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ESTABLISHING OPPORTUNITIES FOR USING BIG DATA ANALYSIS AT *THE HERALD*

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DECLARATION

'I, Nadeem Joshua hereby declare that:

- The work contained in this treatise is my own original work, except as indicated in the acknowledgements, the text and the complete references table;

- This work is submitted in partial fulfilment of the Masters in Business Administration at the Nelson Mandela Metropolitan University Business School; and

- This dissertation has not been previously submitted in full or partial fulfilment of the requirements for an equivalent or higher qualification at any other recognised education institution'.

December 2018

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Signature   **Date**

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ABSTRACT

A few years ago, merely mentioning the term 'big data' within industry circles, would more than likely have received a quirky and confused look; however, the term big data has gained huge popularity in recent years among IT professionals and academics. The big data phenomenon has exploded in popularity worldwide, and continues to grow exponentially with each passing day. It has been good news for many industries, as industries are going ablaze with the huge volume, variety and velocity of data. As technology advances it is lifting and removing so many boundaries, and answering questions that are not currently being asked. Therefore, it is that big data is taking the world by storm, and it is safe to say that big data has gone mainstream with countless benefits being developed within industries.

The opportunity for employing big data strategies are many, according to McKinsey and Company, and the growth in big data will spark a new wave of 'innovation, competition and productivity' within businesses (McKinsey & Company, 2011). Taking advantage of these opportunities will be challenging for companies, creating the need for new skills, tools and ways of thinking. Implementing big data would help in creating new innovative business models, as executives are challenged to make their organisations resilient and agile in today's challenging business environment.

This research paper aimed to unpack the understanding of big data, the challenges, and the value to an organisation and provide a guideline or framework to implement a big data strategy. Furthermore, this research examines the opportunities and the potential value that organisations would obtain from implementing big data, as well as the challenges that could hinder implementation. Due to the rapid growth and size of data, decision-makers need to be able to gain valuable insights from such varied and rapidly changing data that will help organisations make far better, intelligent and data-driven decisions which may help in improving operations.

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CHAPTER ONE - INTRODUCTION AND BACKGROUND

1.1 Introduction

The newspaper industry globally has been in decline for the past decade. This trend has been closely linked to the precipitated rise of the digital age and more so online media (Gillin, 2013). The accelerating drop in print advertising globally has placed stress on publishers, forcing them to consider significant changes to their offerings. The global spend on newspaper print adverts in 2016 declined by 8.7% to 52.6 billion dollars according to GroupM (Vranica & Marshall, 2016) and represented the largest decline since the recession, when global advertising spend plunged by 13.7% in 2009 (Vranica & Marshall, 2016). The advertising spend continues to decline as seen in Figure 1.1 below.

FIGURE 1.1: GLOBAL ADVERTISING SPENDING

Media Shifts
Newspaper declines in print advertising are accelerating, shrinking their share of media spending.
Global ad spending, divided by media share, inflation-adjusted

$400 billion — $375.5 B

6.9% **Magazine**
9.0% **Newspaper**
33.3% **Digital** — Digital is more than ten times larger than it was in 2001.
4.3% **Radio** — Others have managed to generally maintain their shares of advertising.
40.4% **TV**
5.8% **Outdoor**

2001 — $279.3 B

*Projections
Source: GroupM

THE WALL STREET JOURNAL.

(Source: from Vranica & Marshall 2016)

Newspapers, have traditionally had two sources of revenue income, one being sales of the actual paper and the more significant portion the advertising revenue. The decline of these revenue sources has negatively affected publishers, amplifying the need to improve their alternative sources of revenue to compensate for these declines. Adding to this is the rapid growth of digital media, more specifically, social media platforms, which have changed the media landscape entirely with the digital readership exceeding the number of print readers in developed countries (Milsevic, 2015).

For decades, producing and delivering news required substantial operational investments and infrastructure, consisting of journalists, printers and distributors (R. Cooper, 2014b). The invention of the internet and its rapid adoption removed the enormous financial investments which were traditionally needed, enabling anyone to produce and publish news. Digital disruption is altering market environments and the competitiveness of most industries. Technology can no longer be a stand-alone industry as it continually and dramatically reshapes almost every industry, with the ubiquity and influence of new technologies distorting sector frontiers as companies develop their own digital solutions and strategies (EY, 2016).

Alternate news sources have provided readers and consumers with broader options, therefore, newspaper publishers cannot be assured that their products will be opted for through their traditional news outlets (R. Cooper, 2014b). A massive amount of content is being generated quickly, thereby increasing the competition for readers' and consumers' attention (R. Cooper, 2014b). Established corporations are continuously exposed to additional pressure from emergent disruptors and pacesetters from other countries and industries (Bloem, Doorn, van Duivestein, Excoffier, Maas, & van Ommeren, 2014) As a consequence, new technological upheavals stimulate further disturbance (Bloem et al., 2014).

South Africa's newspaper industry has experienced similar trends, leaving media owners to rethink business models. These trends have increased the pressure to boost digital revenue streams and even reconsider formats of existing newsprint products and

the news content that is published. The statistics from The Audit Bureau of Circulations of South Africa (ABC) released for the period Oct-Dec 2017 continued to show a decline across all formats of printed media (Manson, 2018).

According to the latest ABC data, daily newspapers declined by 8.2% in Quarter three, a 17% decline over the previous year (Manson, 2018). Weekly papers declined by 7.6% over Quarter three, and 7% over the previous year (Manson, 2018). Weekend papers declined by 2.9% over Quarter three, and 12.3% over the previous year (Manson, 2018). The daily newspaper decline was primarily driven by the closure of *The Times* newspaper in December 2017 (Manson, 2018).

The Herald newspaper (based in Port Elizabeth), established in 1845 is the oldest newspaper in the country and is no stranger to these challenges. *The Herald* is a media brand under the holding company, Tiso Blackstar Group, formerly known as Times Media Group (TMG). It's a locally based newspaper with an online presence, namely *HeraldLIVE* which serves the Port Elizabeth region and surrounds; and has experienced similar trends in circulation and advertising revenues over the past decade. The graphs below (Figures 1.2, 1.3 and 1.4) illustrate the declines in sales, circulation revenue and advertising revenues, of the respective papers based in Port Elizabeth, over the last 5 years. The declining trend is showing no signs of a turnaround soon. This is in line with global trends barring a few countries where newspapers are still growing in demand (WAN-IFRA, 2016).

FIGURE 1.2 CIRCULATION TREND OF *THE HERALD* AND *WEEKEND POST*
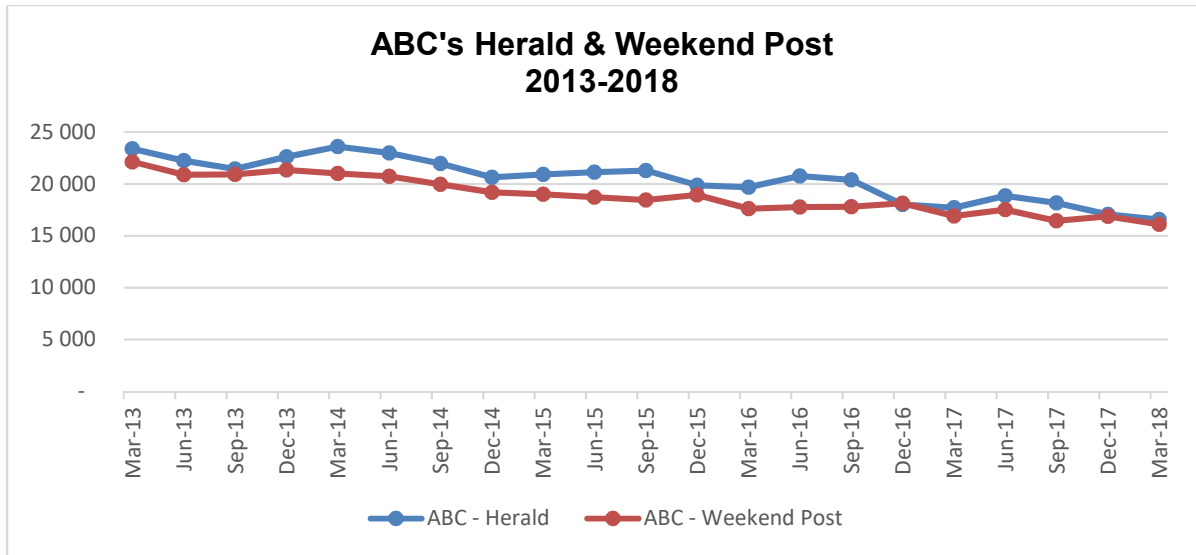
(Source: Author's own construction taken from Swartbooi, 2018)

FIGURE 1.3 CIRCULATION REVENUE TREND OF *THE HERALD* AND *WEEKEND POST*
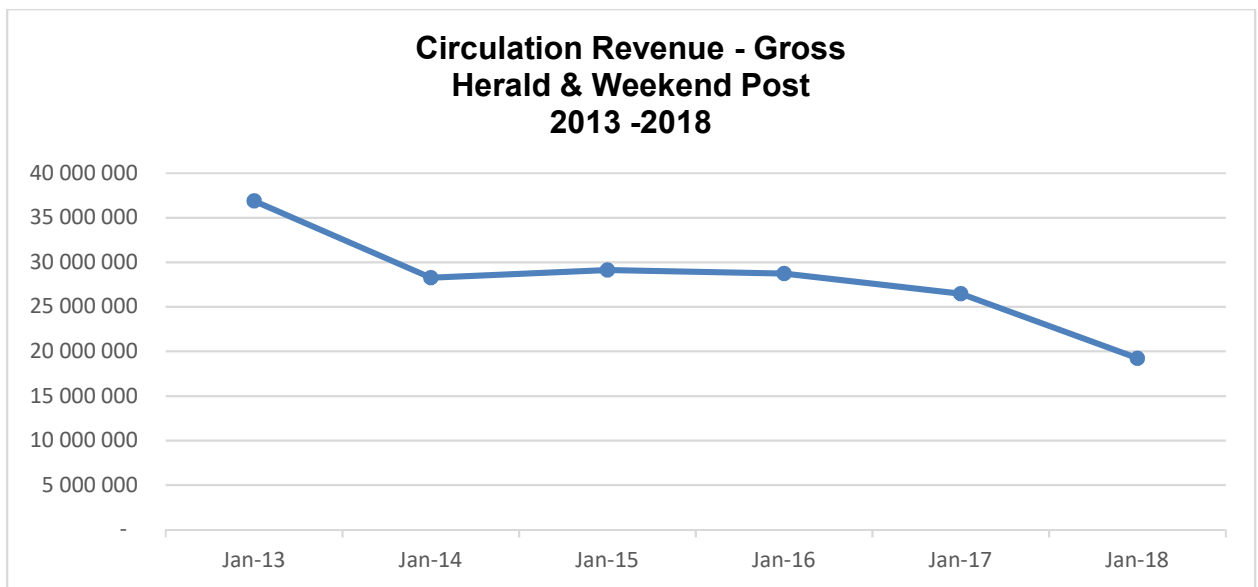
(Source: Author's own construction taken from Swartbooi, 2018)

FIGURE 1.4 ADVERTISING REVENUE TREND OF *THE HERALD* AND *WEEKEND POST*
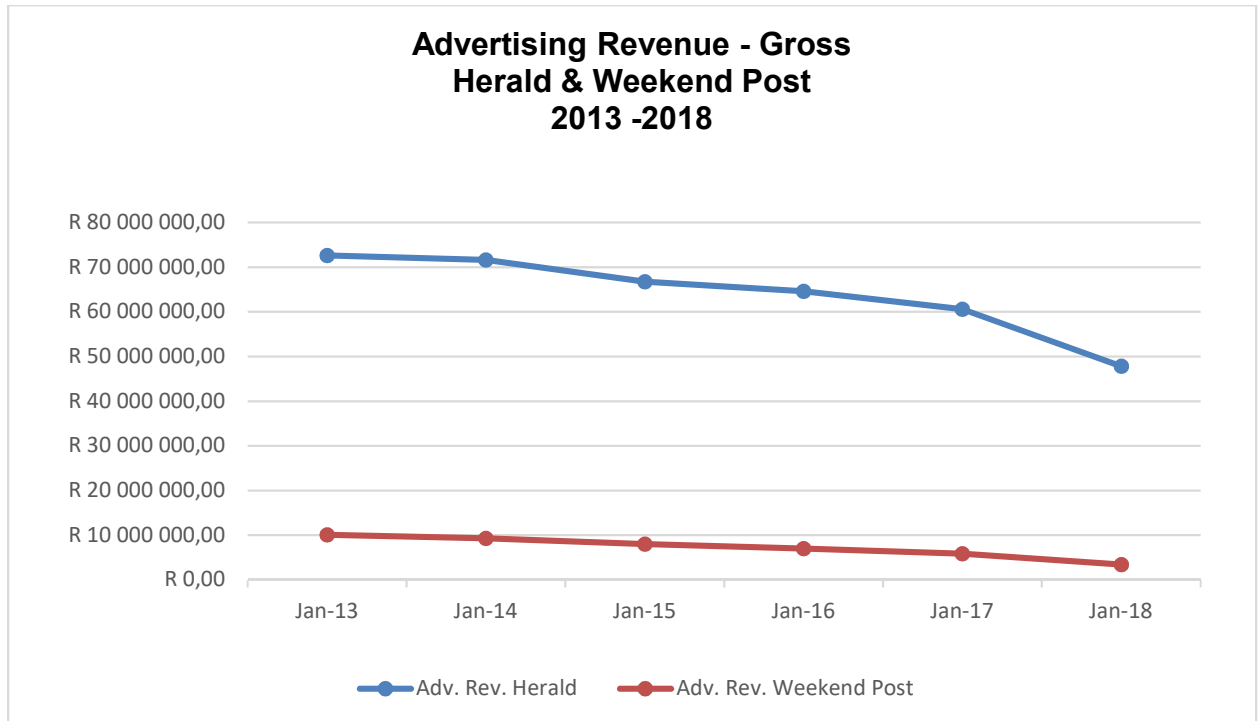
(Source: Author's own construction taken from Swartbooi, 2018)

Although the internet has disrupted the traditional business models and business formats of newspaper publishers, it has, however, expanded readers' consumption of information providing new methods and platforms for traditional newspapers to identify and target their customers. Exceptional opportunities are available today to help companies recognise consumer requirements, preferences and actions (Manyika, Chui, Bughin, Dobbs, Bisson, & Marrs, 2013). This is because the volume and forms of consumer data from sources like social media, online spending trends and geolocation information are growing exponentially (Manyika et al., 2013).

While the newspaper industry has not entered a state of extinction, the internet disruption has rejuvenated an industry, which to an extent, may have become

complacent. Newspaper publishers are facing challenging times and are under immense pressure to grow digital revenue options that can compensate for the collapse and rapid decline of print advertising. This decline is as a result of the dominance and rapid growth of Facebook and Google in the digital market, (Vranica & Marshall, 2016).

The digital alternatives to traditional news consumption have seen readers migrate and increasingly consuming their news online. This has led to marketers moving away from newspapers because of a continued decline in circulation, aging and declining readerships and their need to develop their own digital strategies. Newspapers are operating in a time of rapidly changing market conditions, especially in the world of print advertising: these are the days of accelerating change in the newspaper business (Vranica & Marshall, 2016).

The internet is a game changer for the media industry as this disruption has introduced what is now being called Big Data, which refers to extraordinarily large data sets that are unmanageable through traditional methods (Greer, 2015). The future is still unwritten for the newspaper industry. Fortunately, with the potential benefits of big data, it may not be entirely bleak. Utilising a newspaper's strengths within big data could help carry them into a successful and enduring future (Greer, 2015)

1.2   Main Research Problem

The last 30 years, and more specifically, the last decade, have been extremely challenging and disruptive for the newspaper industry. The disruption within the newspaper industry has resulted in the decline of newspaper circulations, losses in advertising revenue and a migration of readers and customers to alternative platforms, thus forcing publishers to rethink business models, and strategies; and to be innovative to ensure they remain competitive (Vranica & Marshall, 2016). Publishers are still struggling to find ways to stay relevant and profitable in a transformed marketplace. The industry has made some significate strides but still faces challenges, as digital revenues are not growing quickly and substantially enough to counteract declines in print (Vranica & Marshall, 2016).

Newspaper publishers are transforming, by going through some major redesigns of their print publications and digital products, including adding pay-wall systems, to ensure they generate revenue from the content available on their digital platforms, i.e. websites. *The Herald* is in the process of following the same path to ensure it transforms and changes the status quo. These pay-wall systems present organisations with a unique opportunity to gather information from their readers or subscribers; and can be used in conjunction with information that already exists to ensure that they are producing products and services that deliver what consumers need and want (Turner, Schroeck, & Shockley, 2013).

Industry executives globally are recognising the opportunities associated with big data. Big data will create many revenue opportunities for the newspaper industry (R. Cooper, 2014b). Let's not forget, newspaper publishers have been generating information for decades and are among the most significant data collectors in the world (Clark, 2013). It's therefore about time that the industry realised that content is not merely words on pages, or on a screen. The industry needs to understand that the content produced resembles the very essence of the people within the communities they serve (Clark, 2013). No other institution will know as much about its people as will a newspaper (Clark, 2013). *The Herald,* being 173 years in existence and referenced as the oldest newspaper in South Africa, is facing similar challenges and changes with regards to its print publication and digital product offering.

As organisations have been trending towards the significance of big data, the newspaper industry has fallen behind and has been somewhat slow to adapt. There is a definite need for the newspaper industry to adapt and get on board with the increasing demand for big data (Ijaz, 2017). It is becoming abundantly clear that to compete in a consumer-empowered economy, organisations must leverage their information assets' 'data' to gain a deeper understanding of markets, customers, products, competitors, suppliers, employees and more (Turner et al., 2013).

Understanding the role, importance and value that big data potentially offers is a crucial component to the survival of newspaper publishers. Therefore, developing capabilities and processes around big data can allow organisations to generate and cultivate consumer-related initiatives, products and services (Davenport, 2013). Without a deliberate adoption of big data, media companies may find themselves outdated and outmanoeuvred by competitors. The greater the involvement of big data in media and news generation, the better chances of success (Greer, 2015). The key is to understand the role, importance and potential value of what is now called big data and which will be a crucial component in the survival and progress of newspaper publishers. The more big data gets involved with the media and news, the better the chances the news has to succeed (Ijaz, 2017). Therefore, it is essential to have a framework of implementation because of the requirement for a strategic approach necessary to implementing big data analysis and ensuring a return on investment. This framework poses the main research problem for this study.

