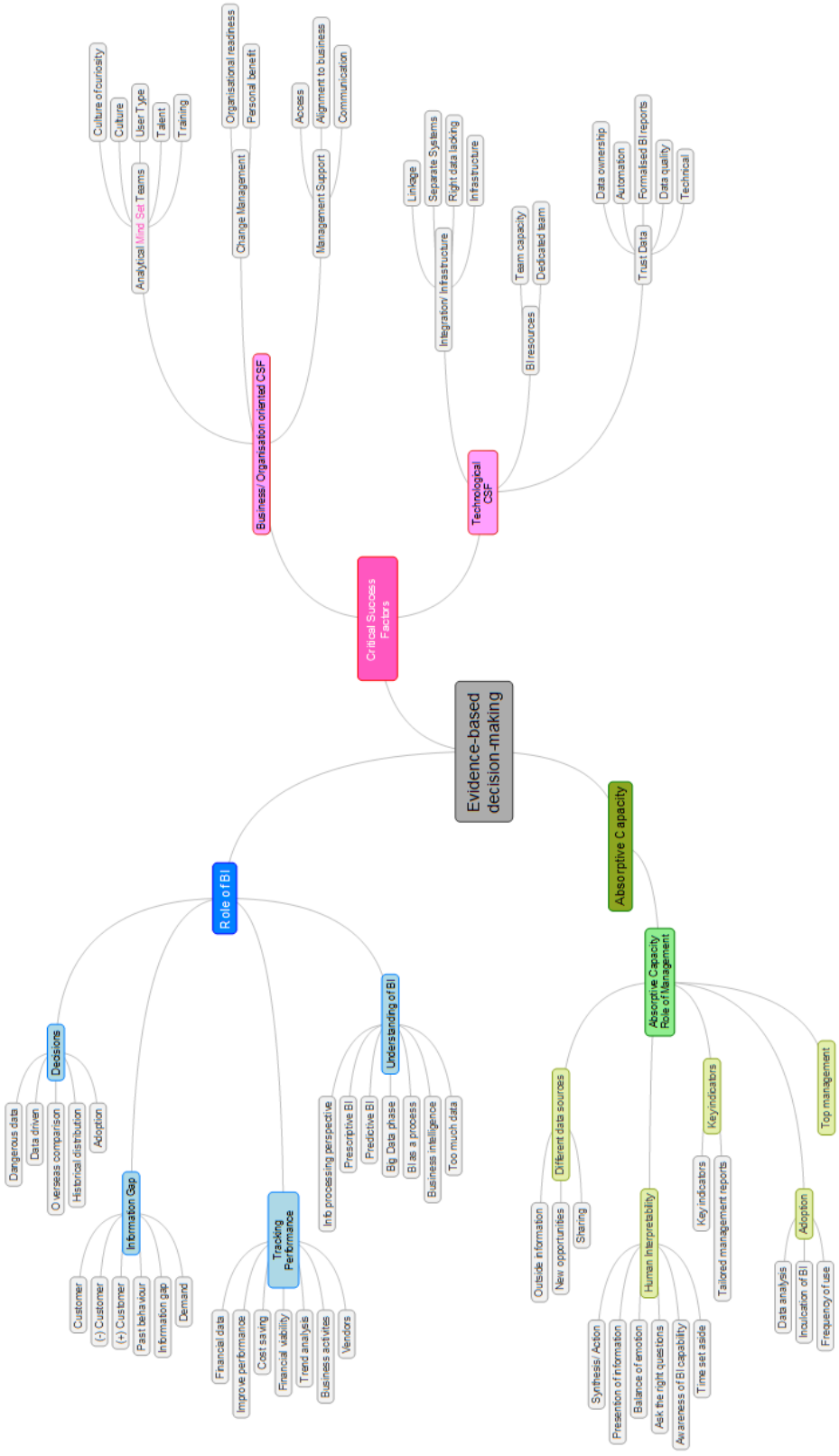
If you have any concerns, please contact my supervisor or me. Our details are provided below.