1.2.1 Main research problem: To what extent does *The Herald* use big data as a source of opportunity, revenue improvement and competitive advantage?

This study aimed to develop a framework for the implementation of big data analysis at The *Herald*. It is intended to guide the business as to how to effectively implement big data analysis within its landscape, to take full advantage of the opportunity that big data presents. This, therefore, introduces the main research question of this study:

RQ_M: **What framework can be developed for the implementation of big data analysis at *The Herald*?**

1.3 Research Questions

The following secondary research questions have been identified and will be investigated to answer the main research question.

- RQ_1: What is big data?
- RQ_2: How can big data create value?

- RQ3: How can organisations use big data in decision-making?
- RQ4: What research methodology should be utilised to undertake this study?
- RQ5: What is the perception of big data and the implementation thereof at *The Herald?*

1.4 Research Objectives

The development of the primary and secondary research questions, established the main research objective. This main objective was later subdivided into secondary research objectives. The main research objective (ROM) for this study was formulated based on the primary (main) research question (RQM) and is as follows:

RO_M: To develop a framework for the implementation of big data analysis at *The Herald*.

For the main research objective to be achieved, secondary research objectives were formulated as follows:

- RO_1: To discuss the background of big data.
- RO_2: To identify how big data can create value within organisations.
- RO_3: To discuss how organisations use big data in relation to decision-making.
- RO_4: To explain the research methodology that would be used to carry out the study and could be used to replicate the study in future.
- RO_5: To interpret the results of the study to understand the perceptions that influence the use of big data, which would subsequently be used to develop a framework for *The Herald*?

Table 1.1 represents a Research Development Plan that was used to describe the theme of the study. As indicated, there is a link between the chapters and their deliverables, main research problem, research questions and research objectives.

TABLE 1.1: RESEARCH DEVELOPMENT PLAN

Chapter	Research Question (RQ)	Research Objective (RO)
CHAPTER TWO (Literature Study)	RQ1: What is big data? RQ2: How can big data create value? *RQ3:* How can organisations use big data in decision-making?	RO1: To discuss the background of big data. RO2: To identify how big data can create value within organisations. RO3: To discuss how organisations use big data in relation to decision-making.
CHAPTER THREE Research Design and Methodology (Literature Study)	*RQ4:* What research methodology should be selected in order to undertake this study?	*RO4:* To explain the research methodology that was used to carry out the study and which could be used to replicate this study in the future.
CHAPTER FOUR Results and analysis of study	*RQ5:* What is the perception of big data and the implementation thereof at *The Herald*?	RO5: To interpret the results of the study and to understand the perceptions that influence the use of big data and which would subsequently be used to propose a framework?
CHAPTER FIVE Findings, recommendations and conclusion.	*RQM:* What framework can be developed for the implementation of big data analysis at *The Herald?*	ROM: To recommend a framework for implementation of big data analysis at The Herald?

(Source: Author's own construct)

1.5 Delimitation of the Research

The scope for this study was limited to *The Herald* newspaper in Port Elizabeth, Eastern Cape. *The Herald* newspaper is the oldest newspaper in the country and the leading news source in Port Elizabeth. The research was restricted to full-time managers within the organisation. Managers were from key function areas, namely, Information Technology (IT), Marketing, Sales, Finance, Circulation and Editorial.

1.6 Significance of the Research

The research endeavoured to provide insight into the use of big data and analysis to potentially improve revenue for *The Herald*. Media revenue globally is under pressure and continues to show declines from both print circulation and advertising (Milsevic, 2015). Therefore, the development of a framework for the implementation of big data analysis at *The Herald* would be timely and beneficial. This treatise is relevant for the following reasons:

- It will assist in identifying and providing a better understanding of big data and how it could facilitate the development of future strategies at *The Herald*, to capitalise on this phenomenon.
- Greater knowledge of big data (and the strategies thereof) will facilitate a greater understanding of how better to build customer relationships and increase revenues.
- This treatise will facilitate a greater understanding of how big data can contribute to making forecasts.
- The treatise should provide understanding of how big data can be used to determine market opportunities.
- Data collected from this study could assist *The Herald* to configure its business model better to take advantage of the opportunities big data offers.

1.7 Research Design and Methodology

According to Leedy and Ormrod (2015), there are two core research approaches, namely quantitative and qualitative. The quantitative research approach involves structured, standard questions with response options that are pre-determined and

arranged in the form of a questionnaire distributed to many respondents (Leedy & Ormrod, 2015). Quantitative research methods make use of scientific methods for collecting raw data and the creation of data frameworks, which are directly related to descriptive research (Leedy & Ormrod, 2015).

Quantitative research is based on positivistic methodologies for developing knowledge, which include cause-and-effect of relationships, reduction of specific variables in the analysis and the utilisation of statistical measurement and observation (Digginess, 2011). Quantitative research involves collecting and analysing data that can be mathematically or statistically interpreted (Leedy & Ormrod 2015). Collis & Hussey (2014) state that qualitative data collection is understood within a context and is associated with an interpretive methodology resulting in a high degree of validity (Collis & Hussey, 2014) The interpretivist approach rests on the interpretation of qualitative data, supported by the belief that social reality is not objective but subjective, because it is shaped by people's perceptions (Leedy & Ormrod 2015).

This research conducted in this study lent itself to the use of qualitative methods, due to the small number of managers that were interviewed. Therefore, the interpretivist approach was assumed to be more appropriate as it involves the use of small samples. Additionally, the chapter has a natural location and is concerned with generating theories. This approach produced subjective qualitative data, with a high validity level. The findings of an interpretivist approach can be generalised from one setting to another similar setting. This research study adopted the use of the qualitative, interpretivist research method; owing to the small number of respondents (Collis & Hussey, 2014).

1.8 Outline of Chapters

1.8.1 Chapter One: Introduction and Problem Statement.

In Chapter One, an introduction to the study is given. The primary research problem, research question and objectives were also stated. Additionally, the chapter presented the overall layout and background of the study.

1.8.2 Chapter Two: Literature Review.

Chapter Two addresses the first three of the research questions in this study which are as follows: RQ1 which states - *What is big data?* RQ2 which states - *How can big data create value?* And RQ3 which states - *How can organisations use big data in decision-making?* Literature will be reviewed to answer these questions which will subsequently achieve the research objectives RO1, RO2 and RO3.

1.8.3 Chapter Three: Research Design and Methodology.

Chapter Three outlines and explains in-depth the research methodology, the research process, the research paradigm and the research approach adopted in the study. The data collection method, the units of analysis, the participants for this study and the data analysis are discussed in depth. A literature review combined with an in-depth explanation addresses the research methodology and design applied in the study. Chapter Three consequently addresses research question RQ4 which states - *What research methodology should be utilised to undertake this study?*

1.8.4 Chapter Four: Results and Analysis of the Study.

Chapter Four discusses the results of the empirical study after analyses. Pie charts and tables are used to present the outcomes and explanations for the data given therein. Research question RQ5 which states - *What is the perception of big data and the implementation thereof to improve revenue?* will hence be addressed in this chapter.

1.8.5 Chapter Five: Findings, Recommendations and Conclusions.

Chapter Five discusses the outcomes of the study, based on the results and analysis in Chapter Four. Recommendations for management are discussed, based on the findings of the study. The chapter also outlines the limitations of this study and any opportunities identified for future research. Finally, a conclusion is reached based on the research questions identified at the beginning of the study. In conclusion, Chapter Five addresses research question RQM which states – *What framework can be developed for the implementation of big data analysis at the Herald?* Figure 1.5 highlights the layout of

the entire study, with each research question and objective linked to the corresponding research chapter.

FIGURE 1.5: OVERALL CHAPTER LAYOUT
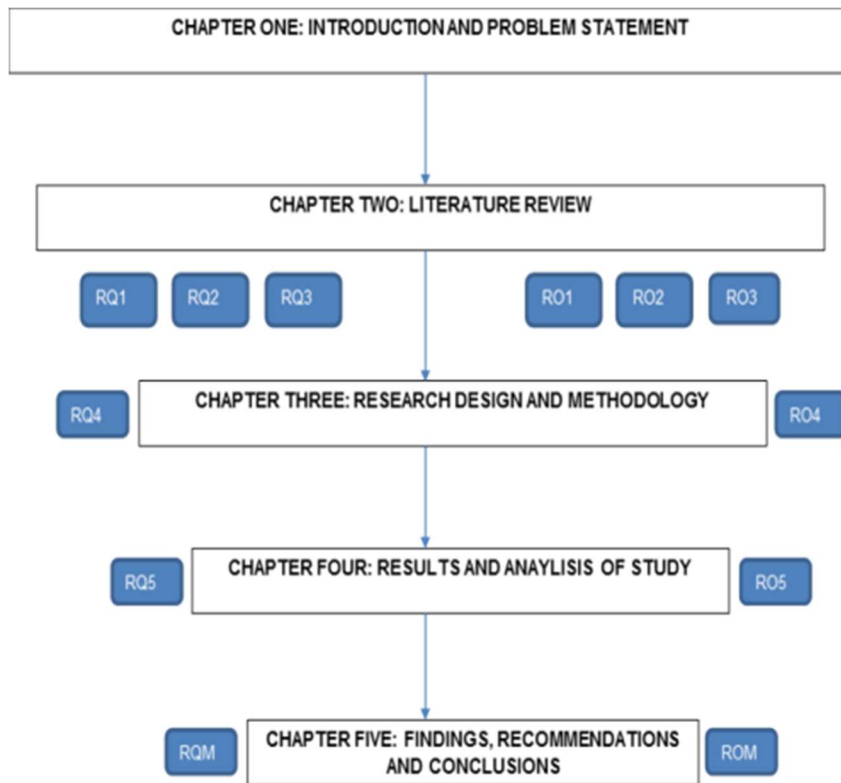
(Source: Author's own construct)

1.9 Assumptions

At the start of this study, it was assumed that there is sufficient literature on big data and the use of big data analyses to conduct a study on the use and implementation of big data. Assumptions were made that a framework could be developed, based on the study of literature on big data, the use of big data and relevant case studies. It is assumed that media houses can use the outcome of this study for the effective use and implementation of big data analysis.

1.10 Ethical Considerations

All ethical criteria were considered as per the FORM E ethics clearance process of the Nelson Mandela University Business School (Appendix A).

1.11 Summary

Chapter One explained the research problem, research questions and the research objectives, subsequently laying the foundation for this study. A brief background of *The Herald* newspaper was given which was further linked to the significance of the outcome of study, i.e. outlining the contribution that the study will make in the field of big data. The chapter layout and the overall reporting structure of the study were given and explained in Table 1.1 and Figure 1.1 respectively.

In the next section, Chapter Two, a literature review is presented to address RQ1 which states - *What is big data?* RQ2 which states - *How can big data create value?* And RQ3 which states - *How can organisations use big data in decision-making?* The overall outcome of Chapter Two will be to achieve the research objectives RO1: which states – *To discuss the background of big data*. RO2: which states – *To identify how big data can create value within organisations* and RO3: which states - *To discuss how organisations use big data in relation to decision-making?*

CHAPTER TWO – LITERATURE REVIEW

2.1 Introduction

A few years ago, mentioning the term big data, was more than likely to elicit quizzical stares from one's peers. Recently, organisations have increasing access to large amounts of data. Access to such data has become an important factor for business success and competitive advantage, with many organisations having adopted and invested in big data projects to improve their value offering and increase their profitability. Organisations have for decades stored and accessed large volumes of data, yet the big data phenomenon has been growing rapidly for only a few years. The expanding mass of data and increased general business awareness of big data disruption, has contributed to the growing awareness (Stone, 2014). According to Moore's law, the storage capacity and processing power available doubles approximately every two years (Intel, 2013; Moore, 1970). Over the past decade, and reflecting Moore's Law, organisations have collected and stored larger volumes of data than ever thought possible (Anderson & Roberts, 2012).

Organisations' incorrect understanding of the term big data associates big data with having an extensive database (Longbottom, 2012). According to Way and Yuan (2012), big data has the potential to become a corporate asset, as the explosion of data is altering businesses and customer relationships through this digital revolution (Way & Yuan, 2012). Therefore, big data and big data analytics has the potential to create competitive advantages for organisations and convert challenges into opportunities (Kiron, Shockley, & Kruschwitz, 2011). The future poses challenges that need tackling in the present and staying ahead in the game is paramount for any organisation to survive in this competitive world. Therefore, it is of utmost importance for organisations to understand the big data concept and how it impacts upon the organisational activities.

2.2 What is Big Data?

Through the advancement, development and rapid growth of new technology, the data now being stored by organisations is no longer just structured data but includes unstructured data (Anderson & Roberts, 2012). Structured data is pre-defined and can be easily saved in relational data bases (CGMA, 2013). Unstructured data is not pre-defined and therefore cannot be easily stored in relational databases, for example, email, videos and images (CGMA, 2013). Therefore, the definition and understanding of the term big data, must consider both structured and unstructured data (Smeda, 2015). The term has gained huge popularity in recent years, although it is still poorly defined, and there is significant ambiguity regarding its exact meaning (Hartmann, Zaki, Feldmann, & Neely, 2014). According to Kaisler et al. (2013), big data was initially defined as volumes of data that cannot be processed efficiently employing traditional databases and tools (Kaisler, Armour, Espinosa, & Money, 2013). This definition, however, was limited to structured data (Smeda, 2015).

The International Data Corporation (IDC) defined big data according to its different characteristics: 'Big data describes a new generation of technologies and architectures designed to economically extract value from large volumes and a wide variety of data, by enabling high velocity capture, discovery, and analysis' (Gantz & Reinsel, 2011). Lisa Arthur (2013) defined big data 'as a collection of data from traditional and digital sources inside and outside your company that represents a source for ongoing discovery and analysis' (Arthur, 2012). *Information Week* defined big data as new analytic applications based on new types of data, to serve customers' needs and gain competitive advantage (Bertolucci, 2013). The following definition 'Big Data is the information asset characterized by high volume, velocity and variety to require specific technology and analytical methods for its transformation into value' has been proposed (De Mauro, Greco, & Grimaldi, 2016), and suggested that big data should refer to its nature of 'information asset', a clear identifiable entity not dependent on any application De Mauro et al., (2016 p.131). These existing definitions provide very different perspectives of big data. Scholars, therefore, adopted anecdotes, success stories, characteristics, technological features, trends or its

impact on society, organisations and business processes to help define big data (De Mauro et al., 2016).

2.2.1 Characteristics of Big Data.

Understanding the value of big data and in determining whether organisations will benefit from big data, one needs to understand the characteristics of big data. The characteristics of big data can be summarised as follows, (Smeda, 2015).

- Data volume
- Data velocity
- Data variety
- Data value
- Data complexity

2.2.1.1 Data volume.

At the turn of the 21st century a rapid explosion of technological achievement came about, and it changed how people communicate, interact and engage. Information is now in abundance, generated from different sources and of different sizes, all of which changes rapidly. The data being collected today is no longer just structured but includes unstructured data. Big data is being measured in terabytes, petabytes, zettabytes and beyond (Stone, 2014).

Unconventional data sources are being generated much faster than structured data sources, aiding in volumes of data being generated daily. This phenomenon presents organisations with opportunities to use and analyse data in new ways, from which they can derive useful information. According to IBM Marketing Cloud, *10 Key Marketing Trends For 2017*, ninety per cent of the world's data today has been generated and created in the last two years alone, at 2.5 quintillion bytes per day (IBM, 2016). The volume of data available to organisations is not limited to the amount of data it stores, but rather to the amount of data which the organisations can access. Being able to access and use these volumes of data can successfully position organisations to gain a competitive advantage within their industry. Information availability has gone from being

rare to overwhelming and brings with it not only new benefits but also huge headaches, says *The Economist* (Cuckier, 2010).

2.2.1.2 Data velocity.

Data is being accumulated at a much faster rate than ever before thanks to the billions of smartphones, wearable devices, web pages, apps, stock fluctuations, news articles, instant messages, social media posts, videos and photos that are now all connected (Valerdi, 2017). The velocity of data is the speed and frequency at which data is being generated and delivered (Kaisler et al., 2013; Russom, 2011). Websites and social media platforms are enabling organisations to collect data in real time at the velocity at which it's being created; and herein lies the challenge; to analyse this data in real time (Russom, 2011). Big data techniques do not only allow organisations to collect the data at the velocity at which it has been created but also enable organisations to analyse the data in real time, thus enabling organisations to gather and interpret information that can be used for decision-making in real time (Smeda, 2015).

Organisations who are able to access information in real time are incredibly agile with situations and scenarios when compared to their competitors (McAfee & Brynjolfsson, 2012). Access to real-time information provides a competitive edge to an organisation in terms innovativeness (Smeda, 2015).

2.2.1.3 Data variety.

According to The Data Warehouse Institute (TDWI), the variety of data is making big data topical (Russom, 2011). Data no longer comes from a single source; therefore, big data combines structured and unstructured data and is positioned to optimise unstructured data (Johnson, Neff, & Stuart, 2012).

The variety of data is not only about the variance in sources, but it includes the richness and depth of the data (Kaisler et al., 2013). Sources of data include text, sensor data, audio, video, click streams and images (Kaisler et al., 2013). The richer the data, the more complicated it becomes for organisations to be able to use it effectively in decision-making. With the use of big data analysis, organisations will be able to discover

automated techniques which could allow for predictions of the needs and wants of customers to a greater extent, providing a competitive advantage within their industry (Buytendijk & Heiser, 2013).

2.2.1.4 Data value.

Big data value can be measured by its usefulness (Kaisler et al., 2013) and it can help by giving insights, which would help in gaining a competitive advantage, increasing revenues and customer retention (Talia, 2014). The fact that data which can be included does not need to be owned by the organisations increases the value of data (Smeda, 2015). Data's usefulness can also be measured by how predictive and how useful the information is that can be extracted. By combining the sources of data available to an organisation one can find patterns and separate the signal from the noise which will improve the data's usefulness and its value.

2.2.1.5 Data complexity.

Data complexity refers to interconnectedness and interdependence of data structures (Kaisler et al., 2013). The data can be from various sources, which is most likely to be the case due to data variety, but there must be a link or connecting factor (Beyer, Lapkin, Gall, Feinberg, & Sribar, 2011). Therefore, the complexity is measured by the impact a small change has on the information extracted from the data (Kaisler et al., 2013). Interconnectedness is a unique attribute of big data and provides organisations with valuable information, which they would not have had access to without the use of big data. Interconnectedness, therefore, allows them to adapt effectively to changes as they can evaluate the effects of big data analysis (Smeda, 2015).

The characteristics discussed indicate what big data entails and is a further elaboration of the definition of the term big data, which is still loosely defined. Defining big data will help an organisation start evaluating if it can benefit from this technology and its implementation. Organisations need to understand how to discern what information is relevant, and to leverage it for better business results as data accessibility continues to expand. Forty percent of organisations' budget is wasted because of the inadequate use

of big data (Yu, 2014). Therefore, it is imperative to understand and take full advantage of big data to gain value.

2.3 The Value of Big Data

The challenge that lies ahead is for organisations to identify how best to use the data generated. Organisations have opportunities to access, extract and harness every byte of relevant data and use it effectively with regards to decision-making. Analysing big data would create value for organisations (Laney & Taylor, 2013), and offers opportunities such as identifying hidden patters, better decision-making, improving business processes and developing new business models (Halaweh & El Massry, 2015). It is, therefore, essential for organisations to understand and distinguish between relevant and non-relevant data. Organisations need to separate 'the wheat from the chaff' and focus on information that counts – not on information overload (Torsten, 2015).

Irrelevant or poor data has cost businesses twenty to thirty-five per cent of operating revenue and bad or poor data quality costs U.S. businesses 600 billion dollars annually (Luckie, 2012). Poor quality data across businesses and government costs the U.S. economy 3.1 trillion dollars a year (Waterford Technologies, 2017). With the magnitude of big data, organisations must focus on 'high-impact' data: intelligent data with the potential to drive more strategic decisions (Yu, 2014).

Many organisations are adopting big data and have a range of initiatives underway. Successful implementations to date have been initiatives to decrease expenses through operational cost efficiencies (Bean, 2017). Executives report that innovation and disruption initiatives have had the highest success rate after an investment in a big data project – sixty-four point five percent (64.5%) started a big data project, forty-four point three percent (44.3%) reported results after implementation of a big data project, and sixty-eight point seven percent (68.7%) of organisations had seen an improved success rate (Bean, 2017).

Organisations need information or data that is relevant, actionable and accurate (Editorial, 2016). Organisations who harness the correct type of data will differentiate

themselves from their competitors and see real business results (Yu, 2014). To date, big data's impact has been widespread across industries, and one can see the fruition of results that were, until very recently, impossible for man to compute. As big data continues to develop, organisations which fail to capitalise will fall further behind.

2.3.1 Benefits of Big Data.

There is no doubt that industries are going ablaze with this massive explosion, as data is now found in every industry and business function and has become an essential factor of production, alongside labour and capital (Manyika et al., 2011). Data can be used to improve what organisations know about customers, their wants and needs and will most definitely be able to ensure that leaders make better decisions based on data and not just hunches (Winig, 2016). According to research conducted by IBM (2013 a), one in three business leaders makes critical decisions without the information they need (IBM, 2013a). Data is meaningful and adds value when used to drive and solve business problems.

The volume of data is exploding and analysing large data sets – big data – will form a crucial foundation of competition, underpinned by new waves of productivity, growth, innovation, and consumer surplus (Manyika et al., 2011). The characteristics discussed in Section 2.2.1 highlight some key benefits of big data, which can assist organisations with decisions to implement big data technology and help derive value from its data. The key benefits based on the characteristics are (but are not limited to) the following:

- Better predictions
- Increased value delivery
- Benefits of scale
- Improved ability to adapt to change

Each of these benefits is discussed briefly in the sections below:

2.3.1.1 Better Predictions.

In the era of fierce competition, everyone wants to stand out from the crowd and with the variety of sources available to organisations, complemented with the appropriate analysis, data can be a powerful tool for analysing customer behaviour and trends to make accurate decisions about innovations in products and services offered, and thereby providing an edge over competitors (Smeda, 2015). Big data has the potential to change how decisions are made and taken within organisations (Brown, Chui, & Manyika, 2011). Big data and big data analytics capabilities form part of significant competitive advantages for organisations (Yusuf, 2015). Proper analysis can be complicated as big data may not provide all the insights an organisation may need. A lot will depend on asking the right questions and extracting the relevant data for it to work (Wang, 2016).

Big Data analysis can allow organisations to predict behaviours of customers better and use the knowledge to their advantage (Brown et al., 2011). Understanding customer behaviour can provide organisations with insights to design innovative products and services to meet customer needs and make organisations more agile in responding to macroeconomic trends (Yusuf, 2015). Such an understanding can result in adding more value to the organisation's customer base as they are able to predict customer wants more accurately, (Kaisler et al., 2013) enabling better business decisions (Johnson et al., 2012), which deliver competitive advantage. In the new world of technology, delivering instant gratification in real time will be significant (Pugh, 2017). Therefore, better predications aid organisations to be more proactive in their business approach (Smeda, 2015).

2.3.1.2 Increased Value Delivery.

Delivering value is one of the Control Objectives for Information and Related Technology (COBIT 5) governance objectives (ISACA, 2013). Organisations will be in a better position to achieve this objective efficiently through the implementation of big data projects (Smeda, 2015). According to King III, value delivery can be achieved through the optimisation of expenditure and improving the value of IT within an organisation (IOD, 2009). Organisations can gather intelligence from big data and translate this into business

value (McAfee & Brynjolfsson, 2012). Herein lies the value. Very large amounts of data from different sources can be analysed to provide actionable insights.

Big data technologies are designed to optimise and effectively transform unstructured data into useful insights (Johnson et al., 2012), which in turn, improves the effectiveness of data and information management (Smeda, 2015). Data as a resource, much like water, energy or any other resource, does nothing on its own (R. Cooper, 2014a). Data can be world-changing, however, in how it is employed and executed in human decision-making.

2.3.1.3 Benefits of Scale.

The implementation of big data allows organisations to capture data from different sources and acquire third-party data (partners & customers), providing the ability to integrate and extract relevant data by using analytics (Brown et al., 2011). Organisations who capture large volumes of valuable data and use the data effectively create an advantage over their competitors (Brown et al., 2011). According to Johnson, et al., (2012), the benefit of scale is that departments within and across organisations benefit from big data systems by gaining access to existing data. Access to data from both internal and external sources provides useful information for better decision-making, adding to the overall advantages to the organisation (Johnson et al., 2012). Considering the benefits mentioned above for organisations and the possible value that can be derived, organisations that link business imperatives to the potential value that a big data implementation project can deliver will also benefit themselves, when considering the use of this technology (Smeda, 2015).

2.4 Potential Value of Big Data

Knowledge or information itself can be viewed as an asset, often with significant marketplace value (Glazer, 1991). Bennet and Bennet (2008) broadly mention that 'the knowledge within organisations determines organisational performance' (Bennet & Bennet, 2008). Authors have argued that one of the most effective ways for organisations to extract the potential value of big data projects is via an increased use of big data as an

input into the organisational decision-making process (Davenport, Harris, De Long, & Jacobson, 2001; McAfee & Brynjolfsson, 2012; McKenzie, van Winkelen, & Grewal, 2011).

Various authors have anecdotally stated that there is a definite link that exists between the effective use of information and knowledge management within an organisation and organisational performance (Myburgh, 2015). As a result of using data as an input into the decision process, there is a direct impact on efficiencies being created, improved organisational performance, or an indirect impact of improved decisions (Myburgh, 2015). Due to the anecdotal references being made to the value of big data, McAfee & Brynjolfsson (2012) conducted research to prove the direct impact of data analytics, and to test the hypothesis that data-driven organisations perform better. The research established that organisations with data-driven decision-making were among the top performers in their respective industries, with five percent more productive, and six percent more profitable, compared to their competitors (McAfee & Brynjolfsson, 2012). The research, however, was potentially biased, because it was based on respondent feedback. McAfee & Brynjolfsson (2012) concluded that 'organisations which characterised themselves as data-driven, performed better on objective measures of financial and operational results'. Discovery, a local South African organisation, through their investment and use of big data and big data analytics, were able to recover millions in fraudulent and billing errors amounting to R 288 million (Yusuf, 2015).

Further research conducted by the IBM Institute for Business Value found that organisations which utilise data analytics for competitive advantage are 2.2 times more likely to significantly outperform their industry peers (Kiron et al., 2011). The research also found that organisations proficient at analytics enjoy 1.6 times more revenue growth, 2.0 times more profit growth and 2.5 times more stock price appreciation (Kiron et al., 2011). Research, therefore, suggests that data-driven analytics can have a direct impact on organisational performance (Myburgh, 2015).

It has also been suggested that data-driven decisions eliminate the possible bias of decisions based on intuition as they result in more consistent decisions which are more

cost effective to replicate, transfer and leverage (Davenport et al., 2001). These authors also mentioned several examples of organisations where executives had based their judgements on data rather than on hunches, and in these cases, they attributed improved organisational performance to this (Davenport et al., 2001).

McKenzie, et al., (2011), a decade later, commented that the application of data in decision-making processes minimises the risk of ill-informed decisions being taken. A link between the use of data during decision-making and the potential benefits thereof were identified by McKenzie et al., (2011) and McAfee and Brynjolfsson (2012) argued that decisions are fundamental to daily business operations, and that quick decision-making based on data can be viewed as a core strategic capability. Globacom, a Nigerian telecommunications giant applied big data and big data analytics throughout its operations across West Africa and managed to optimise their customer's experience (Yusuf, 2015). This led to a better understanding of customer needs, increased customer retention and enhanced and developed overall efficiencies (Yusuf, 2015).

Big data's impact is widespread, and would make new improvements across industries that were difficult or impossible to be determined previously (Halaweh & El Massry, 2015). It can be inferred, based on all the preceding literature, that those organisations which don't adopt big data and big data analytics to capitalise on this intelligence will fall further behind.

2.5 Big Data Related to Decision-Making

It can thus be argued, based on all the preceding literature, that big data has had an impact on organisational decision-making. Therefore, every decision taken today has a significant impact on the future of the organisation. The rate at which organisations respond to challenges in the present and future is what will determine their rate of success. According to Das & Kumar, (2013) making time-sensitive decisions faster than ever before presents a crucial opportunity (Das & Kumar, 2013). For organisations that have invested in big data projects, it's not about the volume or speed of the data being collected; it is about the value and insights that can be derived from the data through

effective decision-making; moving away from making decisions on intuition and moving towards making effective decisions using data. Data would help stakeholders to take decisions in a timely manner since the relevant data is easily accessible (Manyika et al., 2011).

Within the magnitude of big data and the capacity of the data that it encompasses, lies the potential that will help companies to make far better, intelligent and data-driven decisions and improve an organisation's operations. O'Driscoll, (2014) argues that the usage of big data will empower business leaders to make more informed decisions (O'Driscoll, 2014). Organisations must use big data during decision-making to enable the value realisation of big data (Myburgh, 2015). A lack of understanding about the purpose for which big data might be used might potentially result in a great deal of effort to produce information that might be irrelevant and useless to decision-makers within an organisation (Myburgh, 2015). For organisations to ensure relevance, the insights extracted from the data or the decision that needs to be made must be considered and the information requirements, determined accordingly (Kaner & Karni, 2004).

Organisations must consider the use of the right data to effect the optimal decisions to increase value (Myburgh, 2015). The significance of big data lies in its ability to provide information and knowledge of value, upon which to base decisions. Big data is becoming an increasingly important asset for decision makers (Elgendy & Elragal, 2014). However, decision-making within organisations dates back to the 1900s, and is described as a predominately rational, linear process during which several alternatives are considered in order to make a choice (Myburgh, 2015).

Later, Bellman and Zadeh (1970) brought in the concept of uncertainty, or fuzziness; and reported that various alternative boundaries are not sharply defined thus inherently complicating the process (Bellman & Zadeh, 1970). Myburgh (2015) and Mintzberg, Raisinghani & Theoret,(1976) had a similar view, and argued that strategic decision processes are immensely complex and dynamic, due to the unstructured nature of these decision situations that have not yet been encountered, and thus no

predetermined and explicit set of ordered responses exists (Mintzberg,et al, 1976; Myburgh, 2015). Behavioural theories of decision-making such as those of Slovic, Fischhoff & Lichtenstein, (1977) as citied by Bettman and Park (1980) emerged, as well as the influence that knowledge and experience have on the decision-making process (Bettman & Park, 1980; Slovic, et al, 1997).

The emergence of computers in the 1980s, and the impact of decision support systems was featured predominately as part of later research on decision theory (Sprague Jr, 1980; Desanctis & Gallupe, 1987). The use of technology in decisions has been discussed extensively in academic literature for a few decades (Quinlan, 1986; Desanctis & Gallupe, 1987; Sterman, 1987; Turban, 1990; Kohavi, 1995; Saaty, 1996; Ho, 1998; Dietterich, 2000). In the 1990s the introduction of the discipline of knowledge and information management in organisations sparked a new debate concerning how data, information and knowledge, can be utilised as an input into organisational decision-making (Kogut & Zander, 1992; Wiig, 1997; Alavi & Leidner, 2001; Courtney, 2001).

As information management and the field of analytics progressed, the use of such information and data during decision-making also evolved. With the emergence of big data, and big data analytics, a natural evolution for the use of information during decision-making occurred towards the utilisation of big data analytics for organisational decisions, which is often one aspect of big data that most organisations struggle with (Strenger, 2008; J. Cohen, Dolan, Dunlap, Hellerstein, & Welton, 2009; Rajteric, 2010; Boyd & Crawford, 2012; McAfee & Brynjolfsson, 2012). One of the main implications of big data is the impact on decision-making processes within organisations (McAfee & Brynjolfsson, 2012) accompanied by the massive opportunity that big data analytics can have on improving decisions (Davenport et al., 2001). Therefore, the application of big data analytics as an input into the organisational decision-making process improves the effectiveness of decisions and in turn, positively impacts upon the financial performance of the organisation (Myburgh, 2015). It is imperative for business leaders today to understand how this recent phenomenon can be used as an input into decision-making (Myburgh, 2015), which can improve decision quality in abundance (Potter, 2015).

There will be no point for any organisation to adopt big data and big data analytics if they do not make use of the evidence provided to improve the effectiveness of their decisions (Potter, 2015). By utilising insights from big data as an input into decisions, the information requirements would be defined upfront (Malakooti, 2012) and would help distinguish between the noise and essential information (Qin, 2014).

2.6 Impact of Big Data Characteristics on Business Imperatives

Organisations have clear business imperatives, which are specific to the industry in which they operate (Boshoff, 2013). According to *The Economist* Intelligence Unit study, conducted in 2013 among 373 executives globally, fifty-four per cent indicated that they aligned their big data strategies with their overall business strategies (Stone, 2014). Organisations that will benefit from big data will have business imperatives that will be more easily and effectively achieved through the use of big data than they would be without it (Smeda, 2015). Business imperatives related to big data were identified, based on the characteristics and benefits of big data as established and discussed in the preceding literature.

Firstly, the term 'business imperative' must be defined. Terblanche (2011) defines business imperatives as non-negotiable principles to be achieved in order to reach its strategic objectives (Terblanche, 2011). Goosen (2012) defines business imperatives as strategic-level objectives that are critical and fundamental drivers that enable an organisation to achieve its objectives and provide a competitive advantage (Goosen, 2012).

Based on the above definitions, business imperatives can be defined as critical and fundamental drivers that are essential to achieving strategic objectives of the organisation and deriving competitive advantage (Smeda, 2015). The business imperatives can bridge the gap between business and IT by establishing a greater alignment, which helps in achieving the organisation's strategic objectives (Smeda, 2015). In this study, four business imperatives have been identified by means of a literature review. Business and IT alignment are principles of the King III Report on IT

governance (Badenhorst, 2009). The identified imperatives will result in better business and IT alignment within an organisation that implements big data technology. The business imperatives, distinctive of an organisation and which will benefit from the use of big data are the following:

- Innovation
- Pro-active management
- Scalability
- Agility

These business imperatives are defined and the effect of big data on each of them is discussed in detail.

2.6.1 Innovation.

Innovation is regarded as the pinnacle success factor in highly competitive economies (Rajapathirana & Hui, 2018). Organisations which adopt and implement big data and big data analytics will be able to use information extracted, not only to identify opportunities in the market but also to predict customers' wants, thereby providing an ability to target customers and market their products and services more effectively. An innovative company has the potential to gain substantial competitive advantage. An innovation perspective draws a clear picture of future opportunities for gaining competitive advantage and sustaining the competitiveness and growth (Rajapathirana & Hui, 2018). Therefore, to achieve this, organisations need highly functional systems which are able to provide real-time information as the time-cycle for decision-making nowadays is decreasing rapidly (Boshoff, 2013).

Through the use of big data, organisations gain access to useful information, in real time, which is derived from a variety of complex data (Smeda, 2015). The interconnectedness derived from big data can easily determine effects of changes and provides information that is needed to make innovative decisions as time is crucial for the success of any organisation (Kaisler et al., 2013). Analyses of big data provides organisations with the predictive power of the data (Kaisler et al., 2013), enabling

organisations to predict the behaviour of customers accurately, as customer reaction is an important factor in the development of new products and services (Smeda, 2015).

2.6.2 Proactive Management.

Access to real-time, actionable information enables organisations to make accurate and informed decisions (Goosen & Rudman, 2013). Organisations have to make decisions more quickly than in the past, therefore, accelerating the time taken to answer is crucial. An organisation with proactive management as a business imperative, is an organisation where management requires real-time information to react and adjust decisions to what is currently happening (Boshoff, 2013). According to Géczy (2014), a primary goal for many organisations is having access to actionable information and being able to extract this information from large volumes of rich and complex data (Géczy, 2014). Another key benefit of big data is that the effect of changes (big or small) can be easily determined due to interconnectedness, enabling organisations to be proactive in their management by anticipating possible outcomes. This allows management to act faster and more effectively (Kaisler et al., 2013). Proactive management is a unique attribute of organisations that have access to, and use, big data, as it allows access to useful information which is extracted from large quantities of rich and complex data (structured and unstructured), which would not have been possible by using ordinary and traditional database tools or before the big data phenomena (Smeda, 2015).