Researcher name: Lori Grevler
Email: 16391820@mygibs.co.za
Phone:
Signature of researcher: _____
Date: 9 July 2017

Research Supervisor Signature: _____
Email: andrepv@mweb.co.za
Phone:

Signature of participant: _____
Date: _____

Appendix 3: Codebook



Code	Comment- Description	Theme	Category / Concept	Sub Category
Culture of Curiosity	The desire to understand more about what's happened and why. What can be done about it and act on it or actively seek more information.	CSF	Business Critical Success Factor	Analytical Teams
Culture	Mentioning of the type of culture, data-driven or curiosity-	CSF	Business Critical Success Factor	Analytical Teams
User type	Speaks to the type of user of the data - those that are numbers oriented or more graphically oriented	CSF	Business Critical Success Factor	Analytical Teams
Talent	Refers to skills gaps, high performing teams, scarce skills	CSF	Business Critical Success Factor	Analytical Teams
Training	The use of education/training sessions/presentations/documents on BI	CSF	Business Critical Success Factor	Analytical Teams
Organisational readiness	the ability of the organisation to accept the new culture, possess the capabilities necessary to facilitate evidence based decision-making	CSF	Business Critical Success Factor	Change Management
Personal benefit	What does the person get out of using the data? Remuneration policies	CSF	Business Critical Success Factor	Change Management
Access	This refers to the people who have access to the intelligence and whether it is widespread or not	CSF	Business Critical Success Factor	Management Support
Alignment to business	If BI doesn't involve the business need first, then adoption will be more difficult. You need buy-in from the business. Answer a pertinent question.	CSF	Business Critical Success Factor	Management Support
Communication	Management need to speak about BI and promote it, explain it fully to enable adoption	CSF	Business Critical Success Factor Role of Management	Management Support
Dangerous data	The fear of giving people too much access	EBDM	Role of BI	Decisions
Data-driven	Culture or if decisions are made with the use of data	EBDM	Role of BI	Decisions
Overseas comparison	The analytical capabilities as compared to the competitors overseas	EBDM	Role of BI	Decisions
Historical distribution	Speaks to the way information flows in the business value chain	EBDM	Role of BI	Decisions

Customer	Ideas that touch on one view of the customer, who the customer is, demand generation, end user	EBDM	Role of BI	Information Gap
(-) Customer data	Refers to what is not known about the customer. Lack of intelligence or info about the customer or end user	EBDM	Role of BI	Information Gap
(+) Customer data	Refers to what is known about the customer. Past performance or behaviour of the customer but not necessarily the end user	EBDM	Role of BI	Information Gap
Past behaviour	The behaviour of the customers in previous time periods	EBDM	Role of BI	Information Gap
Information gap	Not knowing who the end user is or regarding demand generation	EBDM	Role of BI	Information Gap
Demand	Anything to do with demand generation and end users demand or forecasting demand	EBDM	Role of BI	Information Gap
Financial data	Access to data being from financial systems	EBDM	Role of BI	Tracking performance
Improve performance	Improving performance relating to the terms "performance" or more specifically profitability, ROI, revenue, market share	EBDM	Role of BI	Tracking performance
Cost saving	Where BI saves the organisation money or adds to the bottom line	EBDM	Role of BI	Tracking performance
Financial Viability	The need for BI being linked to the financial sustainability of the company	EBDM	Role of BI	Tracking performance
Trend analysis	Reviewing previous patterns, behaviour to understand the trends and inform decisions	EBDM	Role of BI	Tracking performance
Business activities	Mention of when BI is consulted, and which functions or business activities use BI	EBDM	Role of BI	Tracking performance
Vendors	Anything to do with the vendors and their needs or role in the business value chain	EBDM	Role of BI	Tracking performance
Info processing perspective	relates to the capabilities of gathering, storing, access or interpreting the data	IPP	Role of BI	Understanding of BI
Prescriptive BI	Viewing what happened and making decision from past data, what happened and why.	EBDM	Role of BI	Understanding of BI
Big data phase	The mentioning of the next level of data that is needed, more data sources that are external to the company	EBDM	Role of BI	Understanding of BI
BI as a process	When the respondents speaks to BI being an integrated set of processes and not just a system.	IPP	Role of BI	Understanding of BI
Business intelligence	When the respondents define what BI is according to their understanding	EBDM	Role of BI	Understanding of BI
Predictive BI	Hope for advancement of BI, evolving analytical capability	EBDM	Role of BI	Understanding of BI
Too much data	Any commentary relating to the volume of the data and "analysis	EBDM	Role of BI/ Tech CSF	Tracking performance