2.6.3 Scalability.

Scalability is defined as the ability of systems to manage increasing amounts of data effectively, providing flexibility and the ability to accommodate growth (Bondi, 2000; Géczy, 2014). Big data has the ability to process large volumes of data efficiently, and organisations automatically have the ability to handle larger volumes of data than currently exists (Smeda, 2015). The scalability of big data enables inter-departmental access to the same systems and reports (Johnson et al., 2012). The benefits of scale with regards to big data allows for cross-departmental access, making information available throughout the organisation. By giving departments access to data and reports already

generated, costs, as well as time, can be saved as there may be less duplication which helps organisations achieve greater interconnectedness (Smeda, 2015).

2.6.4 Agility.

Agility is the propensity to adapt to unforeseeable changes within the business environment effectively (Van Oosterhout, Waarts, & Van Hillegersberg, 2006). Traditionally, organisations have been considered flexible if they can adapt to predictable changes (Vokurka & Fliedner, 1998). Organisations that are considered agile are more than just flexible as they can respond effectively to unpredictable changes and are continually ready for change (Vokurka & Fliedner, 1998).

As previously indicated, big data provides an opportunity to access real-time data and information (Russom, 2011). Coupled with improved predictability this allows organisations to adapt as they can anticipate better. Anticipation determines the effects of possible changes and organisations can react more effectively and take corrective measures if needed (Smeda, 2015). The above discussion on big data related to business imperatives can help organisations evaluate the benefits. The business imperatives listed above are a guide based on the literature. These imperatives are not cast in stone but form a decisive base to build on, to ensure that organisations can extract value from the use of big data.

2.7 Strategic and Operational Risks Related to Big Data

Decisions that organisations take are those that enable them to achieve their strategic goals (Smeda, 2015). Business imperatives form key elements that an organisation uses to achieve its strategic goals (Boshoff, 2013; Goosen, 2012; Terblanche, 2011). As big data is an IT solution, according to Boshoff (2013), IT risks can be divided into two specific categories; those of strategic risks and those of operational risks. IT risk can be defined as being risk in which IT systems do not support the organisation in such a way that it can effectively achieve its business objectives (Worrel & Bush, 2007) .

Strategic risk, as defined by Bromiley, Rau and McShane (2014), is 'the risks inherent to the organisation's strategic decisions'. Business imperatives impact upon strategic decisions as they are drivers, which assist in achieving an organisations' strategic goals (Boshoff, 2013; Goosen, 2012; Terblanche, 2011). Hence, technology must be used as a source of competitive advantage for organisations. Boshoff (2013), identified the following strategic risks within organisations:

- Integration risk

- Interoperability risk

- Security risk

- Scalability risk

- Retrofit risk

Operational risk is 'the risk of losses resulting from inadequate or failed internal processes, people and systems' (Böcker & Klüppelberg, 2008). Operational risks in relation to the implementation of new technology are risks that impact upon the different stages of a system's life cycle (Smeda, 2015). A system's life cycle corresponds with the categories of the life cycle according to the COBIT 5 Enabler Dimension (ISACA, 2013) as well as the five categories into which Boshoff divides operational risks. The categories are as follows (Boshoff, 2013):

- Plan
- Design
- Build/Setup/Configure
- Operate
- Maintain

2.7.1 Strategic Risk.

Business imperatives impact upon strategic decisions as they are drivers which assist in achieving organisations' strategic goals (Boshoff, 2013; Goosen, 2012; Terblanche, 2011).

2.7.1.1 Integration Risk.

System integration combines computer systems or software applications in a coordinated physical or functional manner (Hobday, Davies, & Prencipe, 2005). Implementing big data and integrating existing systems poses the risk that the integration between existing and new technology may not be seamless (Smeda, 2015).

Big data technology requires stable and reliable IT infrastructure to perform as intended (Géczy, 2014). If existing infrastructure is not sufficient for big data, this will lead to an integration risk when implementing this technology (Smeda, 2015). Because of the nature and characteristics of big data, this technology also requires specifically-designed analytical software and, if the organisation does not acquire this software, further integration risks may arise as existing database software may lack the database analytics needed to ensure that analytical queries are not compromised (Russom, 2011). The possible lack of understanding by management of the value of big data analytics must be highlighted as a risk (LaValle, Lesser, Shockley, Hopkins, & Kruschwitz, 2011).

The integration problem is not only between existing and new technology but also includes data that is defined as big data (Smeda, 2015). There is risk when combining structured and unstructured data as some of these formats do not automatically fit into a relational database (Kaiser, 2016). Organisations must be conscious of the integration risk between the old and the new technology, as well as between data formats. Therefore, decisions must be made to ensure that alignment between organisational goals and business imperatives can be achieved by implementing this technology (Smeda, 2015).

2.7.1.2 Interoperability Risk.

Interoperability can be defined as interaction between multiple agencies (Way & Yuan, 2012). The process in which opportunities for exchange and the re-use of information, external or internal, is maximised (Way & Yuan, 2012). This is done by managing systems, procedures and the organisational culture (Way & Yuan, 2012). The implementation of big data technology involves interoperability, which relies on hardware, storage and communication protocols to exchange information (Way & Yuan, 2012). As

interoperability involves the management of systems and organisational culture it poses two additional risks when using big data; (a) a skills risk and (b) a compatibility risk.

2.7.1.2.1 Skills Risk.

Big data implementation raises concerns with regards to employees and the skills needed to facilitate implementation, which includes which skills to use to manage this technology and to analyse data (Smeda, 2015). Research conducted by Brown, et al., (2011) for McKinsey, indicated that the demand for employees with the necessary skills was far greater than the availability. They further indicated that by 2018 the US alone could face a shortage of approximately 140 000 – 190 000 people with analytical skills as well as 1.5 million managers and analysts with knowledge to use such analyses to make effective decisions (McKinsey Global Institute, 2011).

A skills shortage when implementing big data poses a interoperability risk because, without the necessary skills, organisations cannot maximise the opportunities inherent to the use of big data (Smeda, 2015). Therefore, organisations must ensure that they have human resources with the knowledge and skill set to implement and operate big data, to ensure this technology is utilised to its full potential (Smeda, 2015). The increasing demand for big data skills has not yet been met with a surge in the required training needed to fulfil the demand. It does appear, however, that the educational industry has finally begun to catch up to the market needs, as in South Africa, the University of Cape Town was the first to launch an official programme around big data.

2.7.1.2.2 Compatibility Risk.

A key big data characteristic is the variety of data. There is no acceptable standard to capture this variety of data (JASON, 2008). As big data is collected from various sources and can be very complex, there is a risk that the same fact may come from different sources, and may not be recognised by the system as the same fact (Green & Panzer, 2014).

The complexity of interconnectedness and interdependence amongst the data concerns the data sources, which is another compatibility issue, since incompatibility can lead to a ripple effect within the system if changes are being made (Kaisler et al., 2013). Interconnectedness is a key advantage of big data, but it is also an element that organisations must be aware of when implementing big data. The variety and complexity available through big data is clearly an advantage but poses a compatibility risk that will need to be managed by organisations.

2.7.1.3 Security Risk.

Privacy issues related to the data sources present a security risk and are mainly linked to the collection of unstructured data (Kaisler et al., 2013). There are no real regulations or protocols in literature with regards to the accumulation of unstructured data; specifically, data collected from social media platforms (Kaisler et al., 2013). Governments and social media networks are aware of this, and are taking consumers' privacy seriously (Danezis et al., 2015). Privacy issues arise as it may be possible to trace the data collected back to individuals, even if it does not seem like personal data (Mayer-Schonberger & Cukier, 2013). Whether permission is received, or the individuals have requested to be anonymous, it may still be possible to identify them (Buytendijk & Heiser, 2013). The anonymity of the data used as part of big data is a concern that could be a serious security risk (Buytendijk & Heiser, 2013). Organisations need to respect and protect privacy by design (Danezis et al., 2015). By anonymising data being collected, organisations will be able to prevent the abovementioned security risk, making it impossible for data to be traced back to specific inidviduals and therefore, reducing the privacy and personal security risks (Smeda, 2015).

2.7.1.4 Scalability Risk.

Scalability was highlighted as a benefit of big data in Section 2.3 above. Therefore, a clear distinction is needed between the benefit and risk of scalability. The benefits of scalability are linked to the fact that all departments within an organisation will be able to have that data available to them. Therefore, it is not limited to a single business unit, but brings about efficiencies throughout the organisation. The scalability risk in relation to big

data is linked to the organisation's systems, networks, processes and its ability to handle the potential growth of data being collected and analysed (Géczy, 2014). It has been estimated that business data worldwide, across all companies, doubles every 1.2 years (Kumar, 2017). Research conducted by The Data Warehouse Institute (TDWI) found that twenty-three per cent of participants experienced scalability problems when using big data (Russom, 2011).

Big data projects are linked to volume and variety and organisations must be in a position to be able to handle significant increases with regards to these factors and their complexities (Smeda, 2015). Appropriate big data tools can assist organisations by safeguarding them from the risk of scalability (Smeda, 2015).

2.7.1.5 Retrofit Risk.

Retrofit risk indicates that older systems may become obsolete with the introduction of new technology or features (Boshoff, 2013). Big data projects comprise unstructured data, which must be added to an organisation's database and which may only be made up of structured data. This poses a potential risk as current databases can possibly become unusable if the additional data is larger than what the organisation's infrastructure can handle (Smeda, 2015). In a study conducted by Avanade in 2010, executives stated that the influx of data has put tremendous strain on their IT infrastructure with fifty-five per cent reporting a slowdown in infrastructure system management (Avanade, 2010). Data centre architectures as well as organisational models, will need to evolve in order to accommodate big data applications within an organisation's IT infrastructure (Gantz & Reinsel, 2011).

2.7.2 Operational Risk.

In the context of big data, operational risk is specifically linked to the implementation of big data tools and is related to the build/setup/configure, operating and maintenance risks. This research does not discuss the big data analytical tools available for the categories of operational risk. However, it does discuss the general risks related to the building, setup, configuration, operation and maintenance of big data.

2.7.2.1 Planning risk.

Planning risk is linked to the planning phase of the implementation of new technologies. Therefore, within the planning phase, the creation and use of information resources are defined (ISACA, 2013). The big data strategic risks identified in Section 2.7.1 have been used as a base to identify the planning risks for the implementation of big data. The planning risks discussed below will assist organisations in identifying areas that need focus when planning the implementation of big data.

In Table 2 the planning risks related to each of the strategic risks are listed. The table indicates how planning risks are directly related to the strategic risks as discussed in Section 2.7.1. Organisations must be aware of these risks and, during planning, identify ways to respond to ensure that the implementation can be managed successfully.

TABLE 2.1: STRATEGIC AND PLANNING RISKS

Strategic risk	Planning risk
Integration risk	The risk that sufficient planning was not undertaken to ensure big data would integrate with the current system of the organisation.
Interoperability risk	The risk that sufficient consideration was not given to whether the organisation has access to the skills necessary for big data implementation. The risk that sufficient planning was not done to ensure that the system will be able to handle the complexity of big data. The risk that the standardisation of data from different sources was not planned for.
Security risk	The risk that the organisation did not determine how they would handle the privacy of the data used when implementing big data by considering how

	the data could be anonymised in such a way that the private and personal data of individuals is protected.
Scalability risk	The risk that consideration was not given to how the large volume and variety of complex data would affect the current systems of the organisation.
Retrofit risk	The risk that an evaluation was not done on the current IT infrastructure to ensure that it would be able to handle the implementation of technology such as big data.

(Source: Author's own construct)

2.7.2.2 Design Risks.

The main design risk that is associated with big data is related to the systems and components required; and an understanding of both the users and the technology (Kaisler et al., 2013). Users' needs and the expectations of management must be clearly outlined and careful consideration should be given to ensure that needs are in line with what the technology provides during the system design stage (Smeda, 2015). The skills shortage, along with the knowledge to execute and design a system that is needed to implement big data, contributes to further risk during the design stage (Buytendijk & Heiser, 2013). Organisations need to evaluate whether they have the skill sets to be able to bridge the gap or whether they should consider contracting the skills needed (Smeda, 2015).

2.7.2.3 Build/Setup/Configure Risk.

The big data analytic tool the organisation selects to implement big data is specifically related to the build/setup/configure. Regardless of which tool is implemented, there are general risks. As with design risk, having employees with the necessary knowledge and skills for implementation is of the utmost importance (Smeda, 2015). If there are no internal skills available, the organisation must consider bringing in the skills, or training internal staff to obtain the necessary skills needed (Smeda, 2015).

2.7.2.4 Operating Risks.

The operational risks of big data tools, to an extent, are related to the specific tools chosen by the organisations to implement. Shortage of skills available within the organisation in relation to operating the big data tools may lead to business risk indicators being missed (Jackson, 2013). Another operating risk related to the lack of skills is that the organisation may capture and store data it cannot use or does not need resulting in wasted storage space and time (Jackson, 2013).

There are some universal operating risks across all available big data tools, one being the extensive parallel processing power needed to process the volume of data (Kaisler et al., 2013). This creates a mismatch between the speed of data transmitted and the speed at which the system is able to store the data (Green & Panzer, 2014) resulting in latency which influences the efficiency of the system (Smeda, 2015).

Quantity versus quality is another processing risk (Smeda, 2015). The organisation must be able to separate the signal from the noise to determine relevant data and how much is enough (Kaisler et al., 2013). These decisions will ensure that only the reliable, most accurate and most valuable data is being used for decision-making purposes (Smeda, 2015). The operating risks must be carefully considered and managed by organisations irrespective of the tool implemented (Smeda, 2015).

2.7.2.5 Maintenance Risk.

The maintenance risk is also strongly linked to the big data tool selected for implementation. Skills availability will apply to the maintenance risk of a big data system. There are solutions to mitigate against the skills risks which have been discussed in Sections 2.7.2.4. The organisation can also decide to outsource the maintenance in order to bridge the skills gap as maintenance is usually conducted daily, periodically or as and when a problem arises. This can be the most cost-effective method for the organisation to deal with such risk (Smeda, 2015).

It is imperative that organisations have a clear understanding of the strategic and operational risks associated with the implementation of a big data project (Kaisler et al., 2013). Such understanding enables organisations to ensure that they can extract the value that big data can offer. It must be noted that while certain types of big data analysis still require the sourcing of skilled resources, a number of internet-based analytical tools have become available as the technology has developed (Potter, 2015), an example being that of Google Analytics, which is offered free and allows organisations to access specific data easily.

2.8 Common Challenges Related to Big Data and Analytics of Big Data

Investing in big data is easy, but using it is hard (Wang, 2016). There are critical challenges for organisations to overcome with regards to big data. The effect of big data is being experienced throughout business and from governments to the arts. This transition is occurring because of the capability to store and manage large sets of information. The transition is being done via data warehouses and the implementation of cloud computing which assists in ensuring that organisations can store and keep all data collected. The increase in the amount of data being collected and stored by organisations globally is undeniable, and the ability to access and analyse this data is becoming increasingly important (Waterford Technologies, 2017). The most commonly cited challenges of big data are those concerning analysis of data; and the shortage of managerial and analytical talent (LaValle et al., 2011; McAfee & Brynjolfsson, 2012; McKinsey Global Institute, 2011; Vriens & Brazell, 2013). A *Financial Times* article summed this up perfectly saying 'Big Data has arrived, but big insights have not.' (Dodson, 2014).

Privacy may present a problem. Big data analytics and data collection present expansive opportunities for organisations to understand their audiences and consumers better. The collection of consumer information, however, can be problematic if not managed correctly. Corporate policy-making and governance regarding the use of data collected are critical, as big data strategies advance among organisations. Executives surveyed by Forbes Insights agreed or strongly agreed that significant breaches of

customer data would cause great harm to customer relationships (EY, 2017). In fact, the larger the company, the more likely the perceived risk and damage to reputation and customer relationships if there is a privacy breach regarding customer data (Stone, 2014).

The debate concerning big data's unique attributes and what makes it different from traditional knowledge management or business intelligence systems continues to confuse organisations and, therefore, how to extract the necessary value from big data (Vriens & Brazell, 2013). 'Companies' struggle with how to capture and analyse big data. As an example, only half a percent of the big data that organisations have access to is being analysed for insights (Bradley, Barbier, & Handler, 2013).

There are also organisational, cultural and strategic changes needed to leverage big data investments (Davenport et al., 2001; LaValle et al., 2011). Davenport et al. (2001) argue that the most pertinent challenges relate to the use of the data itself, as the large volumes of unprocessed or irrelevant data can confuse and overwhelm decision-makers. Erickson & Rothberg (2014), state that there is an easy solution to overcoming these challenges. This would be to approach big data analytics as an outcomes-based process, focused on the use and application of big data during organisational decision-making (Erickson & Rothberg, 2014).

Facts are stubborn but also stupid (Etlinger, 2014). The data does not create meaning but people do. People form the bridge between data and real information (Donohue, 2014). Organisations must focus on critical thinking skills as bad decisions can be quickly made because of data (Etlinger, 2014). Data can provide meaningful benefit and insight but requires the necessary expertise (Dodson, 2014). Data is a resource, like water and energy, and like any resource, it does nothing on its own (R. Cooper, 2014a). Rather, it is world changing in how it is adopted and implemented in human decision-making. Analytics produce the best results when the information is high quality. The more information collected, the better the decision (Ebbers et al., 2013). Collecting and producing data are the first steps in the development of a big data practice. Analysing and making the data actionable is critical to extracting its value.

2.9 Big Data Implementation Framework

Big data implementation encompasses several factors that organisations should consider to ensure successful implementation. Halaweh & El Massry (2015), suggests there are six success factors for an organisation to consider for the implementation of a big data project, aimed at yielding a competitive advantage.

1. **Top management support:** is essential to any project's success and it is not limited to big data. Without top management support and a clear vision of the objectives for implementing big data analytics, the project is bound to fail. Clear alignment with the organisation's business imperatives is critical.

2. **Organisational change**: implementing big data involves change. Besides the required changes in IT, it will include changes in daily operations along with the cultural change. These changes should be consciously considered and planned to avoid any pitfalls and receive the necessary support from staff.

3. **Data availability and quality:** organisations could use big data analytics with the available valid data to generate relevant insights to make better decisions that could provide competitive advantage. On the other hand, the result of using erroneous data can lead to bad decision which would influence the organisation's stability.

4. **Infrastructure:** storing and analysing the massive amounts of data should be supported by a comprehensive technological infrastructure, including high-capacity storage mediums (servers) and powerful processors for data analysis.

5. **The required skillset:** the availability of staff with the required skillset and competencies is fundamental. It is obvious that there is a lack of big data professionals, as mentioned previously.

6. **Privacy and security:** This would include the compliance with laws and regulations that govern individuals or communities' privacy and security. Collecting data from multiple sources and analysing it to identify hidden patterns without an individual's knowledge violates one's privacy. Furthermore, organisations need to maintain sound security controls to ensure data security against internal and external attacks; otherwise, data leakage would affect the organisation's competitive advantage in the market.

These steps provide a foundation for the successful implementation of a big data project within an organisation. They also provide a clear guide of what will be needed and should be carefully considered to ensure that organisations can extract the real value of big data.

FIGURE 2.1: IMPLEMENTATION FRAMEWORK
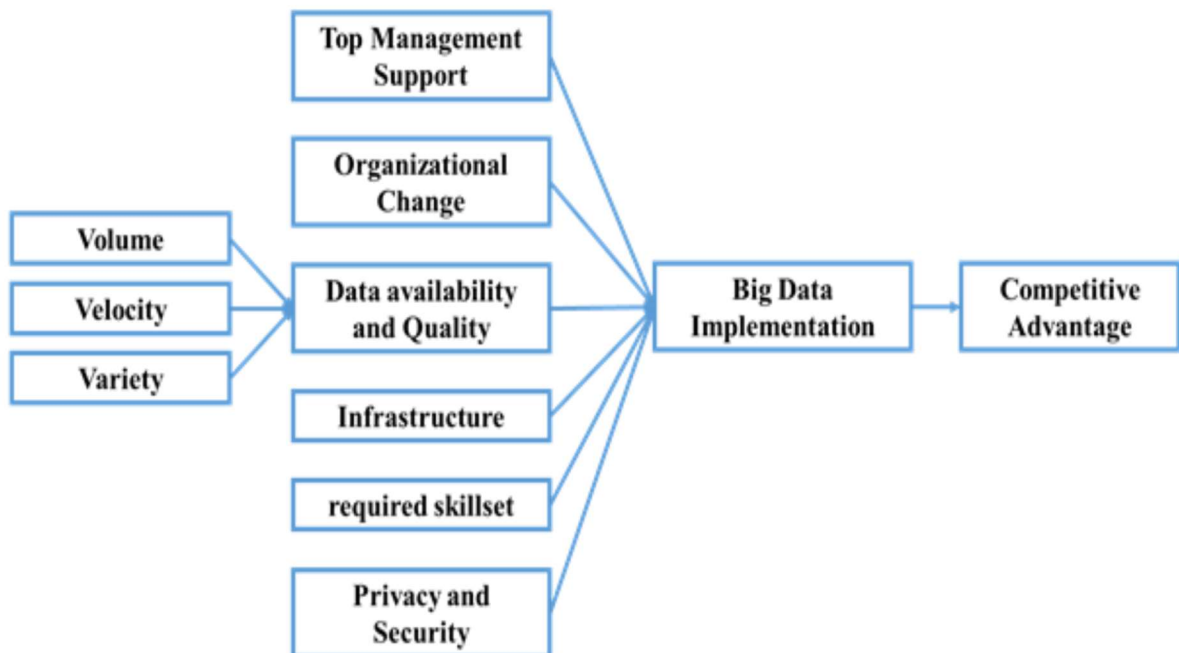
(Source: Halaweh & El Massry, 2015, p.29)

2.10 Summary

From the literature, it is evident that big data is fast becoming the largest source of competitive advantage and will continue to increase in importance in the future. The literature has acknowledged that big data is a potential key resource for organisations. How organisations create and appropriate the value of big data is becoming an imperative. If a big data strategy could be broken down, similarly to Maslow's Hierarchy of Needs pyramid, the newspaper publishing companies' level would fall somewhere in the middle, between the information and knowledge stages (Stone, 2014).

FIGURE 2.2: MASLOW'S HIERARCHY OF DATA NEEDS
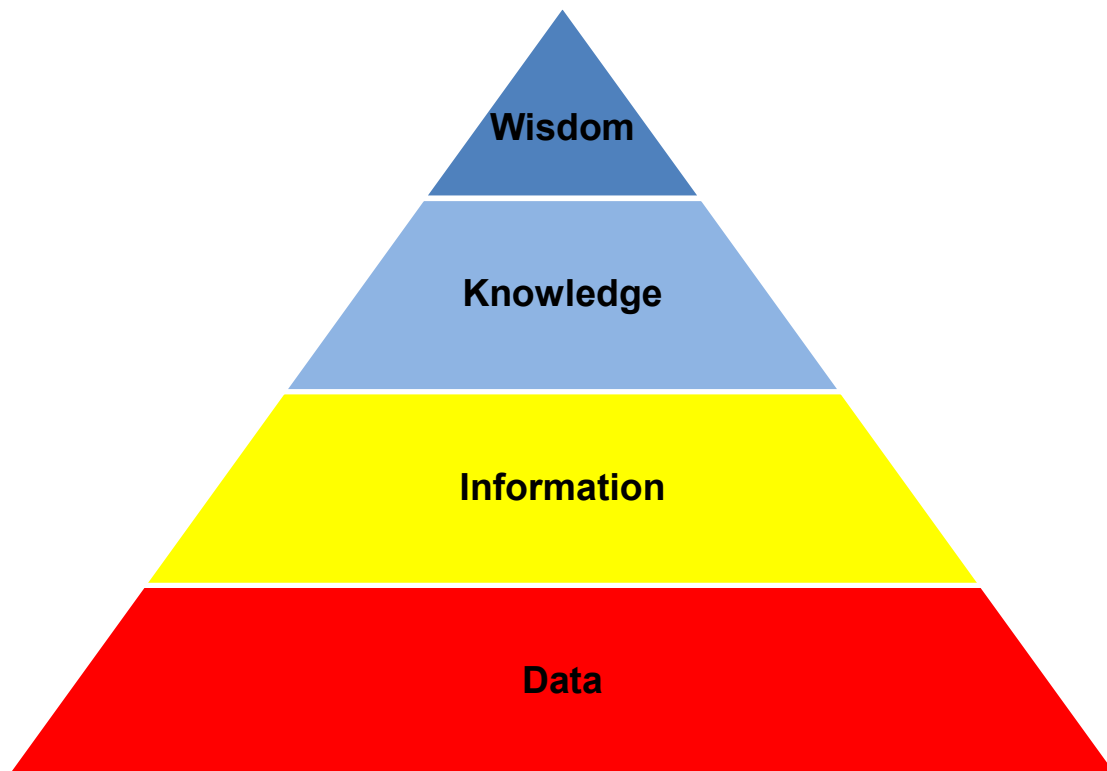
(Source: Stone 2014, p.2)

To reach the wisdom stage, media companies need to embrace the opportunities from a big data strategy, invest in technologies and training in order to leverage the investment, and finally, use this newfound wisdom to improve processes such as

customer service and products (Stone, 2014). Organisations can innovate their business models when big data leads and guides them to, among other things, to develop new value propositions, target different customers, or interact with customers in different ways.

Big data has created a demand for new skills and resources to be able to unlock its value and usefulness. Therefore, organisations' business imperatives and strategies must be aligned with the potential that big data can offer, if organisations are to extract and create value within the organisation. Big data projects and the implementation thereof can be a costly exercise. Organisations will need to be comfortable that this technology can add value. Therefore, a framework for the implementation of big data will add value to how organisations consider or discuss the potential of big data and its usefulness. The framework can guide organisations to ensure that they are able to extract value from this investment.

CHAPTER THREE – RESEARCH AND METHODOLOGY

3.1 Introduction

Before commencing, there is a need to define what research is, followed by an introduction of the research paradigms, that is quantitative (positivist) and qualitative (interpretivist) and the reasons for the selected paradigm, as well as the selected methodology applied, and the measuring instrument used. A discussion of the data collection methodology used is outlined in Section 3.5 while the ethical issues and how they were addressed is in Section 3.7. A summary of the chapter is then given in Section 3.11.

3.2 Research Paradigm

Considering, and deciding on the research paradigm for the study is the starting point in research design, (Collis & Hussey, 2009). Creswell (2009) elaborates on this by stating that research designs are overarching concerning decisions on the methods of data collection and analysis and in moving from general norms to exhaustive methods (Creswell, 2009). In discussing the two paradigms for the research design, it is essential to define the research concepts, paradigm, and the concept of research paradigm.

Research is defined as a logical and methodological procedure of analysis and examination with the intention to add to the existing body of knowledge (Collis & Hussey, 2009). In outlining the objectives of research, the authors infer that given the outcomes-based nature of research, such research is both purposeful and goal-focused. Cooper & Schindler (2014) further posit that the goal of research is to recognise, clarify and forecast events. A paradigm in the research context is defined by Guba & Lincoln (1994) as 'the perspective or ideologies that direct the behaviour of scholars'. Consequently, Collis & Hussey (2009, p.43) define the research paradigm as 'a philosophical framework that guides how scientific research should be conducted'.

There are two main paradigms that exist in the literature on research; the interpretivist (qualitative) and the positivist (quantitative) paradigm (Collis & Hussey, 2003). Hence, as alluded to by Collis & Hussey (2009) the choice of whether to follow a quantitative or qualitative research approach is influenced by factors such as the type and essence of the research being undertaken, including the philosophical inclinations of the researcher (Collis & Hussey, 2009).

Collis & Hussey (2009) posit that the ascension of the qualitative (interpretivist) paradigm during the latter part of the 20th century was in part a reaction to the criticisms about the quantitative (positivist) paradigm which deals only with the investigation of cold, hard facts relating to the event (Collis & Hussey, 2009). Research conducted qualitatively is centred around 'researcher immersion in the phenomenon to be studied, gathering data which provide descriptions of events, situations and interaction between people and things, providing depth and detail' (Carson, Gilmore, Perry, & Gronhaug, 2001, p.205). Qualitative research is an information collection method meant to describe, but not predict. This is achieved through 'a sustained and intensive experience with participants' (Creswell, 2009). However, Berg (2009) asserts that 'neither qualitative research nor Interpretivism are precise or agreed terms' (Berg, 2009). Being strongly influenced by phenomenology, the philosophy held by interpretivist researchers is that reality is constructed in the social domain thus holding that the concept of reality is not determined by purely objective experiences (Hesse-Biber & Leavy, 2011). Interpretivist researchers attempt to 'understand, explain, and demystify social reality through the eyes of different participants' (Cohen, Manion, & Morrison, 2007).

The paradigm adopted by a researcher will be determined by assumptions and influenced by the dominant paradigm and the nature of the research problem under investigation. Irrespective of the research paradigm used, it is of utmost importance to pay attention to all elements to ensure there are no contradictions or deficiencies in the research design. Table 3.1 below compares the main features of the two paradigms which have been polarised to illustrate their differences more clearly.

TABLE 3.1: FEATURES OF POSITIVISM AND INTERPRETIVISM

Positivism tends to:	Interpretivism tends to:
Use large samples.	Use small samples.
Have an artificial location.	Have a natural location.
Be concerned with hypothesis testing.	Be concerned with generating theories.
Produce precise, objective, quantitative data.	Produce rich, subjective, qualitative data.
Produce results with high reliability but low validity.	Produce findings with low reliability but high validity.
Allows the results to be generalised from the sample to the population.	Allows the findings to be generalised from one setting to another similar setting.

(Source: Collis & Hussey 2014, p.50)

Interpretivism was adopted as the research paradigm for this study, and relates to the study of phenomena in their natural environment (Saunders & Lewis, 2012) in order to attain an understanding within context (Carson et al., 2001) The interpretivist paradigm places the focus on investigating the complexity of the social phenomena with the purpose of achieving an interpretive understanding. The understanding is obtained from the qualitative research methods that are applied.

The focus of an interpretivist paradigm is to obtain an understanding of a topic, issue, or problem from an individual's perspective as knowledge obtained is socially constructed rather than objectively determined, thus more personal and flexible (Carson et al., 2001). Although qualitative research provides rich, detailed information it is normally conducted among a small number of participants (or sample) and, therefore, limits the research to only describing something and does not help with planning or coming to a decisive conclusion.

The research paradigm was selected because a small population of active and current management across various businesses in the Tiso Blackstar Group was selected to participate. The sentiment to capture the voice of participants in the study is echoed by Maxwell (2013) who states that for qualitative research to have credibility the researcher needs to earnestly think through and incorporate the views, philosophies and practical experiences of the participants being studied, instead of simply relying on the perspectives of the researcher and existing theories (Maxwell, 2013). Table 3.2 below compares the approaches of the two paradigms which have been polarised to illustrate their differences more clearly.

TABLE 3.2: APPROACHES OF POSITIVISM AND INTERPRETIVISM

Positivism	**Interpretivism**
Quantitative	Qualitative
Objective	Subjective
Scientific	Humanist
Traditionalist	Phenomenological

(Source: Collis & Hussey 2014, p.46)

3.3 Research Design

The research paradigms discussed above are linked to the research design, and to the choices made with regards to the methodology to be used in addressing the research questions. With several methodologies with a wide range of methods for collecting and analysing both primary and secondary data, the research design approach selected must meet the philosophical assumptions of the chosen paradigm. Below is a summary of the respective methodologies, as part of the discussion on major methodologies associated with interpretivism paradigm.

TABLE 3.3: COMMON QUALITATIVE RESEARCH DESIGNS

Study Design	Description
Ethnography	Refers to the theory and culture of a group of people usually to develop cultural awareness and sensitivity (Maree, 2016).
Phenomenology	Study of individual experiences of events (Maree, 2016) e.g. The experience of AIDS care.
Grounded Theory	Adding to the existing body of knowledge to develop a new theory about a phenomenon – theory grounded on data (Glaser & Strauss, 1967).
Participatory action research	Individual and groups researching their personal being, social-cultural setting and experiences (Lewin, 1946). This methodology, thus, is to effect desired change and evaluate if the desired results were achieved (Collis & Hussey, 2009).
Case study	Investigation of single or small number of units at a point (over a period) in time (Collis & Hussey, 2009).
Hermeneutics	Historically associated with the interpretation of ancient scriptures, but that the scope of the method expanded for use in modern day literature (Dilthey, 1976).
Participatory enquiry	This methodology researches with people rather than research on people (Reason, 1994).

(Source: Author's own construct)

For this study, and because the chosen methodology must reflect the philosophical assumptions of the interpretivist paradigm, the research design selected was the phenomenological methodology which refers to a person's perception of the meaning of an event. This approach attempts to understand people's perceptions and perspectives relative to a situation. It can be described as a science with the purpose of describing a phenomenon or appearance of things as lived experiences (Leedy & Ormrod 2015).

The focus is on exploring, describing and analysing the meaning of individual 'experiences'. It seeks to find the answer to the questions of how they are perceived, how the population feels about it, how to make sense of it and how people talk about it to others and it looks at how a certain statement or topic is understood and experienced (Marshall & Rossman, 2014).

3.4 Sampling Design

Sampling design is a wide and open-ended activity in qualitative research. This encapsulates the singular rule as stated by Collis & Hussey (2009) in the principle: of sampling for as long as your breadth and depth of knowledge of the issue under study are expanding and stopping when you gain no new knowledge or insights (Collis & Hussey, 2009).

3.4.1 The Population.

A population is defined as group of people or objects being evaluated for research purposes or that meet specific criteria which the researcher is interested in studying (Collis & Hussey, 2009). The population for this study included all individually selected senior managers within the Tiso Blackstar Group. The population size of managers in this study equates to eight officials. To this end, a list containing all information including the names and contact details were obtained.

3.4.2 The Sample.

Collis & Hussey (2009) describe a sample as a subset of a population, and thus, the selected sample size is relative to the population size. However, authors continue to state that ensuring a minimum sample size is not as much a concern in qualitative studies as it is for quantitative studies. This is due to the goal of qualitative studies to have depth and richness from the investigation. Marshall (1996) agrees with this, stating that in qualitative research, adequately addressing the research question is what dictates the sample size (Marshall, 1996). In qualitative research, sample sizes are usually small and differ according to the different methods used (Cooper & Schindler, 2014). Collis & Hussey (2009) advance the belief that the characteristics of the sample as a subset of the population permits the outcomes for the sample to be extrapolated to the entire population but only in very rigidly controlled sampling e.g. Probability sampling (Collis & Hussey, 2009).

3.4.3 The Sampling Frame.

According to Collis & Hussey (2009), the sampling frame includes everyone in the population from which a sample can be drawn for research purposes. In the context of this study, it included the selected senior managers at the Head Office of the Tiso Blackstar Group. For this study it was decided to include everyone in the population, thus, the sample size is equal to the population size, that is, eight officials. Because of the relatively small population for the study, and the difficulty envisaged in securing their availability for the interview, the decision was made to use the entire population for sampling purposes.

3.5 Data Collection

The collection of data in qualitative research is generally associated with interpretive methodologies. The data emanating from a qualitative study is predominately interpreted in context, with high levels of validity, but low reliability and generalisability. This interpretation is in contrast to quantitative studies which generally have high reliability and generalisability, but low validity (Collis & Hussey, 2009). Below is a summary of data

collection methods which are appropriate when collecting primary research data, such as data generated from interviews or focus groups.

TABLE 3.4: QUALITATIVE DATA COLLECTION METHODS SUMMARY

Methods	Brief explanation
Observation	The researcher gets close enough to study the subjects to observe (with or without participation) usually to understand whether people do what they say they do (Creswell, 2009).
Interview	This involves asking questions, listening to and recording answers from an individual or group on a structured, semi-structured or unstructured form in an in depth-manner (Cooper & Schindler, 2014).
Focus group	Focused (guided by a set of questions) and interactive session with a group small enough for everyone to have a chance to talk and large enough to provide diversity of opinions (Cooper & Schindler, 2014).

(Source: Author's own construct)

The chosen method for this study with regards to collecting data under the interpretivism paradigm was via interviews. This process is concerned with exploring, understanding, opinions, what people remember doing, attitudes, feelings and the likes, and what people have in common (Arksey & Knight, 1999). A series of face-to-face and telephonic interviews were conducted as location and accessibility to the sample was a challenge.

3.5.1 Measuring Instrument.

The research instrument for this study was a semi-structured interview protocol. Interviews are a method of collecting data by asking questions of selected participants as to what they feel, think or do. Interviews can be useful tools in collecting data that would otherwise not be unearthed using other data collection techniques (Blaxter, Hughes, & Tight, 2001). Semi-structured interviews are less rigid in their questioning and combine both unstructured and structured interviewing techniques. The research questions covered were exploratory questions, and a wide variety of probing methods were used when necessary during the interviews. Such probing ensured the incorporation of depth and scale into the responses. Collis & Hussey (2009), recommend the use of semi structured interviews under the following circumstances (Collis & Hussey, 2009):

- It is necessary to understand the context in which the interviewee bases opinions and beliefs on certain topics or situations.
- The aim of the interview is to gain an understanding of the respondents' environment or surroundings so that the interviewer may influence it.
- The subject matter is confidential or commercially sensitive.
- The interviewee is unlikely to be candid, unless confidentiality is ensured in a one-to one situation.