	paralysis" or not knowing where to start.			
Adoption	Relates to the use and synthesis of the info provided from the BI system, and how well you're using it	EBDM	Role of BI/ CSF	Decisions
Data analysis	Analysis of the current organisational data	AC	Role of Management	Adoption
Outside information	Access to outside info and insight into their absorptive capacity	AC	Role of Management	Different data sources
New opportunities	The use of BI for scanning the environment, scoping the entrance into a new market or product , sizing the market	AC	Role of Management	Different data sources
Sharing	The hesitation of sharing of sensitive or confidential data	AC	Role of Management	Different data sources
Top management	Reference to behaviours of senior management	AC	Role of Management	Example set
Synthesis/ Action	Doing something about what the data is revealing. Inaction. No absorptive capacity.	AC	Role of Management	human interpretability
Presentation of information	Refers to the manner in which the data is presented in reports, dashboards, presentations	CSF/ AC	Role of Management	human interpretability
Balance of emotion	Can sometime use gut feel but should be balanced with data	CSF/ AC	Role of Management	human interpretability
Ask the right questions	Data is received but the right questions are not being asked of it. Relates to culture of curiosity	AC	Role of Management	human interpretability
Awareness of BI capability	When management are not sure if their system offers various views, tools or applications. How widely is the ability of the current system explained?	AC	Role of Management	human interpretability
Tailored management reports	Reports that give a high level overview of data/information	AC	Role of Management	Key indicators
Key indicators	Showing metrics that are the most important	AC	Role of Management	Key indicators
Time set aside	Dedicating time to the analysis of the data be it in the form of a meeting, call or allocated diary time	CSF/ AC	Role of Management Business Critical Success Factor	human interpretability
Inculcation of BI	Refers to how widespread the adoption of BI is and how it is part of routine/culture	AC	Role of Management Leadership support	Adoption
Frequency of use	How often BI is consulted and by whom	AC	Role of Management Leadership support	Adoption
Team capacity	Management of capacity of the team to ensure value is provided	CSF	Tech Critical Success Factor	BI Resources

Dedicated Team	Dedicated analytics team to guide through the noise	CSF	Tech Critical Success Factor	BI Resources
Group vs subsidiary	Difference in access to information or system availability. The group uses the BI system but the subsidiaries or BUs do not have access or as much access	CSF	Tech Critical Success Factor	integration/ infrastructure
Linkage	Refers to different sources of data and whether or not there is integration. Whether or not they are linked.	CSF	Tech Critical Success Factor	integration/ infrastructure
Separate Systems	Mention of having to access different systems for different information i.e. CRM, Pastel,	CSF	Tech Critical Success Factor	integration/ infrastructure
Right data lacking	Generally in terms of financial, external data that is missing: may be due to technical shortcoming or integration issue. I.e. does the BI system show GL, IS, BS data?	CSF	Tech Critical Success Factor	integration/ infrastructure
Infrastructure	Types of set up in the organisations	CSF	Tech Critical Success Factor	integration/ infrastructure
Data Ownership	Who owns the data that resides in the BI system?	CSF	Tech Critical Success Factor	Trust Data
Automation	Data should have no manual intervention	CSF	Tech Critical Success Factor	Trust Data
Formalised BI reports	Producing standard reports, ensuring capacity of the BI team is maintained and not sending too many different reports	CSF	Tech Critical Success Factor	Trust Data
Data quality	Refers to the process of keeping it clean, maintained	CSF	Tech Critical Success Factor	Trust Data
Technical CSF	As mentioned by Yeoh and Koronios (2010), stability and quality of infrastructure and data	CSF	Tech Critical Success Factor	Trust Data/ infrastructure
Access with no action to end user	When the distributor has a third party logistics model, will deliver on behalf of their customer to the end user but cannot use any of that data to its own benefit	EBDM	ungrouped	ungrouped
CSF	Factors that are mentioned that improve the adoption of BI	CSF	ungrouped	ungrouped
Challenges	Obstacles, considerations encountered in successfully applying BI	CSF	ungrouped	ungrouped

CSF = Critical success factor
EBDM = Evidence-based decision-making
AC = Absorptive capacity
IPP = Information processing perspective