Further to this, Leedy & Ormrod (2010), recommend that the following steps be undertaken to ensure a productive interview:

- Identify certain questions in advance. Preparation of questions will lead to a successful interview. Preparation ensures coverage of all aspects of the study.
- Interviewees should be representative of the population. The selected individuals should have the necessary experience to be able to express their perceptions best.
- Conduct interviews in a suitably quiet location.
- Allow the interviewees to express themselves in their own words.
- Listen carefully to the interviewee.

- Do not react by being shocked or surprised at an explanation as this may deter the interviewee from being honest.
- All responses should be treated as perceptions and not facts.

In setting up the interviews a cover letter was attached to an email, providing background to the study. A sample of the questions to be covered was also attached to ensure that participants were comfortable and willing to participate. The questions were kept short, unambiguous and straightforward. Questions included the demographics of age, rank, educational qualification, and years of experience at Tiso Blackstar Group and T*he Herald*.

There were many secondary literature resources including journals, books, organisational reports and credible online sources that were consulted to compile a list of the topics relevant to the study, and which were used to develop the questions for the interviews (Appendix C). This was effected to ascertain knowledge, opinions and general views with regards to big data and big data analysis at Tiso Blackstar Group and *The Herald.* Also, questions were designed to obtain an in-depth understanding of the respondents' opinions and educational or general knowledge about the topic of big data, its value to organisations and the implementation and use thereof.

Probing is a useful qualitative interviewing technique. This technique is used to obtain as much information as possible from the respondent. Probing involves the interviewer asking the respondent questions when answers are vague or ambiguous and thereby seeks to clarify the interviewee's comments or beliefs (Collis & Hussey, 2014). This ensures that the researcher gains a greater understanding of the topic under study (Collis & Hussey 2014). Collis & Hussey (2014) describe an interview as a procedure for gaining primary data in which interviewees are posed questions to determine what they think or how they feel with regards to a particular topic.

3.6 Data Analysis

This process seeks to manage the data that was collected into usable chunks entailing various steps, including the development of summaries, identifying patterns emanating from the summaries and using statistical methods to convert the data to information to be collated into a research report (Cooper & Schindler, 2014). The data analysis method chosen is usually determined by the paradigm and data types, and given the large volumes of data associated with qualitative studies, Collis & Hussey (2009) assert that such a study can be cumbersome and tough to control.

A fundamental characteristic of qualitative analyses is that it is non-linear and, therefore, its processes of data collection, data analysis, reporting on the findings and making recommendations do not follow sequential steps as is evident in quantitative analyses. This is due to the interpretive and inductive nature of the qualitative approach that necessitates a to-and-fro revisiting of the data and respondents to obtain clarity or feedback. This approach permits research findings and conclusions to emerge from the themes identified from the research data (Maree, 2016)The various data analysis methods and techniques relevant to qualitative research, including the selected method are briefly described in Table 3.5.

TABLE 3.5: TYPES OF QUALITATIVE ANALYSIS

Types of qualitative analysis	Brief description
Content analysis	The procedure for the categorisation of verbal and behavioural data for classification, summarisation and tabulation (Van Maanen)
Narrative analysis	Narratives are transcribed experiences. Every interview/observation has narrative aspect. The researcher must sort out and reflect up on them, enhance them.

	Reformulating stories presented by people in different contexts and based on their different experiences (Riessman, 2003).
Discourse analysis	This is a method of analysing a naturally occurring talk (spoken interaction) and all types of written texts. It focuses on how people express themselves verbally in their everyday social life (Maree, 2016).
Framework analysis	This method involves transcribing and reading the data. Using numerical textual codes to identify specific pieces of data which responds to different themes (Sunday, 2012).
Grounded theory	Is a framework in which there is joint collection, coding and analysis of data using systematic set of procedures to develop an inductively derived theory (Collis & Hussey, 2014).

(Source: Author's own construct)

The method used to analyse the data for this research study was narrative analysis. Narrative analysis refers to the composition of a storyline with regards to events and lived experiences by different groupings such as governments, individuals, scientists and ethnic groups (Riessman, 2008). Selecting, organising, connecting the pieces of information, and evaluating the impact of the story on specific audiences are what constitute a narrative (Hinchman & Hinchman, 1997). Riessman (2008) further posits that because developing narratives are time-consuming it is, therefore, more relevant for studies with a small number of participants and it needs to be more personable to capture the historical, social and cultural contexts. The applicability of research is locked up in its characteristic of not needing to reflect on the past, but to have the freedom to interpret and narrate it to achieve the objective. Thus, the role of the researcher is to track and

record the sequence and processes of events as contained in the data, taking cognisance that generally, narratives have both historical and future aspects to be revealed in the analysis (Maree, 2016).

The rationale for selecting this method was because the researcher could connect the pieces of information and evaluate the impact through developing narratives, which is more relevant in studies with a small contingent of participants and needs to be more personable. Narrative analysis captures the context and allows for interpretation to achieve the objective (Riessman, 2008).

3.7 Ethical Considerations

Ethical quagmires generally include such matters as ensuring respondent anonymity and confidentiality, obtaining consent from authorities that is well informed of the ethical issues relating to the study and making sure that the dignity of participants, and especially vulnerable groups, is protected (Collis & Hussey, 2009). To this end an ethical clearance form (Form E) was completed and may be viewed as Appendix A. According to Cooper and Schindler (2014) the goal of ethics in the context of research is to ensure that no participant is harmed or suffers adverse consequences from research activities (Cooper & Schindler, 2014). An assurance was provided to prospective participants in an information and consent letter to address the issue of confidentiality and anonymity (Appendix B), as recommended by Collis & Hussey (2009).

3.8 Synthesis

Synthesising is defined as the drawing together of different themes and concepts from the research and forming them into new, integrated patterns (Collis & Hussey, 2009). Synthesising, therefore, enables a broader description of the events being studied, with the data being scrutinised, examined and compressed to make it more usable.

3.9 Validity

O'Leary (2004) explains that validity is based on the assumption that what is being explored or considered can be captured or measured and seeks to confirm the legitimacy and accuracy of data that is being captured (O'Leary, 2004). Cohesion needs to exist

between the questions asked and what is being researched, and conclusions need to be justified from the findings of the study. Simply put, validity points to a researcher's methods warranting his or her conclusions.

There are two types of validity, namely internal and external validity. Internal validity refers to the legitimacy of a cause-and-effect relationship or, for example, what effect a change in an independent variable would have on a dependent variable. External validity, by comparison, refers to the 'generalisability' of a study. In other words could the study or findings be repeated if used in other contexts, events or situations (Sekaran & Bougie, 2003).

3.10 Reliability

Reliability is the extent to which a measure procedure or an instrument used in research provides the same result on repeated trials and usually refers to quantitative research (O'Leary, 2004). There are three common ways of estimating the reliability of the responses to questions in questionnaires or interviews and these appear below (Collis & Hussey, 2009):

- Test re-test method involves asking the same questions of the same people but on two separate occasions and correlating the results.
- Split-halves method means that the interview record sheets are divided into two halves and each pile of answers is correlated via a calculation of the correlation co-efficient.
- Internal consistency method means that 'each item is correlated with every other item across the sample and the inter-item correlation is taken as the measure of reliability'.

For the purposes of this study, which was a qualitative study, the interviews were independently transcribed, and a second independent comparative coding was undertaken using NVIVO V8 coding software, in order to ascertain if the outcomes of the second coding were the same as the researcher's manual coding.

3.11 Summary

This chapter discussed the research methodology used, and all its accompanying parts were explained. The background to the research choices were provided to ensure the results of the study were interpreted within their proper context. This ranged from the research design to data collection and analysis. It further expounded on the measuring instrument used and how the required data was obtained using the interpretivist, qualitative approach. It further alluded to the use of this approach to construct a semi-structured interview protocol for data collection, incorporating the themes that arose from the literature review. Furthermore, the researcher reflected on the ethical issues and the validity and reliability of the data collection methods. The next chapter records the data and outlines the results obtained from the research conducted among the eight participants.

CHAPTER FOUR – ANALYSIS OF RESULTS

4.1 Introduction

The research was conducted through a series of interviews with all participants. As the chosen data collection method was to interview, the data analysis technique adopted was narrative analysis. The researcher opted for this technique to ensure that opinions, attitudes and understanding can be explored which will allow the research to connect the pieces of information to create a story.

4.2 Analysis of the Data

To achieve the analysis of the collated data, an interpretivist approach was followed, as recommended by Maree (2016). A total of eight interviews were conducted during the period between 3 May 2018 and 31 May 2018. The respondents spanned across the organisation representing seven business units namely, Information Technology, Marketing, Circulation, Business Intelligence, Advertising Sales, Publishing and General Operations. A total of 240 minutes of interview recordings were collected. Recordings were transcribed into 102 pages of narrative.

4.3 Descriptive Statistics – Demographic Analysis

The first section of the questionnaire aimed at obtaining profile data on the respondents, inclusive of age, rank, qualification level, and years' service at Tiso Blackstar – *The Herald.* The tables and figures following represent the profile data of eight interviewees.

FIGURE 4.1: AGE OF INTERVIEWEES
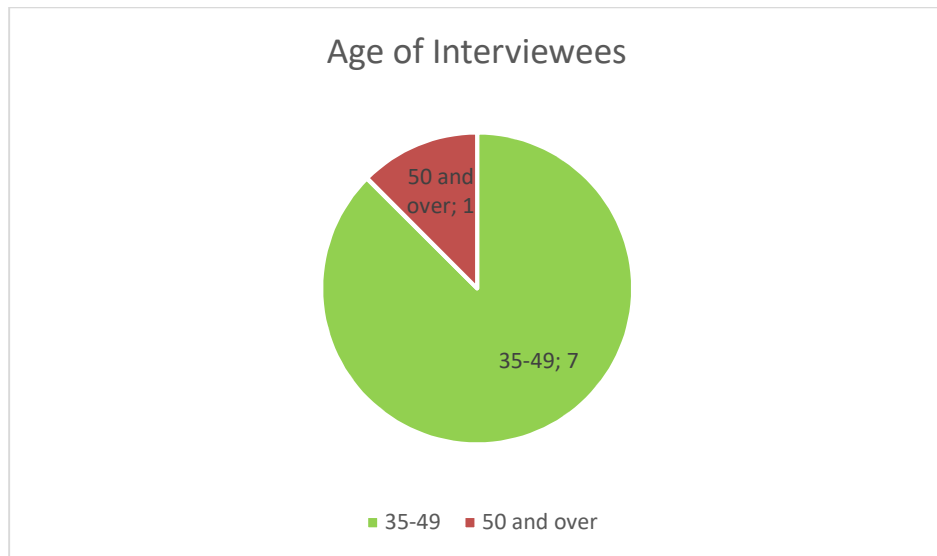
(Source: Researcher's own construction)

Figure 4.1 indicates that from a sample of eight participants, seven (87, 5%) were between the ages of 35-39 years and one (12, 5%) was 50 or over.

FIGURE 4.2: QUALIFICATIONS OF INTERVIEWEES
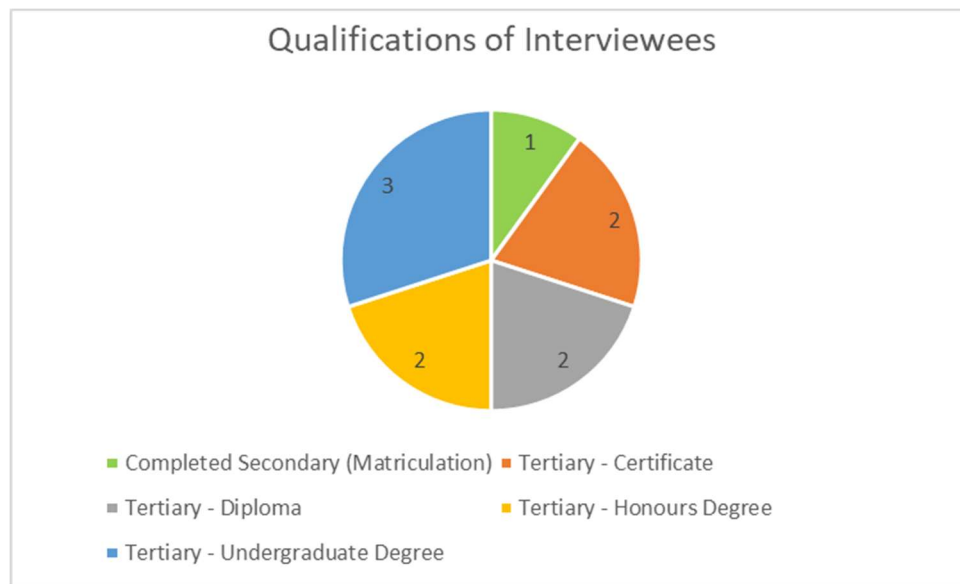
(Source: Researcher's own construction)

Figure 4.2 shows the total combined qualifications of the eight participants. One completed secondary school (matriculated), two held a certificate qualification, two have a diploma, three have an undergraduate degree and two hold Honours degrees.

FIGURE 4.3 GENDER OF INTERVIEWEES
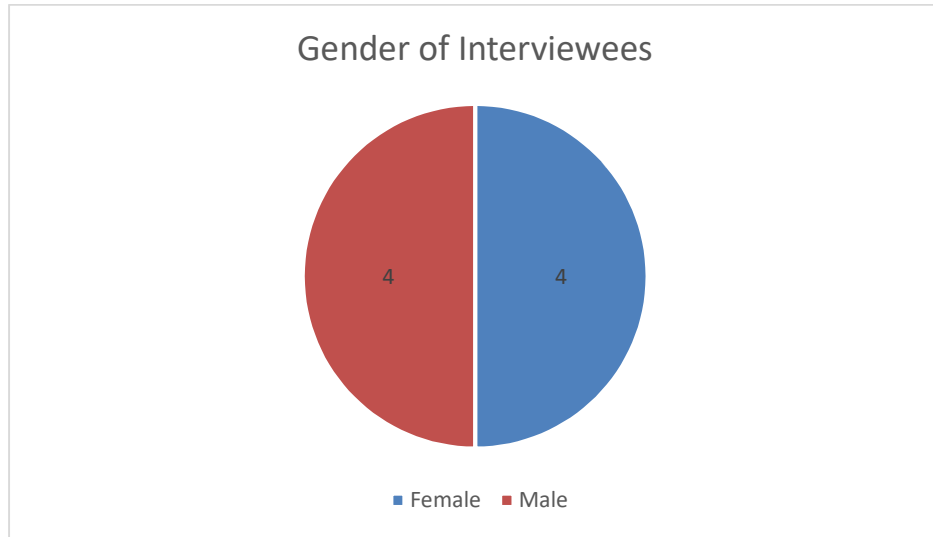
(Source: Researcher's own construction)

Figure 4.3 depicts the equal gender categories of the interview participants.

FIGURE 4.4 RACIAL DEMOGRAPHY OF INTERVIEWEES
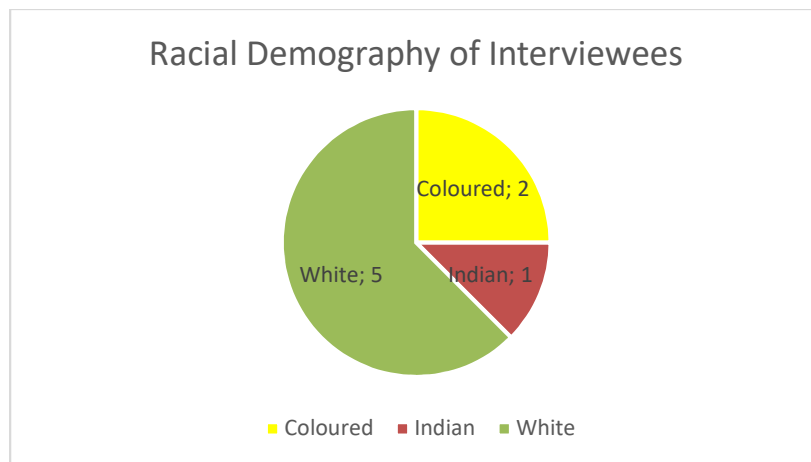
(Source: Researcher's own construction)

Figure 4.4 indicates the racial demographics of the 8 participants interviewed. Two (25%) were Coloured, one (12, 5%) was Indian and Five (62, 5%) were white.

FIGURE 4.5 TIME EMPLOYED IN ORGANISATION

Time employed in organisation

- 5-10 years; 1
- 3-5 years; 1
- 10 years or more; 6

■ 10 years or more ■ 3-5 years ■ 5-10 years

(Source: Researcher's own construction)

As per Figure 4.5 respondents who were interviewed have several years' experience with the organisation and in the positions that they occupy. The eight interviewees represented various areas of the business, namely, two participants from the Information Technology Department, one each from Marketing, Circulation, Business Intelligence, Advertising Sales, Publishing and General Operations respectively. All participants represented senior management within the organisation and their respective roles. This helped to ensure that the researcher could obtain an understanding from all areas within the organisation.

4.3 Data Analysis Approach

After the interviews, the recordings were transformed into written transcriptions. The researcher compared the transcriptions with the recorded copies of the interviews and corrections were applied. The researcher found that most of the transcriptions were an accurate and concise replication of the interviews, and only minor amendments were required. The data analysis utilised a narrative analysis, which allows the researcher to create a storyline by selecting, organising and connecting relevant information to evaluate the impact.

4.4 Narrative Analysis of Interviews

Narrative analyses are coded transcriptions of experiences, allowing the researcher to sort out, reflect upon the coded pieces of data from the interviewees connecting and comparing their different experiences.

4.4.1   Understanding of and Implementation of Big Data.

4.4.1.1 Discussion of participants' understanding of big data.

There is a fair understanding of big data, and the term or definition of big data among all eight participants, with a golden thread being that big data is large volumes of data gathered internally and externally and which allows for greater analysis, prediction, commonalities, trends and behaviours of customers. One participant said, '*It is the relation of numerous, various information from various sources into one pool that can be used to analyse and identify trends and data sets for a specific purpose.*'

Another stated that '*big data can basically try and predict the future of the organisation a little bit*', with another participant stating that

> '*it's a result of our ability to gather information, not necessarily structured information, and relates to unstructured data, but the problem is the unstructured data*'.

There is no single definition found in literature, as big data is an evolving concept and is continuously challenging the status quo. So, the above understanding coincides with the notion that it is a concept still being developed.

4.4.1.2 Participants' knowledge of organisational plan to implement the use of big data.

With this question participants were divided 50/50 as to their knowledge of a plan to implement the use of big data. Fifty percent of the participants indicated that they were not aware of any plan to implement the use of big data, with one participant adding that '*We just work with the data that we currently have*' and does not believe there is a specific plan to implement the use of big data.

The remaining fifty percent are very confident that they already use big data; therefore, it was already being implemented. One participant stated that '*When we moved into a digital first strategy it was already implemented'.* One participant responded saying:

'*It was implemented but not across the board and only in specific parts of the organisation.'* Another individual shared that*:*

'*It is implemented we probably very much taking baby steps at the moment towards understanding all the data being collected'.* Another participant believed that there was:

'*a big drive at the moment to sort of implement a strategy around how do we manage big data, and how do we incorporate it into day to day business'.*

Answers indicate that these discussions are mostly likely happening but there is no central point of communication and that it is happening at a business unit level in the organisation.

4.4.2 Organisational Performance

The value of big data lies in its ability to improve an organisations performance.

4.4.2.1 Participants' belief that big data analysis could improve the organisation's performance.

There were four sections to this question and participants were asked to comment on the following aspects of performance:

- Profitability
- Revenue generation
- Cost efficiencies
- Customer relationships

With regards to the above four areas – all participants categorically agree and believe that big data analysis can improve the organisation's performance.

Profitability – All eight participants strongly believed that there would be an improvement in profitability. Comments included: *'Focus on where the fish are, so that does affect profitability'.*

'It can actually unlock opportunities'.

Revenue Generation – All eight participants believed that big data analysis would aid in revenue generation. Comments included: '*Potential for revenue obviously increases with our understanding of what we trying to sell our clients'.*

'The more we understand the more we can give them'.

Cost efficiencies – seven out of the eight respondents believed that big data analysis could deliver and provide insights into achieving great cost efficiencies. Comments included: '*Big data allows us to nip and tuck in the right places.'*

'Assist with eliminating wastage'.

'Can find better, cheaper and more effective ways of publishing and distributing'.

Customer relationships – All eight interviewees believed that big data analysis would provide greater knowledge and insights into customer relationships which would, therefore, lead to the development of better relationships. Comments included: '*allows for further and deeper engagement with customers.'*

'Definitely helps in providing customer satisfaction'.

'Greater understanding leads to better services to customers'.

'Will limit missed opportunities'.

The above highlights and indicates some of the common threads identified. Participants believed that big data could improve an organisation's performance if implemented.

4.4.3 Decision-Making.

Decision-making is a critical part of organisations and making the right decisions with the relevant and most accurate information can provide a competitive advantage.

4.4.3.1 Participants' description of how decision-making is typically done within their organisation.

There was an overwhelming agreement that decisions were mostly still being done in a traditional manner but with some decisions being made on past experiences and historical data. A statement by one participant was that '*decisions are made without any data; they take decisions on what they think they know about a market.'* Another believed that:

'*Decisions are based on historical data, with a significant amount of reference to things like year-on-year or quarter-on-quarter type of analysis which is fairly shallow data.* In some instances, decisions are:

'*In complete isolation to any other information that might be available and, in some cases, ignoring substantial data and going by gut feel rather than analysing the data that is at your disposal.*'

4.4.3.2 Participants' opinion on how problems are currently being identified within the organisation.

From the interview, the one thing that is apparent is that problems are currently being identified retrospectively, by using existing information that is available through the various business units. Problems become apparent through other things highlighted such as low or high percentage returns of sales.

4.4.3.3 Participants' knowledge of how problems are being solved currently within the organisation.

Respondents answers highlighted some inconsistencies with regards to solving problems. Problem-solving was reactive and was in response to a problem identified. Sometimes it was solved via research and the results of the research. One participant stated '*often its people using their common sense, intuition and experience to solve problems*'. Another shared that:

'*It's reactive, never with foresight*'.

4.4.3.4 Participants' understanding of the basis, merits or information that decisions are based on.

Participants believed that decisions were being made under the traditional guise of the organisations and that current decisions were based on profitability with some believing they are often being informed by intuition. One participant stated that: '*trend analysis of the past and present is used and then what they think is going to happen in*

the future is another basis for decision making.' There was a mix of existing data, gut, intuition and experience, with one individual using the word '*emotional'* to describe what decisions are based on.

4.4.3.5 Participants' belief that they have access to all the necessary information needed to make decisions.

Most participants indicated that they did not have access to all the necessary information they needed to make decisions because the information 'lived' in various departments and it was not easy to access all the information simultaneously. The only contradiction to this was one respondent who believed that: *'the problem is not having access and having enough information, the issue is that you are almost overwhelmed with what you have'.* Manyika, et al.,(2011) argues that data would help stakeholders to take decisions promptly since the relevant data is easily accessible (Manyika et al., 2011).

4.4.3.6 Participants' belief as to whether and how the implementation and use of big data analysis could improve decision-making within the organisation.

All participants strongly believed that the implementation and use of big data analysis could improve decision-making, with one respondent, stating: *'if the information is used for the correct purposes then it's valuable'.* Another shared that:

'*As long as it is easy to access and must be shared with staff and must be available across different departments.'* One participant felt:

'*Delivering a greater understanding, more of the detail on how you got there, will improve decision-making.'* Another respondent believed that:

'*A Big data project would be able to unearth a lot of information that is buried inside the existing databases allowing for a granular level of patterns to be identified and provide insights to be able to pre-empt'. Still* another believed that:

'*They will be able to move away from PowerPoint presentations that are being manually collated currently with information and data.*'

4.4.4 Big Data Implementation.

Big data implementation may come at a cost, and an organisation will need to understand the importance and believe that the investment committed will deliver a return on investment in various ways.

4.4.4.1 Participants' opinion on whether there is a need to implement the use of big data analysis within the organisation.

All participants believed that there was a need and that the organisation would derive benefit from the implementation and that there was not a single area within the organisation that would not benefit from better understanding of data that was being generated. '*Without data you cannot do much and could help the company*' was one comment. Another participant felt that:

'*It may help us understand why certain newspapers have certain revenue collection patterns.*'

4.4.4.2 Respondents were asked if they could identify the sources of information within the organisation.

There were various sources, and to a large extent these were also fragmented but still available to the organisation. One respondent shared that: '*Due to budget constraints there is limited third party sources available which is subscribed to by the organisation namely AMPS, TGI, and specific outsourced data like Generation X research done by Nielson.*' Another participant stated that they use:

'*Digital analytical tools such as Google analytics.*' Internally, there were various data sources identified by respondents: sales data for revenue and customers, marketing and events data, circulation, distribution data, financial data of all customers, and, within the group, as mentioned by an individual:

'There are archives dating back to 1845 in terms of content.' There were various types of structured and unstructured data available within the organisation.

4.4.4.3 Participants' opinion as to whether they feel that it is important to stay up-to-date with new developments or changes in technology and the environment.

All participants believed it was a necessary evil, with one participant sharing that: *'It is stressful as there is just so much happening in the technology space that makes it very difficult to be fully up to date with technology.'* Another respondent felt that:

'We need technology to help us win this information war that we in at the moment.'

4.4.4.4 Participants' response as to whether and why they would like to see a big data project implemented within the organisation.

All participants would like to see a big data project implemented and for various reasons. Therefore, to be a little more concise, the researcher chose to highlight the following answers:

- *'Additional sources of income and to establish better customer relationships with advertisers'*
- *'Consolidate all the data across the organisation where everybody could access it'*
- *'Manage customer needs better'*
- *'Predict trends better'*
- *'Better view of revenue generation'*
- *'Clear view of impacts and results of decisions'*
- *'Find efficiencies'*
- *'Find, extract and present meaningful information'*
- *'To make better-informed decisions'*

4.4.4.5 Participants' opinion as to whether they would need to analyse and act on data in real time.

All participants believed that it would be very advantageous to be able to analyse data in real time. The technology was improving, and the speed of the information being generated was increasing and, therefore, a real-time analysis would be a valuable asset, with one respondent stating: '*One could be able to predict the sale of newspapers as they are happening in stores.*' Another shared that:

They could reallocate stories to better platforms in order to get better traction, which improves readership and ultimately eyeballs which equals revenue.' Another respondent believed that:

'*Real time will allow sales to react faster and adapt initiatives to speak to a current on demand need instead of being reactive to market demands.*'

4.4.4.6 Participants' quantification of the amount of data available to support decision-making.

Participants were split between 'enough' and 'not enough' data available to support decision-making. They all believed that they had enough data to make decisions which were specific to their departmental functions and roles or specific questions being asked. One respondent stated: '*There is lot of data that we already have, but then not enough intelligence that we get out of that data, so I think there can always be more.*' Another participant shared:

'*We don't have access to all the information from the various departments.*' One individual believed:

'*The problem is that the volume of data is so high it's almost impossible for a person to make a half decent stab at using it.*' It appears the data did exist; however, the data was isolated and was not readily available.

4.4.5 Big Data and Skill Sets.

Big data is new technology that needs a new set of skills to be able to implement and extract the opportunities needed by organisations.

4.4.5.1 Participants' belief as to whether their organisation is equipped with the necessary skill sets to implement and derive value, from analysing and interpreting the data.

Out of the eight participants, four categorically believed that the organisation did not have the skill sets to implement and derive value, concerning analysis and interpretation of the data. One participant believed the skills sets did exist: 'However, *there must be direction given from the top in terms of a key strategic areas and focus areas where we can really embark and use the vast amount of data'.* The three remaining participants believed the skills sets did exist but were limited, and for a big data project, the organisation would need more skilled individuals on board. One respondent stated that:

'It was not good enough to have someone just in IT; you need individuals from across the business with the skill sets to ensure you extract the value that is meaningful.' Having the relevant skills within the organisation was key to unlocking the potential of big data and to implementing a big data strategy.

4.4.6 Big Data and Perceptions.

Understanding of individual's perception of how big data allows for deeper insights and analysis to ensure that the researcher is able gain the insights needed.

4.4.6.1 Participants' view as to whether their organisation already 'uses' big data.

All participants, with various reasons, did consider the organisation to already be using big data; one participant highlighting that: '*It is still very fragmented and is being used in isolation and per department or business unit.*' Another respondent stated that:

'*The data used in most cases was historical or third-party data*.' One individual shared that:

'*The level of sophistication is not very high level with regards to use of big data.*' One participant responded:

'*You have the data; you just don't have the means to analyse it.*' The data clearly exists within the organisation; it is now about trying to harness the power of that data.

4.4.6.2 Participants' knowledge as to what type of data (if any) their organisation currently 'leverages'.

The commonly highlighted ones across the eight individuals were as follows - Readership and circulation data, one participant commenting that: '*This is what the industry demands, and strategists use for making decisions on campaigns and target markets.*' Digital data, website and Facebook traffic where the numbers and target audiences were. Here another respondent stated that:

'*It is used to as target audiences for marketers and marketing campaigns.*' One respondent highlighted:

'*Sales trends, within advertising and circulation to find areas for improvement or identify any concerns*'.

4.4.6.3 Participants' belief as to whether their organisation 'derives value' from existing data.

All participants believed that the organisation derived value from existing data in various ways. The surveys and external resources were used to put together sales proposals for specific clients. Internally, existing data as stated by one respondent: '*was used to analyse the major cost drivers across the group to be able to better negotiate with contractors.*' Another participant stated that:

'*Circulation and Editorial used existing data to try and determine why specific papers had sold more than others.*' One respondent mentioned that:

'*There is not enough data available across departments, and that data is being used in a very silo way which therefore provides a very narrow view of my environment.*'

4.4.6.4 Participants' discussion as to what extent they feel their organisation can 'measure' the value that existing data currently contributes.

All participants believed it could be measured but whether it would be an accurate measurement would be debatable. There were specific areas where it could most definitely be seen, with one respondent saying: '*in Circulation and the second in Advertising Sales and it is basically the sales versus the day, versus the time of the month*' Another participant stated that:

'*in Circulation, the print order must be put together in order to get the best sale and smallest return'.* One individual highlighted:

In terms of Advertising Sales, the value is in measuring improvement on day-to-day revenue, month-to-month, quarter-to-quarter.'

4.6.6.5 Participants' belief as to whether big data is viewed strategically at senior levels of their organisation.

Six out of the eight participants strongly agreed that big data management was not viewed strategically at senior levels of the organisation, one participant saying that: '*I know that we know it is there and can be used but why is there not plan to utilise it'.* The two of the eight who disagreed with the statement believed that it was viewed strategically, with one respondent saying:

'H*owever, the problem is the implementation and the analysis thereof that has to be done.*'

4.6.6.6 Participants' belief as to whether management within their organisation understood big data and its potential.

Five out of the eight believed that it was understood by management. One participant stated: '*However, they may not understand the granular detail of it'.* Another respondent answered:

'*I believe they do understand but sometimes they not in agreement with what the data says so hence they go ahead and make their own decisions and ignore the data.'* The remaining three individuals believed that it was not understood with one individual saying:

'*Because management were not 100% clear on its value and because there is no specific plan towards getting to that point of utilising it.'*

4.6.6.7 Participants discussion on whether they believed organisational silos could prohibit the effective implementation and use of big data within their organisation.

There was an overwhelming response that silos were detrimental, not just to big data implementation, but also because of the very nature within the business environment. One respondent maintained: '*Data is available in every department, but nobody knows about it and if people knew about it they could use it efficiently'.* Another participant stated that:

'*The departmental silos also brought about issues with systems, systems being completely fragmented, so we have different systems for different things*.' Another concern raised by a respondent was that:

'*People not talking to each other and willing to integrate and communicate effectively with each other'.* One individual felt:

The silo approach caused people to analyse data they have available, as people don't want to share the data they have in their environment, maybe because there are

positives and negatives in their data in terms of performance.' Another respondent's comment, was that:

'The idea that big data can be used in business more effectively to get better results probably isn't that mainstream yet.' Departments and people needed to understand that decisions made in silos did have a direct impact on other departments and perhaps then they would try and work together. Integration and collaboration would be needed to ensure a successful implementation of a big data project and for the organisation to be able to extract value.

4.6.6.8 Participants' identification of three impediments to using big data for effective decision-making and extracting value within their organisation.

Participants were given a list of possibilities to discuss. These were:

- Too many silos – data is not pooled for the benefit of the entire business.
- Shortage of skilled people to analyse the data properly
- The high cost of implementing, storing and manipulating large data
- Big data is too complex to collect and store.
- Management don't see the value in big data.
- The culture is not conducive.
- Time taken to analyse large data
- Something not on this list

The most significant impediments identified by the eight participants were as follows:
- Too many silos – data is not pooled for the benefit of the entire business.
- Shortage of skilled people to analyse the data properly.
- The high cost of implementing, storing and manipulating large data.

The following impediments were identified as what could be labelled 'outliers':

- Management don't see the value in big data.

- The culture is not conducive.

- Time taken to analyse large data

- Focus on a crisis and not a very outward focus at that.

4.4.7 Privacy.

Data privacy and security form significant challenges that need to be tackled to have successful implementation, especially regarding the impact on individuals, organisations and society in general.

4.4.7.1 Participants were asked to discuss their views on data governance and privacy policies as solutions.

Seven out of the eight participants believed that governance and privacy policy around the protection of personal information could be a solution, with one respondent stating that: '*organisations must obtain permission first.*' Another participant responded that:

'*When people opt in to a certain environment they need to be aware that this information may be used by the service provider to market to you.*' One respondent mentioned:

'*It is also what you use that information for, if it is being used for trend analysis, interest, dislikes then its fine*.' One individual stated:

'*People need to take responsibility for what they opt into*' and therefore he did not necessarily agree with a governance and private policy.

4.4.7.2 Participants were then asked if they believed privacy will hamper business opportunities in the future.

The majority view was that it depended on the reason for using that information. One respondent said, '*If it was going to add value to the end user, and that person opted in willingly and with clear understanding, then it would not hamper business*.' Another participant mentioned:

'*However, the Facebook and Cambridge Analytic scandal had made people more aware and more sceptical of just sharing personal information*.' One participant referenced an actual, experience in that:

'*When sending out and communicating with subscribers and explaining why their details are needed, they are sceptical and refuse to share personal information.*' Another comment was:

'*I actually don't need to know who the end user is to make a lot of key business decisions'.* One outlier mentioned that:

'*If something is governed to an extent where I can't effectively market to the individual or group, then it will damage or could negatively influence business opportunities.*'

4.5 Conclusion

This chapter presented the biographic analysis of the respondents who had been interviewed along with an extensive analysis on the understanding, perception, implementation, decision-making, skill sets, privacy and use of big data and big data analysis respectively. After hours of reading, listening and analysing the interviews, it is evident that big data awareness is increasing. Individuals are becoming more and more aware of this phenomenon called big data. It is also clear that organisations need to get to grips with understanding big data to be able to extract the potential value. Organisations are sitting on minefields of data, and now have opportunities to unlock its value. Chapter five will address the findings, conclusions and provide recommendations for the future as well as management consideration.

CHAPTER FIVE – CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

It is clear from the literature that big data and big data analytics will be one of the most significant sources of competitive advantage in the near future (McKinsey Global Institute, 2011). Not all organisations are equally adept, and only a handful of organisations have been able to demonstrate examples of how they have extracted value from their big data efforts. Therefore, a big data implementation framework or strategy will be a starting point to ensure a successful return on investment if implemented.

Based on the results of this study, there is no consensus about the definition, understanding, perception and use of big data within the organisation. There is consensus, however, with regards to the potential value of implementing and using big data and big data analytics. Most respondents had been very interested and engaged, and open to a conversation of big data. They all exuded high levels of excitement with regards to the idea of big data and big data analytics in their organisation. Their reactions denote a certain level of urgency and excitement to start a better understanding of big data and to explore the various opportunities that it may present.

For this study, various research questions were identified, and a discussion of findings and recommendations will follow. The primary objective of this study was to explore the opportunities to use big data at *The Herald*. This final chapter commences with addressing the stated research questions of the study as they relate to the findings that surfaced during the completion of this research work. The broader significance behind the results is then discussed as recommendations, with special emphasis placed on their managerial implications. Preceding the recommendations, the author will expound upon the limitations of the study and suggestions for future research.

5.2 The Research Methodology Utilised to Undertake This Study

Qualitative research was conducted. This type of research allows for descriptions providing depth and detail. This method is meant to describe and not predict. This method was chosen because the researcher was attempting to understand, explain and demystify social reality through the eyes of different participants. The focus was to obtain an understanding of the topic from an individual's perspective and provide rich, detailed information which can only be obtained from a small number of participants. Leedy & Ormrod (2015) argue that the interpretivist approach is based on the interpretation of qualitative data, supported by the belief that social reality is not objective but subjective because it is shaped by people's perceptions (Leedy & Ormrod, 2015).

The research conducted was done among eight individuals who are in the employ of the organisation under review. Telephonic and face-to-face interviews were conducted and recorded for research purposes. These individuals had been based in Gauteng and the Eastern Cape, hence telephonic interviews were used as a preferred method with some respondents. The focus was on exploring, describing and analysing the meaning of an individual's experiences. The study sought to find answers to the questions of how big data is perceived, how the population feels about it, how to make sense of it, how people talk about it to others and how a particular statement or topic is understood and experienced.

5.3 Findings of the Study

To establish if this study was successful is dependent on how successful it was in addressing the research questions. The findings of the research are summarised below along with recommendations.

5.3.1 Understanding of Big Data.

As the definition of big data is in most cases subjective, from the interviews it was clear that no universal definition or understanding existed amongst participants. This is in line with the findings within literature, as there is currently no single definition of Big Data.

Some define big data by its characteristics (Gantz & Reinsel, 2011). *Information Week* defines big data as new analytic applications needed, (Bertolucci, 2013) and De Mauro et al., (2016) believe that big data is an information asset which the researcher believes delivers greater understanding of big data. Most of the respondents, however, had a fair understanding when describing what their interpretation of big data was.

Providing a more in-depth and very granular insight on what big data is, will most definitely achieve a clear understanding. A clearer understanding will also demystify any ideologies or myths around big data, for example, that big data is new, that big data is just hype, and that a big data strategy is an IT responsibility. This understanding will provide executives with a foundation to be able to start conversations with their management teams around a big data strategy and to ensure that they have management buy-in.

5.3.1 How Big Data Can Create Value.

Value is in the eye of the beholder. Most respondents believed that overall organisational performance could be impacted upon positively, which is in line with Bennet and Bennet (2008 P.1) who mentioned 'the knowledge within organisations determine organisational performance'. Below are responses from the individuals in terms of Profitability (unlock new opportunities), Revenue Generation (being able to adapt to demands), Cost Efficiencies (eliminating wastage and allow the organisation to be extremely accurate with regards to achieving efficiencies), and Customer Relationships (will allow for a deeper understanding and more robust and meaningful engagement with customers, perhaps even achieving personalisation). Big data may be able to answer questions that are not being asked by organisations or managers, and therein lies its value. This supports Myburgh's opinion that there is definite link that exists between the effective use of information and knowledge management within an organisation and organisational performance (Myburgh, 2015).

Management in organisations needs to treat, understand and categorise big data as an 'information asset'. In 2011 AT&T derived value from big data on its balance sheet

to the amount of 2.7 billion dollars (AT&T, 2012). The data was shown as an intangible asset. This was achieved because they had been able to extract that data and engage with it to ensure it delivers value.

5.3.3 How Organisations Can Use Big Data in Decision-Making

There was an overwhelming agreement among respondents that decisions are mostly still being made traditionally, using historical data, coupled with past experiences, common sense, intuition and with what the individuals believe of a specific situation. This way of making decisions is very shallow and does not deliver greater insights. Therefore, problems and solutions to problems are in many ways responses in retrospect of a situation. According to the respondents, they do not have access to all the necessary information they would need to make more informed decisions. These findings differ from those of Myburgh (2015) who states that to enable the value realisation of big data; organisations must, therefore, use big data during decision-making. This is in line with findings by IBM (2013b), however, which indicated that one in three business leaders make critical decisions without the information they need (IBM, 2013b).

The business landscape is changing rapidly and has been disrupted to a large extent. Therefore, decision-making can no longer be a reactive process but must instead be a proactive process which is in line with Smeda who states that proactive management is a unique attribute of organisations that have access to and use big data (2015). Staying ahead in the game is paramount for any business to survive in this competitive world. The future poses challenges that need tackling in the present. Every decision made today has a significant impact on the future. Therefore, the rate at which a company responds to challenges in the present and the future is what determines their rate of success. Everyone wants to stand out from the crowd. O'Driscoll argues that the usage of big data will empower business leaders to make more informed decisions (O'Driscoll, 2014). The question is how? How will one be perceived as unique? The answer lies in the practices adopted. This supports what Smeda contends, i.e., that everyone wants to stand out from the crowd and with the variety of sources available to organisations, complemented with the appropriate analysis, data can be a powerful tool for analysing customer behaviour

and trends to make accurate decisions about innovations in products or services offered and thereby providing an edge over competitors (2015).

The organisation will need to make a dramatic shift in culture, creating a conducive environment and move towards an information-centric culture, which is in keeping with Brown et.al., (2011) who state that big data has the potential to change how decisions are made and taken within organisations. This opinion is also in line with Davenport who states that there are also organisational, cultural and strategic changes needed to leverage big data investments (2014). The time cycle for decision-making is decreasing rapidly. Therefore, accelerating decision-making time is crucial for the success of any organisation. The ability to make good and intelligent decisions at every step will allow an organisation to outperform competitors which is supported by Myburgh who maintains that organisations should consider the use of the right data to effect the optimal decisions to increase value (2015).

These decisions should not only be good ones but must be made smartly and as quickly as possible to allow the organisation to remain proactive in its approach instead of being reactive. Accelerating time to answer is crucial for customer satisfaction which is supported by Pugh who states that in the new world of technology, delivering instant gratification in real time will be significant, and using big data resources to understand customers, their needs and wants can derive greater competitive advantage (2017). This is in line with and supported by Yusuf, who states that understanding customer behaviour can provide organisations with insights to design innovative products and services to meet customer needs and make organisations more agile in responding to macroeconomic trends (2015). The key is to understand precisely where the data currently exists and how to ensure that the entire business has easy access to relevant information to make informed decisions; to ultimately create a convenient data ecosystem that allows for the generation of new insights all the while executing present plans.

5.3.4 The Perception of Big Data and the Implementation Thereof at *The Herald*

Based on the results from the research conducted, there is clear consensus that a big data implementation project will deliver value and be able to derive greater value for the organisation across departments which is in line with Johnson et al., (2012) who state that departments within and across organisations benefit from big data systems. There are various sources which are supported by Johnson et al., who state that data no longer comes from a single source that currently exists internally and externally but is fragmented (2012).

There is a concern around the skill sets required, as many respondents believed that there were not enough individuals with the necessary skills to be able to extract and interpret the data. This would support Brown et al., whose research indicated that the demand for employees with necessary skills was far greater than the availability (2011). There would need to be an element of real-time analysis which would be designed for specific departments within the organisation, but that functionality would be a crucial differentiator. This is in line with Smeda who indicates that through the use of big data, organisations will gain access to useful information in real time, and that access to real-time information provides a competitive advantage to an organisation in terms of innovativeness (2015).

Greater support and guidance from senior levels would be advantageous for a big data project which supports Halaweh & El Massry who suggest that top management support is essential to any projects success (2015). The costs associated with such an implementation are high but would be offset against the value that would be achieved. A successful big data project needs to be aligned to business imperatives, as indicated by Smeda, who states that organisations that link business imperatives to the potential value that a big data project can deliver would also benefit themselves when considering the use of this technology (2015).

The media industry is facing challenges, and big data can provide the competitive advantage needed. Therefore, executive and management support of a project of this nature is crucial to the success. Businesses have been collecting data for decades, and the amount of information available is gigantic. Hence, there needs to be clear business objectives, and upskilling or outsourcing of the right skill sets to extract value from a big data project which is in line with Dodson who states that data can provide meaningful benefit and insight but requires the necessary expertise (2014). Although there has been a huge surge in demand for big data skills in the job market, there has not been a corresponding surge in training to meet that demand. The skills gap is narrowing, however, as educational institutions have begun to catch up to the market need. At the beginning one needed a PhD. Today, as mass market big data visualisation platforms have emerged, the markets have lowered the average educational attainment level of big data professionals. This also allows organisations to be able to upskill existing staff to ensure they bridge the skills gap that may exist.

Being able to collate all existing data into a central location, and provide ease of access, will deliver greater value. When an organisation's data is in one place and organised in a way that suits organisational goals, one is in a better place than when ones data is in different locations. Customers are more informed now than ever before; their options and alternatives increase every day and hence the need to be able to be more responsive, and real-time assessment of data provides that much-needed advantage. Creating a big data roadmap is key to a successful big data strategy, and it all starts with laying the foundation and starting the conversation of big data. A change in organisational culture is critical, moving from a culture where gut feeling decisions are acceptable to a culture and organisation that genuinely incorporates big data at the heart of one's business is challenging.

5.4 Proposed Framework

Figure 2.1 in the literature review, provided an excellent guideline for the implementation of big data project. However, organisations will also need to consider including the following when considering implementation:

1. Generate organisation-wide understanding of big data – creating an understanding allows for greater buy-in from all stakeholders.

2. Integration and Collaboration – allows for the sharing of knowledge across the organisation.

3. Creating a data ecosystem – Data availability is centralised and creates ease of use for all relevant stakeholders.

4. Align business imperatives – Alignment of big data project with business imperatives can ensure that a big data project adds value and does not end up being a white elephant.

5.5 Limitations of The Research

The researcher of this study was, at the time of the study, employed at the organisation being researched, and therefore his interpretation of the results could potentially have been influenced by his current organisational and situational context and interpretation of the respondents' comments. Therefore, researcher bias could have occurred during both the data collection process during the interviews as well as the analysis of results. The geographical distribution of the sample was also slightly skewed towards Gauteng, with five out of the eight respondents residing in Gauteng.

5.6 Suggestions for Future Research

As the topic of big data is an evolving one, and at the rate that technology is changing and improving, there will most likely be changes in how big data can be implemented as organisations start adopting big data as an integral part of their business strategies moving forward.

5.7 Conclusion

The future of big data is still unsure, as the big data phenomenon is still unfolding. It will however change and transform organisations and society. Big data is here to stay, and organisations will need to adapt to survive in this competitive landscape. Organisations can no longer postpone their big data strategies, as organisations that have already adopted and implemented a big data strategy are seeing improvements and are achieving a competitive advantage.

The investment in big data is huge; however, the opportunities are endless. Moreover, creating the right culture that aligns with the business imperatives can yield returns from a big data project.

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APPENDIX A: ETHICAL CLEARANCE FORM

NELS⬤N M🔺NDELA

UNIVERSITY

FORM E

<u>ETHICS CLEARANCE FOR TREATISES/DISSERTATIONS/THESES</u>

Please type or complete in black ink

FACULTY: Business and Economic Sciences

SCHOOL/DEPARTMENT: Nelson Mandela University Business School.

I, (surname and initials of supervisor) A . Weimann

the supervisor for (surname and initials of candidate) N. Joshua

_____ (student number) 217 05 7225

a candidate for the degree of MBA

with a treatise/dissertation/thesis entitled (full title of treatise/dissertation/thesis):
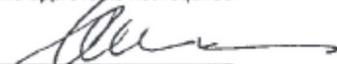
Establishing opportunities for using Big Data analysis at THE HERALD.

considered the following ethics criteria *(please tick the appropriate block)*:

	YES	NO
1. Is there any risk of harm, embarrassment of offence, however slight or temporary, to the participant, third parties or to the communities at large?		X
2. Is the study based on a research population defined as 'vulnerable' in terms of age, physical characteristics and/or disease status?		X
2.1 Are subjects/participants/respondents of your study: (a) Children under the age of 18?		X
(b) NMMU staff?		X
(c) NMMU students?		X
(d) The elderly/persons over the age of 60?		X

(e) A sample from an institution (e.g. hospital/school)?		
(f) Handicapped (e.g. mentally or physically)?		X
3. Does the data that will be collected require consent of an institutional authority for this study? (An institutional authority refers to an organisation that is established by government to protect vulnerable people)		X
3.1 Are you intending to access participant data from an existing, stored repository (e.g. school, institutional or university records)?		X
4. Will the participant's privacy, anonymity or confidentiality be compromised?		X
4.1 Are you administering a questionnaire/survey that:		
(a) Collects sensitive/identifiable data from participants?		X
(b) Does not guarantee the anonymity of the participant?		X
(c) Does not guarantee the confidentiality of the participant and the data?		X
(d) Will offer an incentive to respondents to participate, i.e. a lucky draw or any other prize?		X
(e) Will create doubt whether sample control measures are in place?		X
(f) Will be distributed electronically via email (and requesting an email response? Note: • If your questionnaire DOES NOT request respondents' identification, is distributed electronically and you request respondents to return it *manually* (print out and deliver/mail); AND respondent anonymity can be guaranteed, your answer will be NO. • If your questionnaire DOES NOT request respondents' identification, is *distributed via an email link and works through a web response system (e.g. the university survey system); AND respondent anonymity can be guaranteed, your answer will be NO.*		X

Please note that if ANY of the questions above have been answered in the affirmative (YES) the student will need to complete the full ethics clearance form (REC-H application) and submit it with the relevant documentation to the Faculty RECH (Ethics) representative.
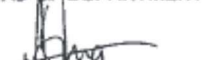
and hereby certify that the student has given his/her research ethical consideration and full ethics approval is not required.

_____ 24/7/2018
SUPERVISOR(S)   /DATE

_____ 24 /07/ 2018
HEAD OF DEPARTMENT   DATE

_____ 04-05-18
STUDENT(S)   DATE

Student(s) contact details (e.g. telephone number and email address):

082 458 7228 / joshuan@tsoblackstar.co.za.

Please ensure that the research methodology section from the proposal is attached to this form.

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APPENDIX B: INFORMATION AND CONSENT LETTER

Good afternoon

Trust you are well.

My treatise requirement for my MBA at the department of business economics at Nelson Mandela University Business School is to administer interviews with senior staff members (editors and senior management) who form part of the target participants for my research study entitled "Establishing opportunities for using big data analysis at The Herald".

The purpose of the study is to explore and identify any opportunities to use big data within the organisation.

The interview will be conducted telephonically with a digital voice recorder and will take between 20 minutes to 30 minutes to complete.

All information provided will remain confidential and participation is voluntary. No identifying details will be recorded, and no individual will be advantaged or disadvantaged as responses will be examined in general.

As part of the study, all participants will have the right to withdraw from the study at any given time without any negative repercussions. As a participant you are also entitled not to answer any questions that you may feel uncomfortable answering.

Please find attached the questionnaire and confirm what the best time will be to conduct the interview.

For more information on the study, please contact the researcher or supervisor.

Thank you for considering this request and for supporting my research.

Researcher: Nadeem Joshua   Supervisor: Alan Weimann

Email: joshuan@tisoblackstar.co.za   Email: aweimann@iafrica.com

Regards

Nadeem

APPENDIX C: INTERVIEW QUESTIONNAIRE

Interview Protocol

Introduction:

Big data seems to be the new hype floating in the media industry and among academics. However, because it's a fairly new concept, its value to organisations is largely debated, and is sometimes misunderstood.

Demographics:

Gender:

☐ Male
☐ Female

Age:

☐ 16-24
☐ 25-34
☐ 35-49
☐ 50+

Race:

☐ African
☐ Coloured
☐ Indian
☐ White
☐ Other

How many years have you been working for the Tiso Blackstar Group?

☐ 0-1
☐ 1-3

☐ 3-5

☐ 5-10

☐ 10 or more

What is your highest qualification?

☐ Matric

☐ Certificate

☐ Diploma

☐ Undergraduate Degree

☐ Honours

☐ Masters

☐ PhD

What is your present role in the company?

☐ News Editor

☐ Senior Management

Questions:

Understanding big data:

- What is your understanding of big data?
- Do you know if the organisation has a plan to implement the use of big data?

Big data in relation to Organisational performance:

- Do you believe big data analysis can improve the organisations performance in terms of -
    a. Profitability
    b. Revenue generation
    c. Cost efficiencies
    d. Customer relationships

Big data and Decision making:

- Can you describe how decision making is typically done within the organisation?

- How are problems currently being identified within the organisation?
- How are problems being solved currently within the organisation?
- What would you say these decisions are based on?
- When making decisions would you say that you have access to all the necessary information you need?
- Do you believe that the implementation and use of big data analysis can improve decision making within the organisation? And How so?

Big data implementation:

- Do you think there is a need to implement the use of big data analysis within the organisation?
- What would say are the sources of information within the organisation?
- Do you feel that's it's important to stay up to date with new developments or changes in technology and your environment?
- Would you like to see a big data project implemented within the organisation? Why?
- Do you think you would need to analyse and act on data in real time?
- Looking specifically at your department, how would you characterise the amount of data available to support decision making?
    - Too much – Enough – Not Enough – Don't know

Big data and skill sets:

- Assuming that a big data project was implemented in the organisation. Do you believe the organisation is equipped with the necessary skill sets to implement and derive value, in relation to analysing and interpreting the data?

Big data and perception:

- Do you consider that the organisation already uses big data?
- What types of data does the organisation currently leverage if any?

- Do you believe that the organisation derives value from existing data? Please explain.
- To what extent do you feel your organisation can measure the value that existing data currently contributes?
- To what extent do you agree with the following statement – Big data management is not viewed strategically at senior levels of the organisation?
    - Agree – Strongly agree – Not sure – Disagree – Strongly disagree
- To what extent do you feel that data (and its potential contributions) are well understood by management?
- In terms of your experience, in what ways do you think organisational silos could prohibit the effective implementation and use of big data?
- What do you think would be the organisations three biggest impediments to using big data for effective decision-making and extracting value?

  - Too many silos – data is no pooled for the benefit of the entire business
  - Shortage of skilled people to analyse the data properly
  - The high cost of implementing, storing and manipulating large data
  - Big data is too complex to collect and store
  - Management don't see the value in big data
  - The culture is not conducive
  - Time taken to analyse large data
  - Something not on this list

Privacy

Considering the recent debacle around Facebook and the use of personal information to specifically target communication. Is a governance and privacy policy around the protection of personal information a solution?

Do you think this has perhaps hampered the potential for business opportunities going forward?

Nadeem Joshua Treatise submission fin 1

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